

2019 年长安大学 CSCD 论文产出概况

长安大学图书馆学科服务工作组

2019 年 6 月

第一章 数据来源与简介

1.1 数据库来源

本报告的数据来源于 CSCD（中国科学引文数据库SM），论文检索时间范围：2019 年 1 月-2019 年 12 月；报告检索及筛选条件：第一作者单位署名为长安大学的论文；报告中论文的检索及被引频次采集日期：2019 年 6 月 16 日。

1.2 CSCD 数据库简介

中国科学引文数据库（Chinese Science Citation Database，简称 CSCD）。作为国内首个引文数据库，CSCD 覆盖近 1,200 种来自中国的顶尖学术出版物，并将其嵌入到 Web of Knowledge 平台中，目前已包含从 1989 年至今的论文记录将近 370 万条，引文记录超过 1,700 万条，每年新增 25 万条数据。覆盖学科内容涉及数学、物理、化学、天文学、地学、生物学、农林科学、医药卫生、工程技术、环境科学和管理科学等诸多领域出版的中英文科技核心期刊和优秀期刊。2017-2018 版本，中国科学引文数据库遴选了核心期刊 1229 种，其中中国出版的英文期刊 201 种，中文期刊 1028 种。中国科学引文数据库来源期刊分为核心库和扩展库两部分，其中核心库 887 种（以备注栏中 C 为标记）；扩展库 342 种（以备注栏中 E 为标记）。

大多数论文信息（标题、作者、来源出版物）均提供简体中文和英文两种语言版本。约 40% 的条目包含英文摘要，超过 60% 的引文是英文。

第二章 2019 年长安大学 CSCD 论文产出概况

2.1 CSCD 论文统计及学院分布概况

2.1.1 CSCD 论文统计及学院分布概况

2019 年，长安大学师生的科研论文被 CSCD 数据库收录 909 篇，以长安大学为第一作者单位发表的 CSCD 论文有 674 篇，分别分布在 14 个学院。各学院发表的论文情况详见表 1。

表 1 2019 年长安大学各学院 CSCD 论文发文情况

序号	单位名称	2019 年 CSCD 论文数量
1	公路学院	158
2	材料科学与工程学院	43
3	地质工程与测绘学院	92
4	建筑工程学院	60
5	环境科学与工程学院	82
6	信息工程学院	37
7	电子与控制工程学院	24
8	汽车学院	38
9	工程机械学院	24
10	地球科学与资源学院	79
11	经济与管理学院	9
12	理学院	12
13	建筑学院	7
14	公共管理与法学院	2
15	其他	7
合计		674

注：上表中的数据统计均为第一作者为“长安大学”的 CSCD 论文

从表 1 各学院的发文情况来看，2019 年我校 CSCD 论文发文量分布在各个学院，它们分别是公路学院、材料科学与工程学院、地质工程与测绘学院、建筑工

程学院、环境科学与工程学院、信息工程学院、电子与控制工程学院、汽车学院、工程机械学院、地球科学与资源学院、经济与管理学院、理学院、建筑学院、公共管理与法学院等 14 各学院，其中公路学院 2019 年发表的论文被 CSCD 数据库收录排全校第一，共 158 篇。

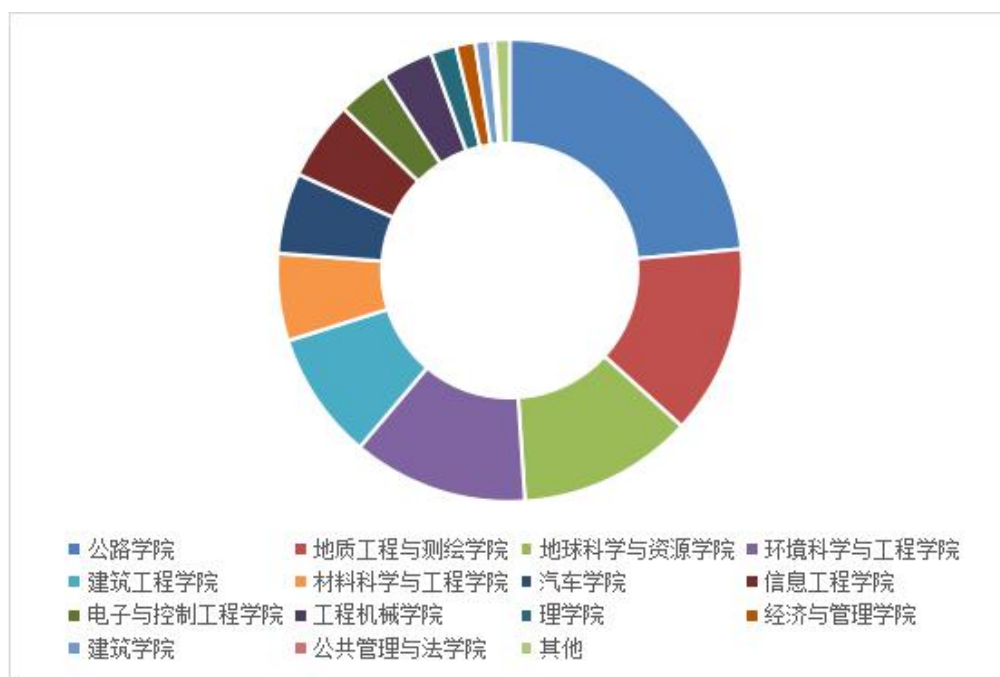


图 1 2019 年长安大学各单位 CSCD 论文发表情况图

2.1.2 2019 年 CSCD 论文的发文作者及所属单位分布

2019 年我校发表的 674 篇 CSCD 论文中，发文量在 3 篇以上的作者有 23 人，其中公路学院 9 人、汽车学院 3 人、环境科学与工程学院 1 人、建筑工程学院 3 人、工程机械学院 1 人、地球科学与资源学院 2 人、地质工程与测绘学院 2 人、经济与管理学院 1 人、信息工程学院 1 人，详见表 2。

表 2 2019 年长安大学发表 CSCD 论文数量 3 篇以上的作者及所属单位分布

序号	作者	发文数量	所属单位
1	冯忠居	10	公路学院
2	白桦	3	公路学院
3	郭聚坤	3	公路学院
4	郭寅川	5	公路学院
5	韩跃杰	3	公路学院

6	蒋进科	3	汽车学院
7	李军军	3	地球科学与资源学院
8	李耀华	3	汽车学院
9	马莲净	4	环境科学与工程学院
10	任帅	4	信息工程学院
11	苏佶智	3	建筑工程学院
12	万一品	3	工程机械学院
13	王晓峰	3	地球科学与资源学院
14	王星	3	公路学院
15	王奕淇	3	经济与管理学院
16	韦建成	3	地质工程与测绘学院
17	邬晓光	3	公路学院
18	徐婷	3	汽车学院
19	杨丽萍	4	地质工程与测绘学院
20	杨利伟	3	建筑工程学院
21	叶飞	3	公路学院
22	张常光	3	建筑工程学院
23	张莎莎	3	公路学院

对各学院 CSCD 论文第一作者发文统计如下：

表 3 公路学院

序号	中文名	发文数量	序号	中文名	发文数量
1	冯忠居	10	59	梁志磊	1
2	白桦	3	60	刘彬	1
3	郭聚坤	3	61	刘占良	1
4	郭寅川	5	62	刘状壮	1

5	韩跃杰	3	63	罗刚	1
6	王星	3	64	吕政桦	1
7	邬晓光	3	65	马书红	1
8	叶飞	3	66	马印平	1
9	张莎莎	3	67	牛艳伟	1
10	戴学臻	2	68	裴建中	1
11	蒋应军	2	69	彭波	1
12	雷俊安	2	70	彭辉	1
13	李宁	2	71	彭余华	1
14	刘永健	2	72	齐群	1
15	马峰	2	73	邱军领	1
16	潘兵宏	2	74	渠广镇	1
17	宋亮	2	75	任伟	1
18	王春生	2	76	沙爱民	1
19	王露	2	77	邵海鹏	1
20	延西利	2	78	申爱琴	1
21	杨少伟	2	79	沈正峰	1
22	杨晓华	2	80	时元绪	1
23	张驰	2	81	史小丽	1
24	赵静	2	82	宋超杰	1
25	安平和	1	83	孙敏	1
26	毕洁夫	1	84	孙胜江	1
27	曹阳森	1	85	唐可	1
28	常琨	1	86	田淮	1
29	陈谦	1	87	万晨光	1
30	陈玉静	1	88	王朝辉	1

31	戴杰	1	89	王亚琼	1
32	段兰	1	90	王泳丹	1
33	方滢	1	91	翁效林	1
34	房娜仁	1	92	吴昊	1
35	冯国平	1	93	吴松	1
36	高超	1	94	武隽	1
37	高广中	1	95	夏全平	1
38	高江平	1	96	项煜	1
39	韩万水	1	97	肖凯龙	1
40	韩兴博	1	98	谢永利	1
41	贺敏	1	99	徐明非	1
42	贺拴海	1	100	许波	1
43	侯炜	1	101	许汉铮	1
44	黄晓凤	1	102	薛晓锋	1
45	惠冰	1	103	薛晓姣	1
46	纪小平	1	104	闫磊	1
47	姜磊	1	105	晏长根	1
48	雷平	1	106	杨治军	1
49	雷勇	1	107	叶宏宇	1
50	李光玲	1	108	游庆龙	1
51	李浩	1	109	于晓光	1
52	李慧	1	110	张久鹏	1
53	李瑞	1	111	张琦	1
54	李微	1	112	张庆	1
55	李岩	1	113	张怡文	1
56	李又云	1	114	赵伟封	1

57	李宇	1	115	赵煜	1
58	李院军	1	116	周救	1

表 4 材料科学与工程学院

序号	中文名	发文数量	序号	中文名	发文数量
1	安鑫	1	21	孙阳辉	1
2	陈典典	1	22	孙增智	1
3	陈宏	1	23	田耀刚	1
4	陈彤丹	1	24	王珊	1
5	陈永楠	1	25	王志臣	1
6	丁一耕	1	26	魏俊基	1
7	冯超	2	27	吴蕾	2
8	冯潇	1	28	夏慧芸	1
9	耿九光	1	29	熊锐	1
10	苟蕾	1	30	徐鸥明	2
11	何锐	1	31	颜录科	1
12	胡腾腾	1	32	张凤英	1
13	孔祥泽	1	33	张丽俊	1
14	李红伟	1	34	张梦瑶	1
15	李江	1	35	张世龙	1
16	李祖仲	1	36	张学敏	1
17	吕乃欣	1	37	张哲	1
18	马晓燕	1	38	赵明娟	1
19	邱莹	1	39	郑睢宁	1
20	宋莉芳	1	40	周振君	1

表 5 地质工程与测绘学院

序号	中文名	发文数量	序号	中文名	发文数量
1	白正伟	1	42	马艳鸽	1
2	包乾宗	1	43	孟杰	1
3	蔡晓军	1	44	聂永鹏	1
4	陈子玉	1	45	彭建兵	1
5	程冬	1	46	任超锋	1
6	程梦真	1	47	沈月强	1
7	程雪	1	48	苏生瑞	1
8	丛铭	1	49	万阳	1
9	崔新盛	1	50	王飞永	1
10	杜长城	2	51	王海春	1
11	樊亚楠	1	52	王进	1
12	冯卫	1	53	王君	1
13	高晓	1	54	王丽霞	1
14	高阳	1	55	王腾军	1
15	郭春喜	1	56	王毅鹏	2
16	郭剑	1	57	韦建成	3
17	郭天颂	1	58	魏峥嵘	1
18	韩军强	1	59	吴艾祺	1
19	韩鸣	1	60	徐强	1
20	郝建斌	1	61	严豪	1
21	贺鸣	1	62	杨丽萍	4
22	洪勃	1	63	杨龙伟	1
23	黄强兵	2	64	于文才	1
24	计国锋	1	65	翟栋梁	1

25	贾艳军	1	66	翟越	1
26	姜刚	1	67	张冰	1
27	康尘云	1	68	张亮	1
28	李斌	1	69	张盼盼	1
29	李林翠	1	70	张伟琪	1
30	李绵绵	1	71	张亚彬	1
31	李楠	1	72	张云	1
32	李鹏	1	73	张镇飞	1
33	李泉洲	1	74	赵超英	2
34	李同录	1	75	周静静	2
35	李喜安	1	76	周阳	1
36	李昕	1	77	朱凤基	1
37	李宇磊	1	78	朱文峰	1
38	梁鑫	1	79	鲁雁翔	1
39	刘锦阳	1	80	吕艳	1
40	刘晓杰	1	81	马骥	1
41	刘鑫	1			

表 6 建筑工程学院

序号	中文名	发文数量	序号	中文名	发文数量
1	卜永红	1	25	任翔	1
2	柴少波	1	26	苏佶智	3
3	常召群	1	27	隋学敏	1
4	戴岩	1	28	田威	1
5	段留省	1	29	王博	1
6	高颖	1	30	王步	2
7	苟海刚	1	31	王瑞	1

8	管宇	1	32	王天涯	1
9	胡志平	2	33	韦杰文	1
10	黄山	1	34	魏慧	2
11	井彦林	1	35	邢国华	1
12	兰官奇	2	36	熊二刚	1
13	李利亚	1	37	颜卫亨	1
14	李沛东	1	38	杨利伟	3
15	刘伯权	1	39	姚夏	1
16	刘宽	1	40	叶艳霞	1
17	刘喜	2	41	袁春燕	1
18	刘星	1	42	张常光	3
19	刘云霄	1	43	张勋	1
20	卢林枫	2	44	赵传靓	1
21	芦昭霖	1	45	赵均海	1
22	孟庆龙	1	46	郑宏	1
23	聂少锋	2	47	朱健	1
24	乔朋	1			

表 7 环境科学与工程学院

序号	中文名	发文数量	序号	中文名	发文数量
1	曹巍	1	38	马致远	1
2	陈丽	1	39	马稚桐	1
3	程东会	1	40	孟建昊	1
4	崔心水	1	41	孟燕	1
5	代伟	1	42	慕登睿	1
6	丁湛	1	43	聂启阳	1
7	董洁	1	44	乔晓英	1

8	窦妍	1	45	屈文岗	1
9	杜炜	2	46	宋浩	1
10	杜毅帆	1	47	孙亚乔	1
11	冯文文	1	48	孙永昌	1
12	冯鑫	1	49	孙钰琨	1
13	符婉琛	1	50	陶丹玉	1
14	高文龙	1	51	田薪成	1
15	郭梦	1	52	王锴	1
16	郭倩	1	53	王美琪	1
17	姜程	1	54	王帅	1
18	蒋翠婷	1	55	王通	1
19	兰兰	1	56	王雪平	1
20	李吉程	1	57	韦红	1
21	李健弟	1	58	校康	1
22	李俊亭	2	59	谢亚萍	1
23	李萌	2	60	徐斌	1
24	李倩	1	61	徐斌	1
25	李涛	1	62	杨彤	1
26	李文溢	1	63	张琛	1
27	李鑫	1	64	张奇莹	1
28	刘梦茹	1	65	张姝琪	1
29	刘珊	1	66	张晓周	2
30	刘双	1	67	张瑶瑶	1
31	刘媛媛	1	68	张宇浩	1
32	柳凤霞	1	69	郑小路	1
33	罗浩	1	70	朱俊彦	1

34	吕向菲	1	71	朱雅琪	1
35	马莲净	4	72	宗宇寒	1
36	马雄德	2	73	左优	1
37	马雪冬	1	74	魏徵文	1

表 8 信息工程学院

序号	中文名	发文数量	序号	中文名	发文数量
1	陈艳	1	15	任帅	4
2	段宗涛	1	16	宋欢欢	1
3	樊娜	1	17	宋青松	1
4	郭号洁	1	18	孙昭	1
5	纪艺	1	19	田彬	1
6	李婵	1	20	王静	2
7	李骁驰	2	21	王青龙	2
8	李雨冲	1	22	王润民	1
9	刘家宏	1	23	王伟	1
10	柳有权	2	24	吴骅跃	1
11	马峻岩	2	25	徐志刚	2
12	明洋	1	26	张伟	1
13	牛丹丹	1	27	赵祥模	2
14	屈八一	1			

表 9 电子与控制工程学院

序号	中文名	发文数量	序号	中文名	发文数量
1	代亮	2	12	宋永超	1
2	段晨东	1	13	王会峰	1
3	冯梦溪	1	14	温立民	1

4	高婷	1	15	文常保	2
5	胡欣	1	16	肖剑	1
6	黄鹤	2	17	许桂敏	1
7	李立	1	18	晏雨婵	1
8	梁华刚	1	19	余雷	1
9	刘义艳	1	20	张弢	1
10	孟芸	1	21	周熙炜	1
11	茹锋	1			

表 10 汽车学院

序号	中文名	发文数量	序号	中文名	发文数量
1	陈轶嵩	2	16	谭子胡	1
2	付锐	1	17	王童	1
3	郭金刚	1	18	王晓勇	1
4	吉鹏	1	19	熊演峰	1
5	蒋进科	3	20	徐婷	3
6	李彬	1	21	闫晟煜	1
7	李博	1	22	杨一鸣	1
8	李耀华	3	23	阴培	1
9	刘攀	1	24	袁伟	1
10	刘晓东	1	25	张凡	1
11	马冰山	1	26	张硕	1
12	马建	1	27	张新锋	1
13	沈小燕	1	28	赵博选	1
14	史培龙	2	29	赵俊玮	1
15	史雪莹	1	30	赵轩	1

表 11 工程机械学院

序号	中文名	发文数量	序号	中文名	发文数量
1	曹蕾蕾	1	12	万一品	3
2	曹学鹏	1	13	吴书强	1
3	陈光	1	14	徐元博	1
4	陈世斌	1	15	闫强	1
5	丁凯	2	16	杨波	1
6	董武	1	17	张春国	1
7	韩共乐	1	18	张静	1
8	黄鑫	1	19	张青哲	1
9	庞利叶	1	20	赵俊锋	1
10	邵雨虹	1	21	赵勇	1
11	索雪峰	1			

表 12 地球科学与资源学院

序号	中文名	发文数量	序号	中文名	发文数量
1	曹地	1	38	马腾	1
2	常海钦	1	39	马晓军	1
3	陈国超	1	40	牟多铎	1
4	陈有炘	1	41	穆可斌	2
5	邓楠	1	42	宁文涛	1
6	丁华	1	43	潘雪峰	1
7	丁坤	1	44	秦嘉琛	1
8	董一博	1	45	阮仕琦	1
9	凤永刚	1	46	邵雅静	1
10	高峰	1	47	苏联国	1
11	高翔宇	1	48	谭细娟	1

12	高云峰	1	49	田鸽	1
13	高作宇	1	50	王辉	1
14	葛媛媛	1	51	王龙江	1
15	弓晨	1	52	王盟	1
16	郭思琪	1	53	王盟	1
17	韩珂	2	54	王玮	1
18	韩磊	1	55	王晓峰	3
19	韩玲	1	56	王兴	1
20	胡国朝	1	57	王雅婷	1
21	赖晨曦	1	58	王岩	1
22	雷如雄	1	59	王艺茜	1
23	雷武超	1	60	王永炜	1
24	李换换	1	61	武甜甜	1
25	李健锋	1	62	闫馨云	1
26	李军军	3	63	尹礼唱	1
27	李佐臣	1	64	张贵山	1
28	栗朋	1	65	张湘雪	1
29	梁积伟	1	66	张毅茜	1
30	刘福田	1	67	张永明	1
31	刘磊	1	68	张泽	1
32	刘艳荣	1	69	赵帮胜	1
33	刘源	1	70	支倩	1
34	刘志兴	1	71	周煜杰	1
35	栾燕	1	72	朱谨谨	1
36	罗耀清	1	73	朱莹莹	1
37	马冯	1			

表 13 经济与管理学院

序号	中文名	发文数量	序号	中文名	发文数量
1	李武强	1	4	王雅坤	1
2	彭志敏	1	5	王奕淇	3
3	孙启鹏	2	6	袁长伟	1

表 14 理学院

序号	中文名	发文数量	序号	中文名	发文数量
1	程晓晗	1	7	任丽梅	1
2	董安国	2	8	王康	1
3	高建忠	1	9	杨苗苗	1
4	李轩	1	10	张文彬	1
5	柳顺义	1	11	郑秋亚	1
6	马晗	1			

表 15 建筑学院

序号	中文名	发文数量	序号	中文名	发文数量
1	董晓	1	5	刘加平	1
2	董晓	1	6	刘凌	1
3	樊禹江	1	7	罗婧	1
4	李琛	1			

表 16 公共管理与法学院

序号	中文名	发文数量
1	蔡洁	1
2	刘兰剑	1

附件:各单位发表的 CSCD 论文详细情况

公路学院

第 1 条, 共 158 条

作者: Yan Xili; Jing Hongjun; You Qinglong; Ai Tao

作者: 延西利; 景宏君; 游庆龙; 艾涛

标题: Mixing flow characteristic and workability index of asphalt mixtures

标题: 沥青混合料的拌和流动特性及和易性指数

来源出版物: 土木工程学报 卷: 52 期: 10 页: 120-128 出版年: 2019

文献号: 1000-131X(2019)52:10<120:LQHHL>2.0.TX;2-Y

来源出版物: China Civil Engineering Journal 卷: 52 期: 10 页: 120-128 出版年: 2019

文献号: 1000-131X(2019)52:10<120:LQHHL>2.0.TX;2-Y

语言: Chinese

文献类型: Article

作者关键词: road engineering; asphalt mixture; mixing velocity; mixing power; flow model; workability index

作者关键词: 公路工程; 沥青混合料; 拌和速率; 拌和功率; 流动模型; 和易性指数

摘要: To quantitatively evaluate the mixing flow characteristic and know well about the strength evolutionism of asphalt mixture, an experimental device with different mixing velocities and different temperatures was developed and practiced in this study. A mixing experiment was carried out for different kinds of asphalt mixture with different bitumen types and different bitumen content and different granular composition. By analyzing the mixing flow behaviors of asphalt mixture, a mixing rheological model is presented, and the workability index is defined. The result shows that the mixing power measured by this device has an alternating error less than 5%, so the measurement can be thought reliable to characterize the mixing power of asphalt mixture. The consumption of mixing power is less when temperature is greater and mixing velocity is slower, thus it is easier to mix asphalt mixture. The mixing rheological behavior obeys the linear Bingham's model, in which the slope represents the mixing viscosity of asphalt mixture, and the intercept describes the mixing plastic limit. The workability index may be defined as the area reciprocal of the Bingham's line with mixing velocity, thus to integrate the visco-plastic parameters in theory. The mixing obstruction is greater and the workability is bad when the aggregates is coarser, the bitumen is more viscous and the bitumen content is richer. In view point of strength evolutionism of asphalt mixture, the aggregate properties determine the intrinsic plastic limit, and the bituminous mastic determines the viscous strength.

摘要: 为定量评价沥青混合料的拌和流动特性,深化认识混合料强度构成的演变机理,文章利用自行开发的一种变速拌和试验装置,在不同拌和速率(20~50r·min⁻¹)和拌和温度(130~180°C)下,对不同沥青种类、不同沥青用量和不同级配类型的沥青混合料进行拌和功率测试,分析拌和流动特性,建立拌和流变模型,定义拌和和易性指数。研究结果表明:拌和试验装置的功率测试误差小于5%,测试数据稳定可靠,可用来表征沥青混合料的拌和功率;拌和温度越高,拌和速率越小,所消耗的拌和功率越少,沥青混合料越容易拌和;沥青混合料的拌和流变模型服从线性的宾汉黏塑性模型,模型直线的斜率表征混合料的拌和黏度,截距反映内在塑限;拌和和易性指数可以定义为模型直线对拌和速率之面积的倒数,从理论上综合考虑黏塑性流动参数;沥青越黏稠,沥青用量越大,集料颗粒越粗,沥青混合料的拌和阻力越大,和易性越差;

从强度构成的演变机理来看,集料的组成特性决定内在塑性极限,沥青砂浆的黏性决定黏性强度即牛顿黏性流强度。

入藏号: CSCD:6585732

地址: Yan Xili, Chang'an University, Xi'an, Shaanxi 710064, China.

You Qinglong, Chang'an University, Xi'an, Shaanxi 710064, China.

Ai Tao, Chang'an University, Xi'an, Shaanxi 710064, China.

Jing Hongjun, Xi'an University of Science and Technology, Xi'an, Shaanxi 710064, China.

地址: 延西利, 长安大学, 西安, 陕西 710064, 中国.

游庆龙, 长安大学, 西安, 陕西 710064, 中国.

艾涛, 长安大学, 西安, 陕西 710064, 中国.

景宏君, 西安科技大学, 西安, 陕西 710064, 中国.

电子邮件地址: xili.yan@chd.edu.cn

电子邮件地址: xili.yan@chd.edu.cn

使用次数 (最近 180 天): 0

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第 2 条, 共 158 条

作者: Zhang Qing; Dong Shi; Chang Hongyu; Hou Dehua

作者: 张庆; 董是; 常宏宇; 侯德华

标题: Consistency Properties of Emulsified Asphalt- Cement Composite Mortar

标题: 乳化沥青-水泥复合胶浆稠度研究

来源出版物: 沈阳建筑大学学报. 自然科学版 卷: 35 期: 6 页: 1044-1050 出版年: 2019

文献号: 2095-1922(2019)35:6<1044:RHLQSN>2.0.TX;2-R

来源出版物: Journal of Shenyang Jianzhu University. Natural Science 卷: 35 期: 6 页: 1044-1050 出版年: 2019

文献号: 2095-1922(2019)35:6<1044:RHLQSN>2.0.TX;2-R

语言: Chinese

文献类型: Article

作者关键词: emulsified asphalt; cement; composite mastic; consistency

作者关键词: 乳化沥青; 水泥; 复合胶浆; 稠度

摘要: The consistency of emulsified asphalt-cement composite cement was studied in order to provide a scientific basis for optimizing the performance of emulsified asphalt mixture. Effect of cement and emulsified asphalt different dosage ratio on the consistency of composite cement was studied by a new consistency tester independently developed. On this basis, the contribution rate of cement to the consistency of emulsified Asphalt-Cement composite mortar was analyzed. When

the ratio of cement to emulsified asphalt is 22%, the consistency of the composite mastic reaches the maximum, showing strong adhesiveness, At the same time, the contribution rates of cement consistency were 65.5% and 55.5% respectively at 25°C and 45°C, under the test condition of 25 °C, the contribution of cement to the adhesion formation of asphalt and composite mastic are more significant. Cement and emulsified asphalt interact and restrict each other. Cement hydrate structure not only enhances the consistency of composite mastic, but also contributes to the optimization of emulsified asphalt binder film formation.

摘要: 目的研究乳化沥青-水泥复合胶浆的稠度性质,为乳化沥青混合料性能优化提供科学依据.方法采用自主研发的新型稠度测试仪,探究了水泥与乳化沥青不同用量比对复合胶浆稠度的影响,在此基础上,分析了水泥对乳化沥青-水泥复合胶浆稠度的贡献率.结果水泥与乳化沥青用量比为22%时,其胶浆稠度达到最大值,表现出较强的黏韧性;在25 °C和45 °C测试条件下,水泥稠度贡献率分别为65.5%和55.5%,且25 °C测试条件下水泥对沥青黏结成膜状态的促进作用及其胶浆稠度的贡献程度更加显著.结论水泥和乳化沥青这两种胶结材料相互影响和制约,水泥水化物结构不仅对胶浆稠度具有提升作用,还对乳化沥青黏结成膜作用的优化具有一定的贡献.

入藏号: CSCD:6630878

地址: Zhang Qing, Chang'an University;;Henan Normal University, Key Laboratory of Road Structure and Material of Ministry of Communication of PRC;;Key laboratory of Green Chemical Medium and Reaction of Ministry of Education of PRC, Xi'an;;Xinxiang, ;; 710064;;453007.

Dong Shi, Chang'an University;;Henan Gaoyuan Highway Maintenance Technology Co. Ltd., Key Laboratory of Road Structure and Material of Ministry of Communication of PRC;;, Xi'an;;Xinxiang, ;; 710064;;453003.

Chang Hongyu, Chang'an University, Key Laboratory of Road Structure and Material of Ministry of Communication of PRC, Xi'an, Shaanxi 710064, China.

Hou Dehua, Henan Gaoyuan Highway Maintenance Technology Co. Ltd.;;Key Laboratory of High-grade Highway Detection and Maintenance Technology of Henan Province, ;;Key Laboratory of High-grade Highway Detection and Maintenance Technology of Henan Province, Xinxiang;;Xinxiang, ;; 453003;;453003.

地址: 张庆, 长安大学;;河南师范大学, 道路结构与材料交通行业重点实验室;;绿色化学介质与反应教育部重点实验室, 西安;;新乡, 陕西;;河南 710064;;453007, 中国.

董是, 长安大学;;河南省高远公路养护技术有限公司, 道路结构与材料交通行业重点实验室;;, 西安;;新乡, 陕西;;河南 710064;;453003, 中国.

常宏宇, 长安大学, 道路结构与材料交通行业重点实验室, 西安, 陕西 710064, 中国.

侯德华, 河南省高远公路养护技术有限公司;;河南省高等级公路检测与养护技术重点实验室, ;;河南省高等级公路检测与养护技术重点实验室, 新乡;;新乡, 河南;;河南 453003;;453003, 中国.

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第 3 条, 共 158 条

作者: Liu Yongjian; Liu Jiang; Zhang Ning

作者: 刘永健; 刘江; 张宁

标题: Review on solar thermal actions of bridge structures

标题: 桥梁结构日照温度作用研究综述

来源出版物: 土木工程学报 卷: 52 期: 5 页: 59-78 出版年: 2019

文献号: 1000-131X(2019)52:5<59:QLJGRZ>2.0.TX;2-G

来源出版物: China Civil Engineering Journal 卷: 52 期: 5 页: 59-78 出版年: 2019

文献号: 1000-131X(2019)52:5<59:QLJGRZ>2.0.TX;2-G

语言: Chinese

文献类型: Review

作者关键词: bridge engineering; solar thermal actions; review; numerical simulation; field test of bridge; meteorological parameters; statistical analysis

作者关键词: 桥梁工程; 日照温度作用; 综述; 数值模拟; 实桥测试; 气象参数; 统计分析

摘要: To improve the understanding of the solar thermal actions of bridge structure, the domestic and overseas research status about the distribution characteristics, the research methods, the thermal action patterns and the values, etc. of solar temperature field of bridge structure were summarized and analyzed. The future research emphasis and directions were discussed. The results show: typical time-history periodic and spatially non-uniform characteristics of temperature field of bridge structure can be observed, and the characteristics, which are mainly affected by three types of factors including structural type, climate condition and geographical environment, have obvious difference due to the differences of bridge type and region. Numerical simulations and field tests are employed as the main research methods of analyzing the temperature field of bridge structure. Because the boundary conditions of solar radiation and heat convection haven't been unified in numerical simulations, the long-term field testing of bridge based on meteorological data is still very necessary, and enough emphasis should be put on the arrangement of measurement points to completely reflect the nonlinear distribution of temperature field of bridge structure. In the existing researches, multiple parabola, exponential curve and broken lines have been commonly used to describe the temperature gradient of bridge structure, and the temperature values were generally attained based on meteorological data correlation and statistical analysis. The research directions of solar action on bridge structure may mainly include field test on temperature distribution and thermal action patterns of composite bridge structure, measurement on temperature distribution of bridge structure in different regions and complex terrains, as well as the fine numerical simulations on the solar temperature field of complex large-span bridges.

摘要: 为深化对桥梁结构日照温度问题的认识,从桥梁结构日照温度场分布特性、研究方法、温度作用模式与取值方式等方面,综述桥梁结构日照温度作用国内外研究现状,探讨后续的研究重点和发展方向.研究结果表明:桥梁温度场有着典型的周期性时程特征和不均匀空间特征,主要受结构形式、气候和地理环境 3 类因素的影响,存在明显的桥型间和地域性差异;桥梁日照温度场以数值模拟与实桥测试为主要研究方法,数值模拟中太阳辐射和对流换热的选取尚

不统一,基于气象数据开展长期实桥测试十分必要,且应重视测点布置以充分反应桥梁温度非线性分布规律;现有研究多采用多次抛物线、指数曲线和多折线来描述桥梁的温度梯度形式,普遍基于气象参数相关性和统计分析来获得温度作用取值;桥梁日照温度作用的主要发展方向应关注于组合构桥梁温度场的实桥测试与温度作用模式的研究、不同地域和复杂地形条件下桥梁温度作用实测分析,以及大跨复杂结构桥梁日照温度场精细化模拟.

入藏号: CSCD:6487817

地址: Liu Yongjian, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Jiang, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Ning, Chang'an University;;Northwest A&F University, ;; Xi'an;;Yangling, ;; 710064;;712100.

地址: 刘永健, 长安大学, 西安, 陕西 710064, 中国.

刘江, 长安大学, 西安, 陕西 710064, 中国.

张宁, 长安大学;;西北农林科技大学, ;; 西安;;杨凌, 陕西;;陕西 710064;;712100, 中国.

电子邮件地址: lyj.chd@gmail.com

电子邮件地址: lyj.chd@gmail.com

使用次数 (最近 180 天): 0

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第 4 条, 共 158 条

作者: Wang Chunsheng; Wang Xiaoping; Zhu Jingwei; Li Xitong

作者: 王春生; 王晓平; 朱经纬; 李熙同

标题: Experimental Research on Flexural Behavior of Steel and Concrete Composite Girders with a Rectangular Tubular Up-Flange and a Corrugated Steel Web

标题: 波形钢腹板管翼缘组合梁抗弯性能试验研究

来源出版物: 桥梁建设 卷: 49 期: 1 页: 18-23 出版年: 2019

文献号: 1003-4722(2019)49:1<18:BXGFBG>2.0.TX;2-5

来源出版物: Bridge Construction 卷: 49 期: 1 页: 18-23 出版年: 2019

文献号: 1003-4722(2019)49:1<18:BXGFBG>2.0.TX;2-5

语言: Chinese

文献类型: Article

作者关键词: steel and concrete composite girder; tubular flange; corrugated steel web; flexural experiment; failure mode; mid-span deflection; interface slippage; longitudinal strain

作者关键词: 组合梁; 管翼缘; 波形钢腹板; 抗弯试验; 破坏形态; 跨中挠度; 界面滑移; 纵向应变

摘要: To study the failure mode and mechanical behavior due to flexure of tubular flange

composite girders with a corrugated steel web,we manufactured two test girders to perform flexural tests.Thereafter,we studied the development laws of failure mode,mid-span deflection,interface slippage and longitudinal strain of the test girders designed for the construction stage (Specimen C1)and the service stage(Specimen C2),respectively.The results show that the plastic bending failure will occur in all the test girders,whose bending failure process can be divided into three loading stages:the elastic stage,the elastic-plastic stage,and the failure stage.Shear buckling of the corrugated web does not emerge during the testing processes.The interface slippage or failure between the concrete slab and the steel girder of the Specimen C2 does not occur, which shows a good cooperation working performance between the steel girder and the concrete slab.Due to a wrinkle effect of thin plate,the flexural deformation of the cross section of the tubular flange composite girder with a corrugated steel web will not conform to the plane section assumption of conventional beam theory,whereas it can be analyzed by an approximate plane section assumption.

摘要: 为研究波形钢腹板管翼缘组合梁的受弯破坏形态及弯曲受力性能,制作 2 根试验梁进行纯弯试验,研究波形钢腹板管翼缘组合梁施工阶段(试验梁 C1)及使用阶段(试验梁 C2)的破坏形态及跨中挠度、界面滑移、纵向应变的发展规律。结果表明:试验梁均发生塑性弯曲破坏,其受弯破坏过程可近似划分为弹性、弹塑性及破坏 3 个受力阶段;试验中各试验梁均未出现腹板剪切屈曲;试验梁 C2 的管翼缘与混凝土翼板间未出现界面滑移或破坏,二者协同工作性能良好;受薄板褶皱效应影响,波形钢腹板管翼缘组合梁的截面弯曲变形不再符合常规梁理论平截面假定,但仍可近似按拟平截面假定分析。

入藏号: CSCD:6439368

地址: Wang Chunsheng, Chang'an University, Engineering Research Center for Large Highway Structure Safety of Ministry of Education, Xi'an, Shaanxi 710064, China.

Wang Xiaoping, Chang'an University, Engineering Research Center for Large Highway Structure Safety of Ministry of Education, Xi'an, Shaanxi 710064, China.

Zhu Jingwei, Chang'an University, Engineering Research Center for Large Highway Structure Safety of Ministry of Education, Xi'an, Shaanxi 710064, China.

Li Xitong, Gansu Province Transportation Planning, Survey & Design Institute Co., Ltd., Lanzhou, Gansu 730000, China.

地址: 王春生, 长安大学, 公路大型结构安全教育部工程研究中心, 西安, 陕西 710064, 中国.

王晓平, 长安大学, 公路大型结构安全教育部工程研究中心, 西安, 陕西 710064, 中国.

朱经纬, 长安大学, 公路大型结构安全教育部工程研究中心, 西安, 陕西 710064, 中国.

李熙同, 甘肃省交通规划勘察设计院股份有限公司, 兰州, 甘肃 730000, 中国.

电子邮件地址: wcs2000wcs@163.com; wxp19870601@163.com; zhujingweicadx@126.com; m18793152012@163.com

电子邮件地址: wcs2000wcs@163.com; wxp19870601@163.com; zhujingweicadx@126.com; m18793152012@163.com

使用次数 (最近 180 天): 0

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作者: Zhao Yu; Hong Lujia; Zhou Yongjun

作者: 赵煜; 洪路加; 周勇军

标题: Bearing capacity assessment method for PC box girder by testing stress of tendon

标题: 基于钢束应力测试的预应力混凝土箱梁承载力评估方法

来源出版物: 长安大学学报. 自然科学版 卷: 39 期: 1 页: 61-69 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: bridge engineering; prestressed concrete box-girder; effective stress of tendon; prediction; cross-section analysis; safety assessment

作者关键词: 桥梁工程; 预应力混凝土箱梁; 钢束有效应力; 预测; 截面分析; 承载力评估

摘要: In order to perform quantitative assessment on the safety performance of PC box-girder bridges with cracks during service period, the evaluation method for the bearing capacity of a damaged PC box-girder bridge was carried, based on the partial effective stress test of a tendon in a PC box-girder bridge. Firstly, based on the principle of parameter identification and the correction method, the variation in transient prestress loss, including frictional loss and anti-friction loss, was represented by the friction loss parameters, and a new method was proposed to predict the effective stress on the inner tendons from the outer tendon. Then, an equilibrium iteration algorithm and a procedure for considering the tensile strength of concrete in the cross section were developed. Finally, a full-scale experiment was carried out for three girders. The stress on the outer tendon at the mid-span section of the girders was measured using a special stress detector. Using the proposed method, the stress of the inner tendon at the mid-span section was predicted. The measured load, deformation, and the failure mode of the structure during the entire loading process was obtained. A comparison was made between the theoretical results proposed in this paper and the experimental results. The results show that calculated strain of the test girders is in good agreement with the experimental results, which illustrate that the stress prediction method of the tendon and equilibrium iteration method can accurately reflect the mechanical characteristics of a damaged PC box girder. It can be used to quantitatively evaluate the bearing capacity of box-girder bridges with damage during service period.

摘要: 为了解决在役开裂损伤预应力混凝土箱梁桥安全性能量化评估问题,在局部预应力钢束有效预应力测试的基础上,开展开裂损伤预应力混凝土箱梁桥承载力评估方法研究。首先,基于参数识别与修正思想,将预应力瞬时损失中的摩阻损失和反摩阻损失值用摩阻损失相关参数表示,提出一种基于表层钢束应力推定内层钢束应力的方法,解决预应力混凝土桥梁钢束沿程实际应力分布的量化表达问题。其次,考虑截面受拉区混凝土抗拉强度影响,推导考虑受拉区混凝土开裂影响的截面分析迭代公式,提出迭代求解方法和步骤。最后,开展 3 片实梁足

尺模型试验,采用预应力钢索张力测试仪对开裂损伤的试验梁跨中截面表层钢束进行了应力测试,并将提出的方法应用于钢束有效应力预测,得到了跨中截面所有钢束的应力推定值。进行了桥梁极限承载力试验,得到全过程加载下的结构受力与变形实测值及破坏模式,并将理论算法与试验测试结果进行对比分析。研究表明:各级荷载下的试验梁应变理论计算值与试验测试值具有较好的一致性,提出的钢束应力预测方法和截面分析方法能准确反映开裂损伤预应力混凝土箱梁的力学特征,可用于开裂损伤的预应力混凝土箱梁桥运营期间承载能力的量化评估。

入藏号: CSCD:6428625

地址: Zhao Yu, Chang'an University, Key Laboratory of Bridge Detection Reinforcement Technology of Ministry of Communication, Xi'an, Shaanxi 710064, China.

Hong Lujia, Chang'an University, Key Laboratory of Bridge Detection Reinforcement Technology of Ministry of Communication, Xi'an, Shaanxi 710064, China.

Zhou Yongjun, Chang'an University, Key Laboratory of Bridge Detection Reinforcement Technology of Ministry of Communication, Xi'an, Shaanxi 710064, China.

地址: 赵煜, 长安大学, 旧桥检测与加固交通行业重点实验室, 西安, 陕西 710064, 中国.

洪路加, 长安大学, 旧桥检测与加固交通行业重点实验室, 西安, 陕西 710064, 中国.

周勇军, 长安大学, 旧桥检测与加固交通行业重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: zhaoyu@chd.edu.cn

电子邮件地址: zhaoyu@chd.edu.cn

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作者: Xue Xiaofeng; Jin Qiwen; Wang Tongxing

作者: 薛晓锋; 靳启文; 王通行

标题: Structural vulnerability of long-span cable-stayed bridge subjected to multiple damage scenarios effect

标题: 多损伤场景下大跨径斜拉桥易损性

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作者关键词: bridge engineering; performance degradation of stay cable; structural vulnerability; long-span cable-stayed bridge; separated steel box girder; SHM

作者关键词: 桥梁工程; 拉索性能退化; 结构易损性; 大跨径斜拉桥; 分离式钢箱梁; 结构健康监测

摘要: To study the vulnerability of the cable-stayed bridge with long span and double cable planes, and optimize the sensor placement for structural health monitoring (SHM), the structural characteristics and mechanical properties of this type of bridge were considered. The buckling and stress safety factors were selected as evaluation indexes. One floating long-span cable-stayed bridge with split column towers and split steel box girders and four cable was considered as an example, and the finite element model was established, and towers/girders component, and cables component were simulated by elements Beam4 and Link10, respectively. The buckling safety factor and stress safety factor of the main beam under 149 working conditions in the three types of damage scenarios, such as overall performance degradation, single cable and single-pair cable broken, were calculated and analyzed. The proportion of structural damage and the corresponding damage degree were also considered. According to the principle that the minimum damage ratio causes the largest damage degree, the vulnerable cable subjected to three kinds of damage scenarios were studied and determined based on the Pareto optimization method. The results show that the cable force increases gradually with an increase in cable length, and the interior cable force inside is usually greater than that at the exterior. The overall performance degradation of the cable increases from non-damage to damage to 30% of the main girder. The buckling safety factor of the main girder show a linearly increases, while the stress safety factor show a linearly decreases, both the change range of them are small. Under single cable broken and single pair cable broken scenarios, cables 10~# and 6~# (both outside and inside) are the most vulnerable scenarios, and cables 1~# to 5~# and cables 7~# to 9~# follow. It can provide scientific basis and reference for the vulnerable parts of cables study of double tower and double cable planes steel box girders, sensor placement of this kind of bridge, and structural safety can be further enhanced.

摘要: 为了研究大跨径双索面斜拉桥易损斜拉索部位,进一步优化结构健康监测传感器布置方案,基于大跨径斜拉桥结构特点及受力性能,以斜拉桥主梁屈曲安全系数和应力安全系数为评价指标,以大跨径全漂浮分肢柱式塔四索面分离式钢箱梁斜拉桥为依托,采用有限元分析软件,分别采用 Beam4 梁单元和 Link10 桁架单元模拟塔/梁构件和拉索构件,建立该斜拉桥的三维有限元空间模型;计算分析了拉索整体性能退化、单根断索、单对断索 3 类损伤场景下 149 个工况的主梁屈曲安全系数和应力安全系数。分别考虑结构损伤比例和所造成损伤程度,采用 Pareto 多目标评价方法,根据结构最小损伤比例作用所造成结构损伤程度最大的优化原则,分别研究了 3 类损伤场景下斜拉索的易损性,确定了易损斜拉索的部位。研究表明:成桥拉索索力随着索长的增加而逐渐增大,内侧索力基本大于外侧索力;拉索整体性能退化程度从无损伤到损伤增加至 30%,主梁屈曲安全系数呈线性增大趋势,应力安全系数呈线性减小趋势,但二者变化幅度均较小;单根断索或者单对断索损伤场景下,易损拉索为中跨 10~#、边跨 6~#,较易损拉索为 1~#~5~#、7~#~9~#等。该结果可为研究双塔双索面钢箱梁斜拉桥斜拉索的易损薄弱部位,布控长期监测传感器和提高结构安全性提供科学依据和参考。

入藏号: CSCD:6600072

地址: Xue Xiaofeng, Chang'an University, Key Laboratory of Bridge Detection Reinforcement Technology, Ministry of Communications, Xi'an, Shaanxi 710064, China.

Wang Tongxing, Chang'an University, Key Laboratory of Bridge Detection Reinforcement Technology, Ministry of Communications, Xi'an, Shaanxi 710064, China.

Jin Qiwen, College of Civil Engineering and Architecture, Henan University of Technology, Zhengzhou, He'nan 450001.

地址: 薛晓锋, 长安大学, 旧桥检测与加固技术交通行业重点实验室, 西安, 陕西 710064, 中国.

王通行, 长安大学, 旧桥检测与加固技术交通行业重点实验室, 西安, 陕西 710064, 中国.

靳启文, 河南工业大学土木建筑学院, 郑州, 河南 450001, 中国.

电子邮件地址: xuexiaofeng@chd.edu.cn; jqw.sinx123@163.com

电子邮件地址: xuexiaofeng@chd.edu.cn; jqw.sinx123@163.com

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作者: Wang Chunsheng; Wang Shichao; Wang Qian; Shen Jiancheng; Duan Lan

作者: 王春生; 王世超; 王茜; 沈建成; 段兰

标题: EXPERIMENTAL STUDY ON BEARING CAPACITY OF DANGEROUS AND/OR OLD PRE-STRESSED CONCRETE BOX GIRDERS

标题: 危旧预应力混凝土箱梁承载性能足尺试验

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文献类型: Article

作者关键词: bridge engineering; dangerous and/or old PC box girders; full-scale test; flexural capacity; shear capacity

作者关键词: 桥梁工程; 危旧预应力小箱梁; 足尺试验; 抗弯承载性能; 抗剪承载性能

摘要: In order to obtain the true bearing capacity of dangerous and old pre-stressed concrete box girder bridges, experiments on flexural and shear bearing capacity of full-scale dangerous and old pre-stressed concrete small box girders are conducted to study the mechanical degradation behavior of dangerous and old pre-stressed concrete box girders. Through the residual bearing capacity test of the full-scale prefabricated box girder, the load, deflection, strain and crack width of the test girders are measured and analyzed. The residual bending and shear ultimate capacity and stiffness of the small box girders are analyzed. The bending and shear behavior and failure mechanism of precast box girders in danger are obtained. The comparisons between the results of full-scale test and the calculated value of bearing capacity and also the design value of the internal force of I-Class highway are operated to analyze the actual performance of the small box girder

made of dilapidated concrete. The damage reduction coefficient is introduced to establish the formula of ultimate bearing capacity of the girder. The test results stated that the structural damage affected the bearing performance of this box girder. The deflection of the test girder in the uncracked stage did not meet the proof stiffness requirements under the variable load of highway bridge. The calculated results of the flexural bearing capacity are basically identified with the result from full scale flexural test, which is 70% higher than the design bending moment by the internal force of the main girder. The results of full-scale shear tests are respectively 32% and 37% higher than the internal shear design values of the girder. The formulas with damage reduction coefficient for calculating the bending and shearing capacity of the concrete box girders is applicable to evaluate the bearing capacity of the dilapidated concrete girders with more accurate results, which can provide a reference for the evaluation and maintenance of massive existing small concrete box girders in China.

摘要: 为获得危旧混凝土桥梁的真实承载性能,通过对足尺危旧预应力混凝土小箱梁进行抗弯和抗剪承载性能试验,研究危旧预应力混凝土小箱梁受力退化行为。通过足尺危旧预制箱梁残余承载能力试验,量测分析了试验梁的荷载、挠度、应变、裂缝宽度等,对危旧小箱梁的残余抗弯、抗剪极限承载能力及刚度进行了分析,得出危旧预制箱梁抗弯、抗剪受力性能及破坏机理。将足尺试验结果与承载力计算值以及公路-I级设计内力值进行比较,分析危旧混凝土小箱梁的实际承载性能。引入损伤折减系数,建立危旧混凝土箱梁极限承载力计算公式。试验结果表明:结构损伤降低了箱梁的承载性能,试验梁在未开裂阶段的挠度不满足公路桥规对活载刚度的验算要求,抗弯足尺试验得到的抗弯承载力与抗弯承载力计算结果基本相同,比主梁设计内力弯矩值高 70%;抗剪足尺试验结果比主梁设计内力剪力值分别高 32%和 37%;引入损伤折减系数后的抗弯、抗剪承载力计算公式可以较准确的评估危旧混凝土小箱梁的承载能力,可为我国大量现役混凝土小箱梁的评估与维护提供参考。

入藏号: CSCD:6541254

地址: Wang Chunsheng, Chang'an University, Key Laboratory for Bridge and Tunnel Engineering of Shaanxi, Xi'an, Shaanxi 710064, China.

Wang Shichao, Chang'an University, Key Laboratory for Bridge and Tunnel Engineering of Shaanxi, Xi'an, Shaanxi 710064, China.

Wang Qian, Chang'an University, Key Laboratory for Bridge and Tunnel Engineering of Shaanxi, Xi'an, Shaanxi 710064, China.

Duan Lan, Chang'an University, Key Laboratory for Bridge and Tunnel Engineering of Shaanxi, Xi'an, Shaanxi 710064, China.

Shen Jiancheng, Ningxia Highway & Bridge Corporation, Yinchuan, Ningxia 750016, China.

地址: 王春生, 长安大学, 桥梁与隧道陕西省重点实验室, 西安, 陕西 710064, 中国.

王世超, 长安大学, 桥梁与隧道陕西省重点实验室, 西安, 陕西 710064, 中国.

王茜, 长安大学, 桥梁与隧道陕西省重点实验室, 西安, 陕西 710064, 中国.

段兰, 长安大学, 桥梁与隧道陕西省重点实验室, 西安, 陕西 710064, 中国.

沈建成, 宁夏路桥集团股份有限公司, 银川, 宁夏 750016, 中国.

电子邮件地址: wcs2000wcs@163.com; lhywsc@gmail.com; brightq@163.com; sjc199@sina.com; dl0310dl@163.com

电子邮件地址: wcs2000wcs@163.com; lhywsc@gmail.com; brightq@163.com; sjc199@sina.com; dl0310dl@163.com

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作者: Wu Xiaoguang; He Qilong; Zheng Peng; Xiao Kailong

作者: 邬晓光; 何启龙; 郑鹏; 肖凯龙

标题: Influence Analysis of Concrete Strength on Time-Varying Reliability of Widening T-Beam Bridge Based on Support Vector Method

标题: 基于支持向量机法的混凝土强度对拼宽 T 梁桥时变可靠度影响分析

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作者关键词: 桥梁工程; 拼宽 T 梁桥; 支持向量机; 混凝土强度; 钢束二次力; 收缩徐变; 时变效应; 可靠度

摘要: Based on support vector method, the fitting accuracy of implicit function for the effect function of widening T-beam bridge under the condition of small sample was studied, whose error was less than 5%. The fitting implicit function was used to construct the function of flexural capacity of normal section, and the variation law of time-varying reliability of widening T-beam bridge was analyzed. The research results show that: the prediction results obtained by SVM method are smaller; considering the time-varying effect of concrete strength as well as shrinkage and creep, the reduction of reliability index of beam structure in 70 years is not significant, and it is higher than that of structure without considering time-varying effect. Taking the widening of old beams after 20 years of operation as an example, the reliability index of widening bridge system decreases relatively smoothly in 45 years of operation of new beams, while the reliability index of widening bridge system decreases significantly after 45 years of operation of new beams.

摘要: 基于支持向量机法, 研究了拼宽 T 梁桥的效应函数在小样本条件下的隐式函数拟合精度问题, 误差小于 5%; 将拟合的隐式函数用于构建正截面抗弯承载力功能函数, 分析了拼宽桥的时变可靠度变化规律。研究结果表明: SVM 法预测结果偏小; 分析强度时变效应及收缩徐变因素, 在 70 a 内梁片结构可靠指标降低速率及幅度不显著, 且较不分析时变效应时高; 假设旧梁运营 20 a 后进行拓宽, 新梁运营 45 a 内, 拼宽桥体系可靠指标降低速率相对平缓; 新梁运

营 45 a 后,拼宽桥体系可靠指标减少则值得关注。

入藏号: CSCD:6511271

地址: Wu Xiaoguang, Chang'an University, Key Laboratory for Bridge and Tunnel of Shaanxi Province, Xi'an, Shaanxi 710064, China.

Zheng Peng, Chang'an University, Key Laboratory for Bridge and Tunnel of Shaanxi Province, Xi'an, Shaanxi 710064, China.

Xiao Kailong, Chang'an University, Key Laboratory for Bridge and Tunnel of Shaanxi Province, Xi'an, Shaanxi 710064, China.

He Qilong, Chang'an University;;China Railway Major Bridge (Nanjing) Bridge and Tunnel Diagnosis & Treatment Co.,Ltd., Key Laboratory for Bridge and Tunnel of Shaanxi Province;;, Xi'an;;Nanjing, Shaanxi;;Jiangsu 710064;;210061.

地址: 邬晓光, 长安大学, 桥梁与隧道陕西省重点实验室, 西安, 陕西 710064, 中国.

郑鹏, 长安大学, 桥梁与隧道陕西省重点实验室, 西安, 陕西 710064, 中国.

肖凯龙, 长安大学, 桥梁与隧道陕西省重点实验室, 西安, 陕西 710064, 中国.

何启龙, 长安大学;;中铁大桥(南京)桥隧诊治有限公司, 桥梁与隧道陕西省重点实验室;;, 西安;;南京, 陕西;;江苏 710064;;210061, 中国.

电子邮件地址: wxgwst.cn@126.com

电子邮件地址: wxgwst.cn@126.com

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作者: Yang Xiaohua; Zheng Kunlong; Xu Lixiao

作者: 杨晓华; 郑坤隆; 徐礼笑

标题: Experiment on Effect of Capillary Crystalline Material Additives on Cement Slurry Performance

标题: 渗透结晶型材料添加剂对水泥浆液性能影响试验

来源出版物: 中国公路学报 卷: 32 期: 7 页: 129-135,157 出版年: 2019

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作者关键词: tunnel engineering; cement slurry additives; experimental investigation; capillary crystalline material; grout characteristics; mechanism

作者关键词: 隧道工程; 水泥浆添加剂; 试验研究; 渗透结晶型材料; 浆液性能; 作用机理

摘要: In order to prevent tunnel leakage, the capillary crystalline material, Penetron, was added to cement slurry as an additive to obtain high-performance cement slurry. The added Penetron comprised 0.6%-1.6% of the total cement contents. The viscosity, setting time, and rate of consolidation of the slurry were studied using Vicat Apparatus, Rotational Viscometers, and other instruments. The impermeability of the grouting materials was studied using a self-designed permeability coefficient determination apparatus. Compressive strength tests were used to study the mechanical properties of the grouting materials under standard conditions and conditions of whole water areas. Scanning electron microscopy (SEM) was used to analyze the microstructures of the grouting materials. The results show that Penetron has almost no negative effect on the viscosity or setting time of cement slurry, while it can significantly increase the rate of consolidation of cement slurry. When the amount of addition is 1.6%, the rate of consolidation reaches 98.7%. Penetron can change the pore structure, effectively reduce the permeability coefficient, and improve the impermeability of cement slurry. As the addition amount increases from 0% to 1.6%, the permeability coefficient of the grouting materials decreases from $5.03 \times 10^{-7} \text{ m} \cdot \text{s}^{-1}$ to $3.40 \times 10^{-8} \text{ m} \cdot \text{s}^{-1}$. Penetron can also increase the compressive strength of slurry. For the standard curing time of 28 days and the addition amount of 1.6%, the compression strength of the grouting material is 5.36 MPa. The SEM analysis shows dendritic crystals in high-magnification images of cement slurry containing Penetron, and the number of crystals increases as the added amount of Penetron increases. Based on the experimental results and the mechanism of Penetron in cement slurry, Penetron can be used as a cement slurry additive. When the amount of Penetron is approximately 1.4% to 1.6% of the total cement, high-performance waterproof grouting materials for treating tunnel leakages are obtained.

摘要: 为获得可用于治理隧道渗漏水的高性能水泥浆液, 选取具有优良防水抗渗性能的水泥基渗透结晶型防水涂料 Penetron, 将其以添加剂的形式加入到水泥浆液中, 添加量为水泥总质量的 0.6%~1.6%。参照规范使用维卡仪、旋转黏度仪等仪器对水泥浆液黏度、凝结时间和结石率进行研究, 使用自行设计的渗透系数测定仪研究注浆体抗渗性能, 通过抗压强度试验研究标准养护和全水域养护条件下浆液结石体、注浆体的力学性能, 通过 SEM 扫描试验对添加 Penetron 的浆液结石体微观结构进行分析。结果表明: Penetron 对水泥浆液黏度和凝结时间无负面影响, 随着添加量的增多, 浆液结石率显著提高, 当添加量为 1.6% 时, 浆液结石率可达 98.7%; Penetron 可改变注浆体内部孔隙结构, 有效降低水泥浆液渗透系数, 提高注浆体抗渗性能, 当添加量从 0% 增加至 1.6% 时, 注浆体渗透系数从 $5.03 \times 10^{-7} \text{ m} \cdot \text{s}^{-1}$ 降低至 $3.40 \times 10^{-8} \text{ m} \cdot \text{s}^{-1}$; Penetron 的加入还可提高水泥浆液固结体的抗压强度, 标准养护 28d, 添加量为 1.6% 的注浆体抗压强度为 5.36 MPa; 在添加有 Penetron 的浆液结石体高倍 SEM 扫描图像中可见树枝状晶体存在, 且结晶体数量随 Penetron 添加量的增加而增多。根据试验结果和 Penetron 在水泥浆液中的作用机理分析, 证明该材料可作为水泥浆液添加剂使用, 当添加量为水泥总质量的 1.4%~1.6% 时, 可获得用于治理隧道渗漏水的高性能注浆材料。

入藏号: CSCD:6554142

地址: Yang Xiaohua, Chang'an University;; School of Highway, Chang'an University, Key Laboratory for Highway, Bridge and Tunnel of Shaanxi Province;; Xi'an;; Xi'an, Shaanxi;; Shaanxi 710064;; 710064.

Zheng Kunlong, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Xu Lixiao, Zhejiang Provincial Institute of Communications Planning, Design & Research Co., Ltd., Hangzhou, Zhejiang 310008, China.

地址: 杨晓华, 长安大学;;长安大学公路学院, 陕西省公路桥梁与隧道重点实验室;;, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

郑坤隆, 长安大学公路学院, 西安, 陕西 710064, 中国.

徐礼笑, 浙江省交通规划设计研究院有限公司, 杭州, 浙江 310008, 中国.

电子邮件地址: xiaohuay@126.com; kunlongzheng@163.com

电子邮件地址: xiaohuay@126.com; kunlongzheng@163.com

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作者: Wang Yaqiong; Zhang Lei; Wang Zhifeng; Sun Tiejun

作者: 王亚琼; 张雷; 王志丰; 孙铁军

标题: Seepage Drainage Techniques for the Tunnel Lining in Service

标题: 在役隧道衬砌渗漏水引排技术

来源出版物: 现代隧道技术 卷: 56 期: 2 页: 24-29 出版年: 2019

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作者关键词: Tunnel lining; Water leakage; Treatment; Multi-function drainage channel; Water collection and drainage

作者关键词: 隧道衬砌; 渗漏水; 治理; 多功能排水槽; 集水引排

摘要: Water leakage of tunnel lining is a common disease which endangers the safety of tunnel structure and operation. In light of the shortcomings of current treatment methods, a new treatment technology was proposed, namely grooves are made at three sides or around the place of leakage and multi-function drainage channels are in-stalled, adjustable bolts and steel strips are arranged at the two side grooves to apply pressure at the connection when it's necessary, several multi-function drainage channels are connected by thin drain pipes to drain the water to the nearest drain pipes. The main advantages are that water can be collected and drained and it turns the passive drainage into active drainage, it also has the functions of maintenance, replacement, cleaning and dredging. The en-gineering practice shows good effect is achieved by this new treatment technology.

摘要: 隧道衬砌渗漏水是隧道常见病害,危及隧道结构安全和运营安全。文章针对目前常规处治方式存在的不足提出了一种新的衬砌渗漏水治理技术:在渗漏缝周边进行三边或周边开槽,并安装多功能排水槽,必要时在两侧边槽布设可调式螺栓和钢条对其接缝处施加压力,结合细

排水管将多个多功能排水槽连接并将渗漏水引排到离隧道最近排水管中,以此解决隧道衬砌渗漏水问题。其主要优点是可集水引排,把原来被动排水变为主动排水,同时又具有维护、更换、清理和疏通等功能。经工程实践检验证明,采取这种新的渗漏水处理技术,可以取得良好的治理效果。

入藏号: CSCD:6477361

地址: Wang Yaqiong, Chang'an University, Shanxi Provincial Major Laboratory for Highway Bridge & Tunnel, Xi'an, Shaanxi 710064, China.

Wang Zhifeng, Chang'an University, Shanxi Provincial Major Laboratory for Highway Bridge & Tunnel, Xi'an, Shaanxi 710064, China.

Zhang Lei, Chang'an University;;Anhui Transport Consulting & Design Institute Co., Ltd., Shanxi Provincial Major Laboratory for Highway Bridge & Tunnel;;, Xi'an;;Heifei, ;; 710064;;230088.

Sun Tiejun, Wenzhou Xinda Traffic Engineering Test Co. Ltd., Wenzhou, Zhejiang 325105, China.

地址: 王亚琼, 长安大学, 陕西省公路桥梁与隧道重点实验室, 西安, 陕西 710064, 中国.

王志丰, 长安大学, 陕西省公路桥梁与隧道重点实验室, 西安, 陕西 710064, 中国.

张雷, 长安大学;;安徽省交通规划设计研究总院股份有限公司, 陕西省公路桥梁与隧道重点实验室;;, 西安;;合肥, ;; 710064;;230088.

孙铁军, 温州信达交通工程试验检测有限公司, 温州, 浙江 325105, 中国.

电子邮件地址: ys08@gl.chd.edu.cn

电子邮件地址: ys08@gl.chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Qiu Junling; Lai Jinxing; Guo Chunxia; Fan Haobo; Xie Yongli

作者: 邱军领; 赖金星; 郭春霞; 樊浩博; 谢永利

标题: In-situ Test and Analysis of Mechanical Behaviors of the Mid-wall of Multi-arch Loess Tunnels

标题: 黄土连拱隧道中墙力学特征现场测试与分析

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作者关键词: Loess tunnel; Multi-arch tunnel; Mid-wall; In-situ test; Mechanical behavior

作者关键词: 黄土地层; 连拱隧道; 中墙; 现场实测; 力学特征

摘要: The mid-wall of a multi-arch tunnel is an important loading component and has direct impact on tunnel safety and economy. In order to understand the mechanical behaviors of the mid-wall of a multi-arch loess tunnel, systematic test and analysis were conducted based on a multi-arch loess tunnel in northern Shaanxi province regarding contacting pressure on top and bottom of the middle-wall, axial force of anchor bolt in middle pilot heading and axial force of rebar meter at the middle-wall as well as internal force of the mid-wall using the steel wire transducer. The test results indicate that the pressure at the bottom of mid-wall approximately take a saddle shape, which is large on both sides and small in the middle and the pressure at the base is larger than the contacting pressure at the top of middle pilot heading; axial force of anchor bolt is small, peak axial force occurs at shallow-buried part of rock mass and axial force at the deep-buried part is about 10% of that in shallow-buried section, the support effect of anchor bolt at middle pilot heading is not obvious and anchor bolt can be canceled at this place; the axial force of rebar meter at middle-wall is increasing towards the bottom and it's more sensitive to the force on the upper part of midwall compared with that on the lower part; the max. force of mid-wall occurs at the left lower side of mid-wall, and stress release of the right and left tubes has certain "rectification" effect on force of mid-wall but the mid-wall has always been affected by asymmetric pressure; the calculated max. axial force of mid-wall is about 583 kN, the max. bending moment is about 45 kN·m, the mid-wall is stable, the max. longitudinal torque is around 79 kN·m and the internal force is very complex.

摘要: 连拱隧道中墙是受力复杂部位和重要承载构件,直接影响到隧道的安全性与经济性。为研究黄土连拱隧道中墙受力规律,文章以陕北某黄土连拱隧道为依托,采用钢弦式传感器对隧道中墙顶部和底部接触压力、中导洞锚杆轴力、中墙钢筋计轴力及中墙内力进行了系统测试与分析。结果表明:中墙基底压力两边大中间小,呈马鞍形分布,基底压力比中导洞顶部接触压力大;锚杆轴力较小,峰值在围岩浅部,深部轴力约为峰值的10%,中导洞锚杆支护作用不明显,可以取消;中墙钢筋计轴力向底部增大,中墙受力上部较下部敏感;中墙受力最大位置在中部偏左下侧,左右线应力先后释放对中墙受力有一定的纠偏作用,但中墙始终受到偏压作用;按组合变形构件推算的中墙最大轴力值约为583 kN,最大弯矩值约为45 kN·m,中墙处于稳定状态,其纵向承受扭矩作用、最大值约为79 kN·m,内力十分复杂。

入藏号: CSCD:6477377

地址: Qiu Junling, Chang'an University, Shaanxi Provincial Major Laboratory for Highway Bridge & Tunnel, Xi'an, Shaanxi 710064, China.

Fan Haobo, Chang'an University, Shaanxi Provincial Major Laboratory for Highway Bridge & Tunnel, Xi'an, Shaanxi 710064, China.

Xie Yongli, Chang'an University, Shaanxi Provincial Major Laboratory for Highway Bridge & Tunnel, Xi'an, Shaanxi 710064, China.

Lai Jinxing, Chang'an University; School of Science, Xi'an University of Architecture and Technology, Shaanxi Provincial Major Laboratory for Highway Bridge & Tunnel; Xi'an; Xi'an, ; 710064; 710055.

Guo Chunxia, School of Science, Xi'an University of Architecture and Technology, Xi'an, Shaanxi 710055, China.

地址: 邱军领, 长安大学, 陕西省公路桥梁与隧道重点实验室, 西安, 陕西 710064, 中国.

樊浩博, 长安大学, 陕西省公路桥梁与隧道重点实验室, 西安, 陕西 710064, 中国.

谢永利, 长安大学, 陕西省公路桥梁与隧道重点实验室, 西安, 陕西 710064, 中国.

赖金星, 长安大学;;西安建筑科技大学理学院, 陕西省公路桥梁与隧道重点实验室;;, 西安;;
西安, ;; 710064;;710055.

郭春霞, 西安建筑科技大学理学院, 西安, 陕西 710055, 中国.

电子邮件地址: 870133597@qq.com; laijinxing@chd.edu.cn

电子邮件地址: 870133597@qq.com; laijinxing@chd.edu.cn

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作者: Guo Yinchuan; Xie Zhiteng; Shen Aiqin; Zhang Youhua

作者: 郭寅川; 解志腾; 申爱琴; 张优华

标题: Study on Degradation of Tunnel Exhaust Gas Based on Composite Nano Photocatalytic Materials

标题: 基于复合纳米光催化材料的隧道尾气降解研究

来源出版物: 华南理工大学学报. 自然科学版 卷: 47 期: 7 页: 83-89 出版年: 2019

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作者关键词: tunnel; automobile exhaust; exhaust degradation; steel slag asphalt mixture; nano-photocatalytic material; nano-TiO₂; nano-CeO₂

作者关键词: 隧道; 汽车尾气; 尾气降解; 钢渣沥青混合料; 纳米光催化材料; 纳米 TiO₂; 纳米 CeO₂

摘要: The composite photocatalytic material TiO₂-CeO₂ was incorporated to steel slag asphalt mixture in tunnel environment in order to study its efficiency for exhaust gas degradation. Firstly, a complete set of tail gas degradation test equipment capable of simulating tunnel environment was developed. Then the influence of composite photocatalytic material TiO₂-CeO₂ on the performance of steel slag asphalt mixture in asphalt pavement was studied. Finally, the optimum doping ratio of TiO₂-CeO₂ composite photocatalytic material was also studied. The results show that when the nano-TiO₂ volume is 50% and nano-CeO₂ is 0.7%, the photocatalytic efficiency will reach to the peak value. In this case, the degradation efficiency peak of NO and HC is 89% and 95%, respectively, and exhaust degradation efficiency reach up to 626.3 mg/(m³·min)

and 74.75 mg/(m³·min) within 30 min, respectively. The road performance of tunnel steel slag asphalt mixture meets the requirements.

摘要: 将复合光催化材料 TiO₂-CeO₂ 应用于隧道钢渣沥青混合料中,研究复合光催化材料 TiO₂-CeO₂ 对隧道内汽车尾气的降解效能.首先研发了一套能模拟隧道环境的尾气降解试验装置,然后研究了复合光催化材料 TiO₂-CeO₂ 对隧道钢渣沥青混合料路用性能的影响,最后通过降解效能与降解速率的评价得出了复合光催化材料 TiO₂-CeO₂ 在隧道钢渣沥青混合料中的最佳用量.结果表明:将复合纳米光催化材料应用于隧道钢渣沥青混合料中,在纳米 TiO₂ 的掺量为 50%、纳米 CeO₂ 掺量为 0.7%时会达到光催化效率、光催化效能的峰值,该掺量下对 NO 和 HC 的降解效率峰值高达 89%和 95%,30 min 内降解速率分别高达 626.3 mg/(m³·min)和 74.75 mg/(m³·min),且隧道钢渣沥青混合料的路用性能符合要求.

入藏号: CSCD:6544017

地址: Guo Yinchuan, Chang'an University;;Louisiana Transportation Research Center,Louisiana State University, Key Laboratory for Special Area Highway Engineering of Ministry of Education;; Xi'an;;Baton Rouge, Shaanxi;;USA 710064;;70803.

Xie Zhiteng, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Shen Aiqin, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Zhang Youhua, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 郭寅川, 长安大学特殊地区;;路易斯安那州立大学路易斯安那州交通研究中心, 公路工程教育部重点实验室;; 西安;;巴吞鲁日, 陕西;; 710064;;70803, 中国.

解志腾, 长安大学特殊地区, 公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

申爱琴, 长安大学特殊地区, 公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

张优华, 长安大学特殊地区, 公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: silver007007@163.com

电子邮件地址: silver007007@163.com

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作者: Hou Wei; He Shuanhai; Wu Lijie; Yan Lei

作者: 侯炜; 贺拴海; 吴礼杰; 闫磊

标题: Analysis on Elasto-plastic Ultimate Bearing Capacity of United Twin-pylon Asymmetrical PC Cable-stayed Bridge Based on Failure Mode

标题: 基于失效模式的双联塔非对称 PC 斜拉桥弹塑性极限承载力分析

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语言: Chinese

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作者关键词: bridge engineering; PC cable-stayed bridge; elasto-plastic analysis; ultimate bearing capacity; failure mode

作者关键词: 桥梁工程; 预应力混凝土斜拉桥; 弹塑性分析; 极限承载力; 失效模式

摘要: In order to study the failure mode and elasto-plastic ultimate bearing capacity of main girder of united twin-pylon asymmetrical PC cable-stayed bridge, the destruction form and safety reserve are used to guide the rational and safe operation of actual vehicles. Taking a cable-stayed bridge under construction as research object, based on the elastoplastic finite displacement theory, considering the double nonlinearity of material and geometry, the 3D solid elasto-plastic bridge model for Highway-I load and Vehicle-Super 20 load is established by using 3D elasto-plastic solid FE method and Abaqus software. The failure modes and the ultimate bearing capacity of the complete bridge under the 5 most unfavorable load conditions are calculated and analyzed. The result shows that (1) under the 2 kinds of design loads, the loading on the maximum positive bending moment zone of the main span is under the condition of the minimum structural safety factor, the values are 2.61 and 2.79 respectively, and the ultimate bearing state is the damage at the compression zone of main girder; (2) the safety factor of the structure under the Highway-I load is smaller than the that under the Vehicle-Super 20 load under 5 working conditions, the difference is in the range of 3.6% - 17.2%, and working condition of the minimum structural safety factors under the 2 kinds of load is the same; (3) when the load increment factor is less than 5, the structure is basically in the elastic state; (4) when the structure reaches the ultimate bearing state, the load increment factor of the Vehicle-Super 20 load is greater than that of Highway-I load; (5) since the structural ultimate safety factor of the Vehicle-Super 20 load is greater than that of the Highway-I class load, it is effective and safe to control the actual vehicle operation and management according to the Vehicle-Super 20-level vehicle layout in the bridge operation phase. The analysis result has a positive effect on better guaranteeing the design bearing capacity and the safety design level of the structure.

摘要: 为了研究双联塔非对称PC斜拉桥主梁的破坏形式和弹塑性极限承载力,利用其破坏形式和安全储备指导实际车辆合理安全运营。以某在建斜拉桥为研究对象,基于弹塑性有限位移理论,考虑材料、几何双重非线性,采用三维弹塑性实体有限元法,利用Abaqus软件建立了作用公路-I级和汽车-超20级设计荷载的成桥三维实体弹塑性有限元模型。计算分析了5个最不利荷载工况下结构成桥状态的破坏形式及弹塑性极限承载力。结果表明:在两种设计荷载作用下,主跨最大正弯矩区加载为结构安全系数最小工况,其安全系数分别为2.61和2.79,极限承载状态为主梁受压区破坏;公路-I级荷载作用与汽车-超20级荷载作用相比较,5种工况下前者的结构安全系数均小于后者,差值在3.6%~17.2%,且两者的结构安全系数最小工况一致;荷载增量因子小于5时,结构基本处于弹性状态;结构达到极限承载状态时,汽车-超20级荷载增量因子大于公路-I级;由于汽车-超20级荷载作用下的结构极限安全系数大于公路-I级荷载作用下的,因此在桥梁运营阶段,按汽车-超20级的车辆布置形式进行实际车辆的运行管理控制是有效且安全的。分析结果对更好地保障结构的设计承载能力安全设计水平有积极作

用。

入藏号: CSCD:6612629

地址: Hou Wei, Chang'an University, Key Laboratory of Bridge Detection Reinforcement Technology of Transport Industry, Xi'an, Shaanxi 710064, China.

He Shuanhai, Chang'an University, Key Laboratory of Bridge Detection Reinforcement Technology of Transport Industry, Xi'an, Shaanxi 710064, China.

Yan Lei, Chang'an University, Key Laboratory of Bridge Detection Reinforcement Technology of Transport Industry, Xi'an, Shaanxi 710064, China.

Wu Lijie, Xi'an Keyuan Municipal Engineering and Consulting Co., Ltd., Xi'an, Shaanxi 710068, China.

地址: 侯伟, 长安大学, 旧桥检测与加固技术交通行业重点实验室, 西安, 陕西 710064, 中国.

贺拴海, 长安大学, 旧桥检测与加固技术交通行业重点实验室, 西安, 陕西 710064, 中国.

闫磊, 长安大学, 旧桥检测与加固技术交通行业重点实验室, 西安, 陕西 710064, 中国.

吴礼杰, 西安科源市政工程咨询有限公司, 西安, 陕西 710068, 中国.

电子邮件地址: chdhw@chd.edu.cn

电子邮件地址: chdhw@chd.edu.cn

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作者: Zhou Mi; Zhu Guoqiang; Wu Jiang; Lu Wei; Liu Pingjun

作者: 周敕; 朱国强; 吴江; 卢伟; 刘平均

标题: Constraint system for a long-span continuous rigid frame bridge under earthquake

标题: 地震下大跨径连续刚构桥合理约束体系研究

来源出版物: 振动与冲击 卷: 38 期: 10 页: 98-104 出版年: 2019

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作者关键词: continuous rigid frame bridge; bridge seismic performance; constraint system; nonlinear

作者关键词: 连续刚构桥; 桥梁抗震; 约束体系; 非线性

摘要: In order to study the seismic performance of the restraint system for a long-span continuous

rigid frame bridge under earthquake action and improve the overall earthquake resistance level of the bridge at the conceptual design stage, five different constraint systems were proposed for analysis and processing based on the current state of related technologies and devices. For a three-span continuous rigid frame bridge, using the three dimensional finite element analysis software and nonlinear time history analysis method, the bending moments at the top and bottom of piers as well as the displacement at the pier tops when using five different restraint systems were comparatively analysed. The results show that for the long-span continuous rigid frame bridge with the main span of more than 150 m, the cable-stayed damping bearing and the viscous damper combination system is the most suitable restraint system, the distribution of seismic forces on the piers is rather reasonable and the overall seismic level of the bridge can be better improved. The research results can be used in the design of similar long-span continuous rigid frame bridges.

摘要: 为了研究地震作用下的大跨径连续刚构桥约束体系问题,在概念设计阶段即着手提高桥梁的抗震性能,针对当前相关技术和装置现状,提出了5种不同的约束体系进行分析处理。结合某110 m + 210 m + 110 m三跨连续刚构桥,使用三维空间有限元分析软件,采用非线性时程分析方法,对比了5种不同约束体系下桥梁的桩顶、墩底、墩顶等截面的弯矩值和位移值。结果表明,对于所研究的主跨大于150 m的大跨径连续刚构桥,在过渡墩处设置拉索钢阻尼减震支座和黏滞阻尼器组合体系是最合适的约束体系,使各墩的地震力合理分配,更好地提高了桥梁整体抗震水平。该研究成果,可供同类大跨连续刚构桥借鉴。

入藏号: CSCD:6499908

地址: Zhou Mi, Chang'an University, Key Laboratory for Old Bridge Detection and Reinforcement Technology of the Ministry of Transportation, Xi'an, Shaanxi 710064, China.

Zhu Guoqiang, Chang'an University, Key Laboratory for Old Bridge Detection and Reinforcement Technology of the Ministry of Transportation, Xi'an, Shaanxi 710064, China.

Wu Jiang, Chang'an University, Key Laboratory for Old Bridge Detection and Reinforcement Technology of the Ministry of Transportation, Xi'an, Shaanxi 710064, China.

Lu Wei, Chang'an University, Key Laboratory for Old Bridge Detection and Reinforcement Technology of the Ministry of Transportation, Xi'an, Shaanxi 710064, China.

Liu Pingjun, Chang'an University, Key Laboratory for Old Bridge Detection and Reinforcement Technology of the Ministry of Transportation, Xi'an, Shaanxi 710064, China.

地址: 周敕, 长安大学, 旧桥检测与加固技术交通行业重点实验室, 西安, 陕西 710064, 中国.

朱国强, 长安大学, 旧桥检测与加固技术交通行业重点实验室, 西安, 陕西 710064, 中国.

吴江, 长安大学, 旧桥检测与加固技术交通行业重点实验室, 西安, 陕西 710064, 中国.

卢伟, 长安大学, 旧桥检测与加固技术交通行业重点实验室, 西安, 陕西 710064, 中国.

刘平均, 长安大学, 旧桥检测与加固技术交通行业重点实验室, 西安, 陕西 710064, 中国.

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作者: He Shuanhai; Chen Yinghao; Li Yuan

作者: 贺拴海; 陈英昊; 李源

标题: Exact algorithm for cable saddle of suspension bridge influences by frictional resistance

标题: 考虑摩阻力影响的悬索桥索鞍精确算法

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作者关键词: bridge engineering; suspension bridge; analytical algorithm; cable saddle position; pre-deviation; frictional resistance

作者关键词: 桥梁工程; 悬索桥; 解析算法; 索鞍位置; 预偏量; 摩阻力

摘要: To simulate the position of cable saddle in suspension bridge analysis and calculation precisely, and provide references for the design, construction, and monitoring of suspension bridges, an analytical algorithm were proposed. The influence of frictional resistance between the main cable and cable saddle on the cable saddle position was considered in the algorithm. The calculation formula of the friction coefficient was derived using Euler's formula. The mathematical model and Hooke's law of the saddle was established, and the calculation method of the friction between the main cable and saddle was determined. The cable saddle calculation model was determined on the basis of elastic catenary and static equilibrium equation, considering the relation between mechanics and geometry. The calculation formula was derived based on the deviation between the coordinates of the original cable saddle position and the position of cable saddle in balanced state. Jacobian Matrix was introduced to cyclically solve this problem through Newton's method, cyclic iteration significantly decreases the deviation value considering the prescribed limit, and the cable saddle elements were assumed to achieve balanced position. At the same time, the tangent stiffness matrix was deduced. A cable saddle simulation method which applicable to finite elements was proposed, and the concept of temperature retractable pole was used in simulating the cable saddle of suspension bridge during construction, combined with the analytical algorithm and numerical algorithm. The calculating accuracy of alignment of the main cable during construction was improved, and iterative computation of the MATLAB program was used. The reliability of the algorithm was validated, by comparing two examples, and the trend of the influence of frictional resistance in cable saddle position was demonstrated, by changing the value of frictional resistance. The results show that the proposed analytical algorithm can exactly simulate the cable saddle position, and has good convergence. The influence of frictional resistance on cable saddle position is negligible. Thus, it may be ignored in a simplified calculation. However, especially in force analysis for the long span and multi-span suspension bridges, the influence should be taken into account.

摘要: 为了在悬索桥分析计算中精确模拟索鞍位置,给悬索桥的设计、施工和监控等提供参考,

提出了一种索鞍位置的解析算法。该算法考虑了主缆与索鞍间摩阻力对索鞍位置的影响,根据欧拉公式,推导了摩阻系数的计算公式,通过建立索鞍数学模型和胡克定律,提出了主缆与索鞍间索鞍摩阻力计算方法。从力学和几何关系出发,建立基于弹性悬链线和静力平衡方程的索鞍计算模型,推导了基于初始索鞍位置坐标与平衡状态索鞍位置坐标间偏差的计算公式,引入雅克比矩阵,通过牛顿迭代法求解,使得偏差小于某一允许限值,即可认为索鞍单元位于平衡位置,同时推导了索鞍单元的切向刚度矩阵。结合解析算法,引入温度伸缩杆的概念,给出了一种适用于有限元分析与数值算法相结合的索鞍模拟方法,可用于精确模拟悬索桥索鞍在施工过程中的顶推,提高主缆在施工过程中线形的计算精度,将算法通过 MATLAB 程序进行迭代计算。最后,通过 2 组算例对比验证了该算法的可靠性,并通过改变摩阻力的取值,分析了摩阻力对索鞍位置的影响趋势。研究表明:提出的解析算法可精确模拟索鞍位置,公式收敛性好;摩阻力对索鞍位置的影响较小,简化计算中可以忽略,但在精确分析尤其是大跨、多跨悬索桥受力分析时,应予以考虑。

入藏号: CSCD:6470859

地址: He Shuanhai, Chang'an University, Key Laboratory of Old Bridge Detection Reinforcement Technology Ministry of Transport, Xi'an, Shaanxi 710064, China.

Li Yuan, Chang'an University, Key Laboratory of Old Bridge Detection Reinforcement Technology Ministry of Transport, Xi'an, Shaanxi 710064, China.

Chen Yinghao, Research Institute of Highway, Ministry of Transport, Beijing 100088, China.

地址: 贺拴海, 长安大学, 旧桥检测与加固技术交通行业重点实验室, 西安, 陕西 710064, 中国.

李源, 长安大学, 旧桥检测与加固技术交通行业重点实验室, 西安, 陕西 710064, 中国.

陈英昊, 交通运输部公路科学研究院, 北京 100088, 中国.

电子邮件地址: heshai@chd.edu.cn

电子邮件地址: heshai@chd.edu.cn

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作者: Ren Wei; Guo Lin; Yang Yang; Zhang Deqiang

作者: 任伟; 郭林; 杨阳; 张德强

标题: String debonding effect of curved RC member reinforced by bonding FRP in intrados

标题: 曲面混凝土构件内弧粘贴 FRP 弦剥离效应

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作者关键词: bridge engineering; reinforcement of old bridge; curved RC member; bonding FRP on intrados; string-debonding effect

作者关键词: 桥梁工程; 旧桥加固; 曲面混凝土构件; 内弧粘贴 FRP; 弦剥离效应

摘要: The bonding tests of FRP(fiber reinforced polymer/plastic)-concrete interfaces of 26 curved surface specimens were executed,and the influences of concrete strength,FRP bonding layer numbers,FRP bonding length,and component curvatures on the adhesive strength, interface strain and failure mechanism were investigated.Research result shows that there are three kinds of failure modes in curved concrete members,including the string peeling,FRP fracture at the crack,FRP peeling on the crack side.The greater the curvature of the component, the more likely the string peeling will occur.FRP tensile failure often occurs in small curvature members.With the increase of external load,the peak value of FRP strain has a backward transfer process.It is shown that the FRP along the fiber length is not all involved in the work, and there is an effective working(bonding)length.The analysis result of the test data by the virtual zero point method shows that the effective length of FRP pasted on curved concrete members is about 14cm.The curvature has a significant effect on the adhesive strength.With the increase of the curvature,the changing gradient of the fiber strain increases,the effective adhesive length becomes shorter,and the adhesive strength decreases.When the curvature is the same,the more the number of fiber layers,the more uniform the strain distribution along the fiber direction and the higher the adhesive strength.But this increase is not linear with the number of FRP layers,and the adhesive strength with two layers of fiber is about 1.5times of that with one layer.When the number of fiber layers increases,the normal stress of the adhesive layer increases rapidly,and the specimens are more prone to string-debonding failure.This failure is caused by the coupling effect between the normal bonding stress and in-plane shear stress.The stress function of the pasting layer can be expressed by the cosine function of the center angle of internal arc curvature.When the vector height is 30,60,and 90mm,the average error of the component is 7.7%,2.4%,and 8.8%,therefore,the function has higher accuracy. 2tabs,15figs,30refs.

摘要: 进行了26个曲面构件的FRP-混凝土界面粘贴试验,研究了混凝土强度、FRP粘贴层数、FRP粘贴长度与构件曲率对粘贴强度、界面应变与破坏机理的影响。研究表明:曲面混凝土构件内弧粘贴FRP易出现3种破坏形态:弦剥离破坏、FRP在裂缝处被拉断和FRP在试件裂缝一侧发生剥离,其中构件曲率越大,越容易发生弦剥离破坏,小曲率构件多发生FRP拉断破坏;随外荷载的增大,FRP应变峰值有一个向后传递的变化过程,说明沿纤维长度方向的FRP并不是全部参与工作,存在一个有效工作(粘贴)长度;对本试验数据采用虚拟零点方法分析得出,曲面混凝土构件内弧粘贴FRP有效粘贴长度约为14cm;曲率对粘贴强度影响显著,曲率增大,纤维应变梯度增大,有效粘贴长度变小,粘贴强度降低;曲率相同时,纤维层数越多,沿纤维方向应变分布越均匀,粘贴强度越大,但是这一增长并非与FRP层数成线性关系,2层纤维粘贴强度约为1层的1.5倍;当纤维层数增加时,粘贴层法向应力增大较快,试件更易发生弦剥离破坏,这种破坏是由法向粘贴应力与面内剪应力的耦合效应引起的;粘贴层应力函数可用内弧曲率圆心角的余弦函数表示,当矢高分别为30、60、90mm时,构件平均误差分别为7.7%、2.4%与8.8%,因此,函数精度较高。

入藏号: CSCD:6451290

地址: Ren Wei, Chang'an University, Key Laboratory of Bridge Detection Reinforcement Technology of Ministry of Transport, Xi'an, Shaanxi 710064, China.

Zhang Deqiang, Chang'an University, Key Laboratory of Bridge Detection Reinforcement Technology of Ministry of Transport, Xi'an, Shaanxi 710064, China.

Guo Lin, Xi'an Qujiang Construction Group Co.,Ltd., Xi'an, Shaanxi 710061, China.

Yang Yang, Department of Civil, Environmental, and Biomedical Engineering, University of Hartford, West Hartford, 06117, USA.

地址: 任伟, 长安大学, 旧桥检测与加固技术交通行业重点实验室, 西安, 陕西 710064, 中国.

张德强, 长安大学, 旧桥检测与加固技术交通行业重点实验室, 西安, 陕西 710064, 中国.

郭林, 西安曲江建设集团有限公司, 西安, 陕西 710061, 中国.

杨阳, 哈特福德大学土木、环境与生物医学工程系, 康涅狄格, 06117.

电子邮件地址: rw@chd.edu.cn

电子邮件地址: rw@chd.edu.cn

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作者: Guo Yinchuan; Chen Zhihui; Shen Aiqin; Li Peng

作者: 郭寅川; 陈志晖; 申爱琴; 李鹏

标题: Optimization mix design of bridge deck concrete based on crack resistance in alpine regions

标题: 基于抗裂性能的高寒地区桥面板混凝土配合比优化设计

来源出版物: 长安大学学报. 自然科学版 卷: 39 期: 4 页: 1-8 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: road engineering; recommended value of mix proportion; shrinkage test; anti cracking performance; alpine region; microscopic mechanism

作者关键词: 道路工程; 配合比建议值; 收缩试验; 抗裂性能; 高寒地区; 微观机理

摘要: In order to solve the early shrinkage cracking problem of bridge deck concrete in alpine regions, the concrete working environment of the alpine regions were simulated, the dry shrinkage and plastic shrinkage tests of water cement ratio were conducted, and the effects of the cement and superplasticizer on the cracking performance of the bridge deck concrete were determined. By

using SEM electron microscopy, concrete shrinkage cracks and the evolution process of the micro analysis were clearly identified, and the design proposal for the alpine region based on the crack resistance of concrete bridge deck was presented. The results show that the water cement ratio is an important factor affecting the early shrinkage and crack resistance of the concrete bridge panel in the alpine area. The high water cement ratio was helpful in improving the early shrinkage and crack resistance of the concrete deck C40 bridge and it was conducive to the early age curing the infiltration of water. However, a water cement ratio higher than 0.49 would appear inferior when the crack resistance of concrete mixed plastic and the trend increase, the dosage of cement increased significantly in the 7 d panel concrete shrinkage crack, accelerated through shaping, and increased further to 80 kg/m³, shaping the cracking time would advance 20 min, the though time would be shortened 32 min, so based on the dry shrinkage and plastic shrinkage test results, the best mixing amount should be controlled within 260~300 kg/m³. The superplasticizer was added to refine the initial crack concrete, which made it appear more deterioration trend and its meso crack width was in contraction increased for bridge deck concrete work requirements, the content should be controlled between 0.5%~0.8%; 5 d before the bridge deck concrete shrinkage value accounted for more than 7 d total shrinkage of 80%, and reached the peak at fifth days, it should be as far as possible to extend the curing time to fifth days to reduce early the hydration shrinkage crack. 1 tab, 13 figs, 23 refs.

摘要: 为解决高寒地区桥面板混凝土早期收缩抗裂性不足的问题,在室内模拟高寒地区桥面板工作环境并通过干缩和塑性收缩试验,研究水灰比、水泥用量和减水剂掺量对高寒环境下桥面板混凝土早期收缩阻裂性能的影响规律;采用扫描电子显微镜(SEM)测试技术对混凝土收缩裂缝的产生和演化过程进行微观剖析,从而提出基于抗裂性能的高寒地区桥面板混凝土配合比设计建议值。研究结果表明:水灰比是影响高寒地区桥面板混凝土早期收缩性能的重要因素,高水灰比有利于提高 C40 桥面板混凝土早期收缩抗裂性能,也利于早龄期养护水的渗入,但水灰比高于 0.49 时混凝土塑性抗裂性能会呈现劣化趋势;水泥用量增加会显著增大桥面板混凝土 7 d 内的收缩值,加速塑性裂缝的贯通,且水泥用量每增加 80 kg/m³,塑性开裂时间将提前 20 min,贯通开裂时间将缩短 32 min,因此水泥用量应控制在 260~300 kg/m³ 之间为宜;高效缓凝减水剂的掺入会细化混凝土内部初始裂缝,使其在收缩时呈现多向劣化趋势且贯通裂缝宽度也会显著增大,对有工作性能要求的桥面板混凝土,减水剂掺量应控制在 0.5%~0.8% 之间为宜;桥面板混凝土前 5 d 的收缩值占 7 d 总收缩值的 80% 以上,且在第 5 d 达到峰值,所以应尽可能延长养护时间至第 5 d,以减少早期水化带来的收缩裂缝。

入藏号: CSCD:6555485

地址: Guo Yinchuan, Chang'an University, Key Laboratory of Highway Engineering in Special Region of Ministry of Education, Xi'an, Shaanxi 710064, China.

Chen Zhihui, Chang'an University, Key Laboratory of Highway Engineering in Special Region of Ministry of Education, Xi'an, Shaanxi 710064, China.

Shen Aiqin, Chang'an University, Key Laboratory of Highway Engineering in Special Region of Ministry of Education, Xi'an, Shaanxi 710064, China.

Li Peng, Chang'an University, Key Laboratory of Highway Engineering in Special Region of Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 郭寅川, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

陈志晖, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

申爱琴, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

李鹏, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: silver007007@163.com
电子邮件地址: silver007007@163.com
使用次数 (最近 180 天): 0
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作者: Liu Zhanliang; Zhang Chen; Xu Jinliang

作者: 刘占良; 张琛; 许金良

标题: Low-temperature performance and it's evaluation methods of finished product rubber asphalt mixture in alpine region

标题: 高寒地区成品橡胶沥青混合料的低温性能及评价方法

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文献类型: Article

作者关键词: road engineering; alpine region; finished product rubber asphalt mixture; low-temperature performance; evaluation method

作者关键词: 道路工程; 高寒地区; 成品橡胶沥青混合料; 低温性能; 评价方法

摘要: To study the evaluation methods and low-temperature performance of a RA-1 finished product rubber asphalt mixture in an alpine region, a test along the south section of the Sichuan-Tibet Highway was selected as the support construction. The strength, aging and freeze-thaw cycle effect of the asphalt mixture through laboratory tests such as the beam bending, splitting, aging, and freeze-thaw cycle tests were used to analyze the low temperature performance of a the RA-1 rubber asphalt mixture and provide a reasonable performance evaluation standard at low temperature. The results show that when the temperature is from -5 °C to 0 °C, the maximum bending strain of the RA-1 rubber asphalt mixture show a greater increase of approximately 34.4%. When the loading rate is 2 mm/min, the splitting test can reflect the damage process of the mixture at low temperature. With an increase in temperature, the maximum bending strain and cleavage strength of the mixture following short-term aging are greater than that after long-term aging. After approximately 20 freeze-thaw cycles, the splitting tensile strength of the mixture attenuation trend gradually stabilizes. After 40 freeze-thaw cycles, the maximum bending strain of the mixture decreases by 13.9%, compared to that of the initial state. A splitting test is suitable to evaluate low temperature performance for the new mixture, and the loading rate is

appropriate for an adjustment of 2 mm/min. A low-temperature bending test is suitable to evaluate low-temperature performance of the mixture after long-term aging, and the loading rate is appropriate for an adjustment of 15 mm/min. A freeze-thaw splitting test is suitable to evaluate the low-temperature performance for the mixture with freeze-thaw action and the loading rate is appropriate for an adjustment of 2 mm/min. The RA-1 finished rubber asphalt mixture is suitable for road surfaces in the Sichuan alpine region.

摘要: 为了研究高寒地区 RA-1 型成品橡胶沥青混合料的低温特性,以川藏南线四川段为依托工程,从沥青混合料的强度、老化及冻融循环效应等方面入手,通过室内小梁弯曲试验、劈裂试验、老化试验及冻融循环试验对其低温性能进行分析,并提出合理的低温性能评价标准。研究表明:在 -5 °C~0 °C 时,RA-1 型橡胶沥青混合料的最大弯拉应变的增幅较大,约为 34.4%;当加载速率为 2 mm/min 时,采用劈裂试验更能体现出 RA-1 型橡胶沥青混合料在四川高寒地区的低温破坏过程;随着温度的升高,短期老化后,其最大弯拉应变和劈裂强度均大于长期老化后的相应值,在经历约 20 次冻融循环作用后,RA-1 型橡胶沥青混合料的劈裂抗拉强度衰减趋势逐渐趋于平缓;与初始未冻融状态相比,当经历 40 次冻融循环后,RA-1 型橡胶沥青混合料的最大弯拉应变衰减了 13.9%;劈裂试验适用于研究区域新拌 RA-1 型橡胶沥青混合料的低温性能评价,其加载速率适宜调整为 2 mm/min;低温弯曲试验适用于研究区域 RA-1 型橡胶沥青混合料经长期老化后的低温性能,其加载速率适宜调整为 15 mm/min;冻融劈裂试验适用于评价研究区域经冻融作用的 RA-1 型橡胶沥青混合料低温性能,其加载速率适宜调整为 2 mm/min。RA-1 型成品橡胶沥青混合料适用于四川高寒地区沥青路面的铺筑。

入藏号: CSCD:6633951

地址: Liu Zhanliang, Chang'an University;;Department of Railway Engineering, Shijiazhuang Institute of Railway Technology, Key Laboratory for Special Area Highway Engineering of Ministry of Education;; Xi'an;;Shijiazhuang, Shaanxi;;Hebei 710064;;050041.

Zhang Chen, School of Energy and Architecture, Xi'an Aeronautical University, Xi'an, Shaanxi 710077, China.

Xu Jinliang, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 刘占良, 长安大学;;石家庄铁路职业技术学院铁道工程系, 特殊地区公路工程教育部重点实验室;;西安;;石家庄, 陕西;;河北 710064;;050041, 中国.

张琛, 西安航空学院能源与建筑学院, 西安, 陕西 710077, 中国.

许金良, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: 542389337@qq.com

电子邮件地址: 542389337@qq.com

使用次数 (最近 180 天): 0

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作者: Zhang Jiupeng; Wang Pei; Ge Jingyong; Xing Xiangyang; Liu Yimeng

作者: 张久鹏; 王培; 葛敬勇; 邢向阳; 刘一濛

标题: Test methods and influencing factors for asphalt pavement hydrops and icing thickness detection based on infrared technology

标题: 基于红外技术的沥青路面积水结冰厚度测试方法与影响因素

来源出版物: 东南大学学报. 自然科学版 卷: 49 期: 6 页: 1187-1192 出版年: 2019

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语言: Chinese

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作者关键词: pavement hydrops; pavement icing; thickness detection; infrared technology; photoelectric sensor

作者关键词: 路面积水; 路面结冰; 厚度检测; 红外技术; 光电传感器

摘要: In order to detect the safety condition of pavement, a method for asphalt pavement hydrops and icing thickness detection based on infrared technology was proposed. A photoelectric sensor integrated with infrared light-emitting diodes and photoelectric triodes was developed to judge the dry and wet conditions of the road surface and quantitatively detect the hydrops and icing thickness. The influence of the temperature, the light intensity, the slurry water mass ratio, the volume of air voids and the texture structure of surface were also analyzed. The results show that the temperature, the light intensity and the slurry water mass ratio have no significant effect on the output voltage when the significance level α is 0.05. However, the output voltage is greatly affected by the volume of air voids and the texture structure of the specimen. The developed sensor and the proposed test method can distinguish pavement hydrops and icing thickness with different volumes of air voids and texture structures, which can provide reference for practical engineering application.

摘要: 为了检测路面安全状况,提出了一种基于红外技术的沥青路面积水结冰厚度测试方法.采用红外发光二极管和光电三极管集成制作了收发一体的光电传感器,实现了对路面干燥和潮湿状态的判断以及积水深度和结冰厚度的量化检测,并从环境温度、光照强度、泥水质量比、试件空隙率和路表纹理构造等方面分析了其影响规律.研究结果表明,取显著水平 $\alpha=0.05$,环境温度、光照强度和泥水质量比对输出电压无显著影响,试件空隙率和路表纹理构造则对输出电压有显著影响.利用开发的传感器和所提测试方法,能够显著区分不同空隙率和路表纹理下路面积水深度和结冰厚度,为实际工程应用提供参考.

入藏号: CSCD:6629175

地址: Zhang Jiupeng, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Wang Pei, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Xing Xiangyang, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Ge Jingyong, Henan Urban Planning and Design Research Institute Co., Ltd., Zhengzhou, Henan

450044, China.

Liu Yimeng, Engineering Design Institute of CCCC Fourth Highway Co., Ltd., Xi'an, Shaanxi 710075, China.

地址: 张久鹏, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

王培, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

邢向阳, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

葛敬勇, 河南省城乡规划设计研究总院有限公司, 郑州, 河南 450044, 中国.

刘一濛, 中交第四公路工程局有限公司西安工程设计分公司, 西安, 陕西 710075, 中国.

电子邮件地址: zhjiupeng@chd.edu.cn

电子邮件地址: zhjiupeng@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Gao Jiangping; Liu Wenzhi; Yang Jiqiang

作者: 高江平; 刘雯支; 杨继强

标题: Formulas for bearing capacity of soft soil foundations with hard crust based on three-shear stress unified strength theory

标题: 基于三剪应力统一强度理论的硬壳层软土地基承载力公式

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作者关键词: soft soil foundation with dry crust; three-shear stress unified strength theory; plastic load; critical load

作者关键词: 硬壳层软土地基; 三剪应力统一强度理论; 临塑荷载; 临界荷载

摘要: The soft soil foundations with dry crust are different from the homogeneous foundations. Due to the closure effect and stress diffusion of hard crust, the method for the plastic and critical loads of soft soil foundations is different from that for the homogeneous foundation. By using the unified strength theory of three shears to analyze and calculate the double-layer foundation and considering the influences of the closure effect and stress dispersion with the static lateral pressure coefficient, the formulas for the plastic and critical loads of

hard-shell layer soft soil foundations are obtained. Meanwhile, by adjusting the coefficients b and c , the formulas for the bearing capacity of foundations under the unified strength theories of twin-shear and Mohr-Coulomb are obtained, and the three formulas are compared through examples. The results show that with the increase of the coefficients b, c and the static earth pressure, the bearing capacity of the foundation increases. The unified strength solution of twin-shear and Mohr-Coulomb solutions are divided into three shear unified strength solutions. The three-shear strength solution is more in line with the actual situation.

摘要: 硬壳层软土地基与均质地基不同, 由于其封闭作用和扩散作用, 其地基临塑荷载和临界荷载与均质地基的有较大差异, 将三剪统一强度理论运用到双层地基分析计算中, 并考虑静止侧压力系数不为 1 的情况, 以及硬壳层应力扩散作用和封闭作用对地基的影响, 得出硬壳层软土地基的临塑荷载和临界荷载计算公式, 同时, 通过系数 b, c 的变化, 得出双剪统一强度理论和莫尔-库仑理论下的地基承载力公式, 并将 3 种计算公式通过实例进行比较。结果表明, 随着参数 b, c 以及静止土压力系数的增加, 地基承载力均会增加, 同时双剪统一强度理论解以及 Mohr-Coulomb 解均为三剪统一强度理论解的特例, 三剪应力统一理论解更符合工程实际情况。

入藏号: CSCD:6632311

地址: Gao Jiangping, Chang'an University, Key Laboratory for Special Area Highway Engineering, Ministry of Education, Xi'an, Shaanxi 710064, China.

Liu Wenzhi, Chang'an University, Key Laboratory for Special Area Highway Engineering, Ministry of Education, Xi'an, Shaanxi 710064, China.

Yang Jiqiang, Chang'an University, Key Laboratory for Special Area Highway Engineering, Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 高江平, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

刘雯支, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

杨继强, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: 2227940211@qq.com

电子邮件地址: 2227940211@qq.com

使用次数 (最近 180 天): 0

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作者: Li Youyun; Xie Ke; Sun Yongmei; Li Songhao; An Xinhou

作者: 李又云; 谢柯; 孙永梅; 李松皓; 安鑫厚

标题: Stress and deformation analysis and reinforcement time selection of composite foundations in shallow loess tunnels

标题: 浅埋黄土隧道复合地基受力变形分析及加固时机选择

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作者关键词: tunnelling engineering; loess tunnel; jet grouting pile; strengthening time; model test; numerical simulation

作者关键词: 隧道工程; 黄土隧道; 旋喷桩; 加固时机; 模型试验; 数值模拟

摘要: In order to study the structural deformation characteristics of shallow-buried large-cross-section loess tunnels strengthened by jet grouting piles and the choice of time for foundation reinforcement, indoor model tests and numerical simulations were performed, and the influence of piles and application time on the mechanical deformation characteristics of the tunnel structure was analyzed. The results show that the reinforcement effect of jet grouting piles to the foundation is remarkable and the deformation of surrounding rock at the bottom of the tunnel can be effectively reduced. In the case of full cross-section reinforcement by piles, the stress release of the surrounding rock is relatively sufficient with a large deformation. The displacement of the initial support easily exceeds the limit range in actual construction, and all the piles at the bottom of the tunnel are under pressure, which is beneficial to mobilize the effective bearing capacity of the piles in the later period. It is recommended that the full cross-section reinforcement scheme is adopted while the surrounding rock of the tunnel is stable. In the case of pile reinforcement in stages, however, the earlier closure of the support system is beneficial to the stability of the tunnel structure, but the piles in the middle of the bottom of the tunnel are in tension state and hence, are easy to break during the construction period. It is suggested that the second scheme can be used when the surrounding rock of the tunnel is unstable and at the same time, the piles should be reinforced. The research can provide a reference for the choice of time reinforcement of rotary jet grouting piles for loess tunnel base.

摘要: 为研究旋喷桩加固基底的浅埋大断面黄土隧道结构受力变形特征及基底加固时机的选择,采用室内模型试验与数值模拟相结合的方法,分析了基底加桩及不同加桩时机对隧道结构受力变形特征的影响。结果表明:旋喷桩加固基底效果显著,可有效降低隧底的围岩变形;方案一条件下的围岩应力释放较为充分,围岩变形量较大,实际施工中初支易侵限,隧底桩体全部处于受压状态,利于后期发挥桩体的有效承载力,在可保证隧道围岩稳定时建议选用;方案二较早的实现支护体系的封闭,利于隧道结构的稳定,但隧底中部桩体处于受拉状态,在施工期易出现拉断现象,建议在隧道围岩条件差时选用,同时应对桩体进行加筋等类似措施处理。研究成果可为黄土隧道基底进行旋喷桩加固的时机选择提供借鉴。

入藏号: CSCD:6607682

地址: Li Youyun, Chang'an University, Key Laboratory for Special Area Highway Engineering, Ministry of Education, Xi'an, Shaanxi 710064, China.

Xie Ke, Chang'an University, Key Laboratory for Special Area Highway Engineering, Ministry of Education, Xi'an, Shaanxi 710064, China.

Sun Yongmei, Chang'an University, Key Laboratory for Special Area Highway Engineering, Ministry of Education, Xi'an, Shaanxi 710064, China.

Li Songhao, Chang'an University, Key Laboratory for Special Area Highway Engineering, Ministry of Education, Xi'an, Shaanxi 710064, China.

An Xinhou, Chang'an University, Key Laboratory for Special Area Highway Engineering, Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 李又云, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

谢柯, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

孙永梅, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

李松皓, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

安鑫厚, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: 908630313@qq.com

电子邮件地址: 908630313@qq.com

使用次数 (最近 180 天): 0

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作者: Guo Yinchuan; Shen Aiqin; Wang Shengnan; Li Peng; Zhou Shengbo

作者: 郭寅川; 申爱琴; 王胜难; 李鹏; 周胜波

标题: Deterioration Behavior of Interfacial Transition Zone and Its Correlation with Strength of a Concrete Pavement in Seasonal Frost Region

标题: 季冻区路面混凝土界面区劣化行为及与强度相关性

来源出版物: 中国公路学报 卷: 32 期: 8 页: 49-57 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: road engineering; deterioration; coupled loading condition; interfacial transition zone; microstructure; strength

作者关键词: 道路工程; 劣化; 耦合试验; 界面区; 细观结构; 强度

摘要: To obtain the deterioration behavior of the interfacial transition zone(ITZ)and its effect on the durability of concrete pavement suffering from a combination of an environment attack and mechanical fatigue load (in a seasonal frost region),coupled loading condition of fatigue load(normal traffic and overload),freeze-thaw cycles(FTC)and dry-wet cycles(DWC)was conducted to simulate this interactive effect on concrete during service.The single fatigue load condition and the coupled loading condition of fatigue load and FTC were designed under normal traffic to discover the critical factor that influences the deterioration behavior of ITZ. Studies on

the microstructure and Ca/Si ratio of the ITZ at different loading stages have been conducted by means of scanning electron microscopy(SEM)and energy dispersive X-ray analysis (EDXA).The mechanical properties of pavement concrete under coupled condition of load,FTC, and DWC were measured through a static flexural tensile strength test.Furthermore,the correlation between strength and ITZ deterioration were studied using multiple regression analysis.The results demonstrate that during concrete pavement service in seasonal frost region, the mechanical load leads to localized damage around the principle intrinsic cracks while the environment attack of FTC and DWC contribute to crack propagation in all directions to form large defects,during which the ITZ deterioration is observed to be a physico-chemical process. As the flexural tensile strength of concrete keeps decreasing,many cracks intersect and breakthrough in ITZ,the density C decreases,and calcium hydroxide crystallizes;during overload,the fatigue life of concrete is much shorter and the micro-cracks in ITZ widens.When concrete ruptures,the ITZ width is 70 μm ,density C is 50.96%-54.25%,maximum length and width of micro-cracks are 24.48-26.04 μm and 11.73-15.72 μm ,respectively.The multiple linear regression equation could be used to quantitatively analyze the relationship between the strength of concrete and ITZ structural defects.Their extents of effect on strength are density C >crack width >crack length.

摘要: 为了揭示季冻区路面混凝土界面区在自然环境与车辆荷载耦合作用下的劣化机理,以及界面区劣化对路面耐久性的影响,通过室内设计普通交通环境和超载条件下的荷载-冻融-干湿循环三场耦合试验模拟路面水泥混凝土实际工作环境,并与普通交通条件下的疲劳荷载单因素试验及荷载-冻融双场耦合试验进行对比,以探求季冻区路面混凝土界面区劣化的主要影响因素;采用扫描电镜观测和 X 射线能谱分析分别测定在混凝土处于不同耦合作用阶段的界面区细观结构、钙硅比变化;采用静态弯拉强度试验测定三场耦合下各阶段的混凝土力学性能,并采用多元回归分析方法揭示路面混凝土界面区劣化行为与混凝土强度的相关性。结果表明:季冻区路面混凝土运营时,车辆荷载主要引起混凝土界面区沿原生微裂缝的局部损坏;冻融循环伴随干湿交替的环境作用促使裂缝在各方向蔓延形成大片缺陷,且该界面区劣化行为是物理-化学过程。主要表现为,路面混凝土的抗弯拉强度呈下降趋势;界面区大量裂缝交叉贯通,密实度显著降低,氢氧化钙结晶析出;超载情况下,疲劳寿命急剧缩短,且界面区内部微裂纹的宽度显著增大。混凝土疲劳破坏时,界面区临界损伤阈值为:界面区宽度为 70 μm ;密实度为 50.96%~54.25%;微裂缝最大长度在 24.48~ 26.04 μm 之间;微裂缝最大宽度在 11.73~15.72 μm 之间。可利用多元线性回归方程描述混凝土强度与界面区结构缺陷之间的定量关系,各结构参数对强度影响程度从大到小依次为:密实度、裂纹宽度、裂纹长度。

入藏号: CSCD:6567792

地址: Guo Yinchuan, Chang'an University;;Louisiana Transportation Research Center,Louisiana State University, Key Laboratory of Highway Engineering in Special Region of Ministry of Education;; Xi'an;;Louisiana, Shaanxi;;USA 710064;;70803.

Shen Aiqin, Chang'an University, Key Laboratory of Highway Engineering in Special Region of Ministry of Education, Xi'an, Shaanxi 710064, China.

Wang Shengnan, Chang'an University, Key Laboratory of Highway Engineering in Special Region of Ministry of Education, Xi'an, Shaanxi 710064, China.

Li Peng, Chang'an University, Key Laboratory of Highway Engineering in Special Region of Ministry of Education, Xi'an, Shaanxi 710064, China.

Zhou Shengbo, Chang'an University, Key Laboratory of Highway Engineering in Special Region of Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 郭寅川, 长安大学;;路易斯安那州立大学路易斯安那州交通研究中心, 特殊地区公路

工程教育部重点实验室;; 西安;;路易斯安那, 陕西;; 710064;;70803, 中国.

申爱琴, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

王胜难, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

李鹏, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

周胜波, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: silver007007@163.com

电子邮件地址: silver007007@163.com

使用次数 (最近 180 天): 0

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作者: Han Yuejie; Fu Zhipeng; Li Borong

作者: 韩跃杰; 富志鹏; 李博融

标题: Heat Transfer Model and Temperature Field Distribution Law of Tunnel in Permafrost Region

标题: 多年冻土区隧道传热模型及温度场分布规律

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作者关键词: tunnel engineering; high temperature permafrost areas; heat transfer model; temperature field; heat conduction; tunnel lining

作者关键词: 隧道工程; 高温多年冻土区; 传热模型; 温度场; 热传导; 隧道衬砌

摘要: Theoretical analysis, numerical simulation, and field monitoring of a tunnel heat transfer model and the temperature field distribution in a high-temperature permafrost region were carried out. Firstly, based on the theory of heat conduction, the radial heat transfer model of tunnel lining and surrounding rock was established, and the theoretical solution of the temperature field of the tunnel lining and surrounding rock in the cold region was obtained by superposition principle and Laplace transform method. Secondly, the differential equations of heat transfer of air in the tunnel were established. According to the principle of energy conservation, the gas-solid coupled heat transfer model of the air and tunnel wall in the longitudinal tunnel was established. Combined with the theoretical solution of the radial temperature field, a three-dimensional temperature field calculation method for the tunnel lining, surrounding rock, and air in the permafrost region was

proposed. The calculation method can take multilayer heat transfer media such as surrounding rock, lining, and insulation layer as well as different burial depths along the tunnel axis into account. Finally, according to the measured data in the field, the thermal physical parameters of surrounding rock were analyzed inversely. Based on the derived tunnel longitudinal and transverse heat transfer models, the temperature field distributions of lining and surrounding rock in different frozen soil areas of the Jiangluling Tunnel were analyzed. Analysis results show that in the radial direction of tunnel, the temperatures of surrounding rocks of permafrost and non-permafrost fluctuate with temperature changes in the tunnel. The closer the tunnel is to the surface of surrounding rocks, the larger the temperature fluctuates, and there is a certain lag in the radial heat transfer process of surrounding rock. Longitudinally, on the coldest day of the year, the temperatures of the tunnel lining and surrounding rock were low at both ends and high in the middle. At this time, the maximum surface temperature of the surrounding rock of Jiangluling Tunnel is -2.72°C , and the maximum surface temperature of the second lining is -7.80°C . On the hottest day of the year, the lining temperature was high at both ends and low in the middle, and the minimum surface temperature of the second lining of Jiangluling Tunnel is 1.92°C . The surface temperature of the surrounding rock is an inverted V-shape owing to the influence of the initial ground temperature of the surrounding rock, and the minimum surface temperature of the surrounding rock of the Jiangluling Tunnel is -1.22°C .

摘要: 针对高温多年冻土区隧道传热模型及温度场分布规律开展深入的理论分析、数值模拟和现场监测研究。首先,基于热传导理论,建立隧道衬砌和围岩径向传热模型,利用叠加原理和拉普拉斯变换法求得寒区隧道衬砌和围岩的温度场理论解;其次,建立洞内空气的传热微分方程,根据能量守恒原理,建立隧道纵向洞内空气与洞壁的气-固耦合传热模型,结合径向温度场理论解,提出多年冻土区隧道衬砌、围岩及洞内空气的三维温度场计算方法,该方法可考虑围岩、衬砌、保温层等多层传热介质及隧道沿洞轴线的不同埋深;最后,根据依托工程现场实测数据,反演围岩的热物性参数,并运用推导的隧道纵向传热模型和横向传热模型,分析姜路岭隧道不同冻土区内衬砌和围岩中的温度场分布规律。研究结果表明:在隧道径向,多年冻土和非冻土围岩温度都会随洞内气温的变化而产生波动,距离围岩表面越近,温度振幅越大,且热量在围岩径向传递过程中有一定的滞后性;在隧道纵向,在一年中最冷时刻,隧道衬砌及围岩温度呈两端低,中间高,此时姜路岭隧道围岩、二衬表面最高温度分别为 -2.72°C 、 -7.80°C ;在一年中最热时刻,衬砌温度呈两端高,中间低,此时姜路岭隧道二衬表面最低温度为 1.92°C ,但由于受围岩初始地温的影响,围岩表面的温度呈倒V形,最低温度为 -1.22°C 。

入藏号: CSCD:6554143

地址: Han Yuejie, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Fu Zhipeng, CCCC First Highway Consultants Co.,Ltd., State Key Laboratory of Road Engineering Safety and Health in Cold and High-altitude Regions, Xi'an, Shaanxi 710065, China.

Li Borong, CCCC First Highway Consultants Co.,Ltd., State Key Laboratory of Road Engineering Safety and Health in Cold and High-altitude Regions, Xi'an, Shaanxi 710065, China.

地址: 韩跃杰, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

富志鹏, 中交第一公路勘察设计研究院有限公司, 高寒高海拔地区道路工程安全与健康国家重点实验室, 西安, 陕西 710065, 中国.

李博融, 中交第一公路勘察设计研究院有限公司, 高寒高海拔地区道路工程安全与健康国家重点实验室, 西安, 陕西 710065, 中国.

电子邮件地址: 337931500@qq.com; 12766200@qq.com

电子邮件地址: 337931500@qq.com; 12766200@qq.com

使用次数 (最近 180 天): 1

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作者: Jiang Yingjun; Lin Hongwei; Han Zhanchuang; Chen Zhejiang; Hu Yonglin

作者: 蒋应军; 林宏伟; 韩占闯; 陈浙江; 胡永林

标题: Study of fatigue characteristics of cold recycled mixture of vertical vibration molding

标题: 垂直振动成型冷再生混合料疲劳特性研究

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作者关键词: cold recycled mixture; fatigue characteristics; vertical vibration method; RAP content

作者关键词: 冷再生混合料; 疲劳特性; 垂直振动法; RAP 掺量

摘要: In order to study the fatigue characteristics of the emulsified asphalt cold recycled mixture, the cylindrical test piece was formed by the vertical vibration method which was more in line with the compaction conditions of the mixture. The effects of reclaimed asphalt pavement material (RAP) content, forming method and water immersion environment on the fatigue characteristics of cold recycled mixture were studied. The fatigue equation of cold recycled mixture was established by Weibull distribution, and the fatigue anti-cracking mechanism of cold recycle was revealed by scanning electron microscopy. The results show that the new aggregate content has a significant effect on the fatigue performance of the cold recycled mixture. The fatigue performance shows a parabolic trend with the increase of the new aggregate content. When the new aggregate content is 20%, the fatigue performance is optimal. The cold recycled mixtures designed by vertical vibration method have better fatigue resistance and stress sensitivity than the Marshall method under stress. Compared with the unimmersed test piece, the fatigue life of the immersed test piece under different stress levels decreases, and is more sensitive to stress changes; cement-emulsified asphalt cement interpenetrates and cements, and the aggregates are tightly bonded to form a denser network structure, which effectively improves the interface deformation coordination of the cement and aggregate, and delays the development of cracks.

摘要: 为深入研究乳化沥青冷再生混合料的疲劳特性, 采用更符合混合料现场压实工况的垂

直振动法成型圆柱体试件.研究了 RAP 掺量、成型方法及浸水环境对冷再生混合料疲劳特性的影响,应用 Weibull 分布建立冷再生混合料疲劳方程,并借助扫描电镜揭示了冷再生的疲劳抗裂机理.结果表明:新集料掺量对冷再生混合料疲劳性能有显著影响,疲劳性能随新集料掺量的增加呈抛物线变化趋势,当新集料掺量为 20%时抗疲劳性能最优;垂直振动法设计冷再生混合料在应力作用下的抗疲劳性能及对应力变化敏感性优于马歇尔法;与未浸水试件相比,不同应力水平下浸水试件的疲劳寿命均缩短,对应力变化更加敏感;水泥-乳化沥青胶浆相互渗透胶结,并将集料紧密黏结,形成较致密的网状结构,有效改善胶浆与集料的界面协调变形,延缓裂缝发展.

入藏号: CSCD:6553847

地址: Jiang Yingjun, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Lin Hongwei, School of Highway Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Han Zhanchuang, School of Highway Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Zhejiang, Jinhua Highway Administration Bureau, Jinhua, Zhejiang 321000, China.

Hu Yonglin, Jindong Highway Management Section, Jinhua, Zhejiang 321000, China.

地址: 蒋应军, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

林宏伟, 长安大学公路学院, 西安, 陕西 710064, 中国.

韩占闯, 长安大学公路学院, 西安, 陕西 710064, 中国.

陈浙江, 金华市公路管理局, 金华, 浙江 321000, 中国.

胡永林, 金华市金东区公路管理段, 金华, 浙江 321000, 中国.

电子邮件地址: jjj@chd.edu.cn; 895615537@qq.com

电子邮件地址: jjj@chd.edu.cn; 895615537@qq.com

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作者: Zhang Yiwen; Han Sen; Liu Yamin

作者: 张怡文; 韩森; 刘亚敏

标题: Study of influence factors of noise performance of porous asphalt pavement based on tire-rolling-down method

标题: 基于轮胎滚动下落法的 PA 路面噪声性能影响因素研究

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作者关键词: tire-rolling-down method; porous asphalt pavement; noise performance; grey relational grade

作者关键词: 轮胎滚动下落法; 大空隙沥青路面; 噪声性能; 灰关联度

摘要: In order to simulate the mechanism of tire-road traffic noise efficiently,a laboratory test method of tire-rolling-down is proposed.Based on this method,the effects of different factors(void ratio,road thickness,nominal maximum size and TPS modifier dosage)on the noise performance of porous asphalt pavement are studied.The results show that based on this laboratory test method the noise main body is distributed in 400-5 000Hz and the noise peaks are concentrated at 630-800Hz for porous asphalt pavement,which is consistent with the spectrum distribution of field traffic noise. With the increase of void ratio,TPS modifier dosage and road thickness,A-weighted sound pressure level decreases,the noise performance of porous asphalt pavement is improved significantly;but the variation of sound pressure level caused by the change of nominal maximum size is not obvious.In addition,the calculation result of grey relational grade shows that the influence degree of each factor on noise performance is road thickness > TPS modifier dosage > nominal maximum size > void ratio.

摘要: 为了更好地模拟轮胎-路面交通噪声产生机理,提出了轮胎滚动下落的室内试验方法.基于此方法,研究了不同影响因素(空隙率、路面厚度、公称最大粒径、TPS 改性剂用量)对 PA(大空隙沥青)路面噪声性能的影响.研究表明:PA 路面的噪声主体集中分布在 400~5 000Hz,噪声尖峰分布在 630~800Hz,与实际交通噪声频谱图分布情况一致.随着空隙率、TPS 改性剂用量以及路面厚度增大,A 计权声压级明显降低,PA 路面噪声性能显著改善;由公称最大粒径的改变引起的声压水平变化不甚明显.此外,灰关联度计算结果显示,不同因素对噪声性能影响程度大小依次为路面厚度 > TPS 改性剂用量 > 公称最大粒径 > 空隙率.

入藏号: CSCD:6553849

地址: Zhang Yiwen, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Han Sen, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Liu Yamin, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 张怡文, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

韩森, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

刘亚敏, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: yiwenzhang331@163.com; hram_hs@chd.edu.cn

电子邮件地址: yiwenzhang331@163.com; hram_hs@chd.edu.cn

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作者: Han Yuejie; Wang Ronghua; Ru Han

作者: 韩跃杰; 王荣华; 茹含

标题: Scenic area road functional classification system based on tourist travel demand

标题: 面向游客出行需求的景区道路功能等级体系

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作者关键词: traffic engineering; scenic area road; road functional classification; tourist travel demand; traffic characteristic

作者关键词: 交通工程; 景区道路; 道路功能等级; 游客出行需求; 交通特性

摘要: In order to establish the functional classification system of scenic area road in China, the reasons of road functional classification and the nature of road function in scenic area were analyzed deeply, based on the reference of highway functional classification system in domestic and abroad. Focusing on traffic characteristics, scenic attraction and tourists demand, the demand of tourists for scenic road function was analyzed. Scenic area road functional classification system based on tourist travel demand was proposed, and scenic area road function was classified into three categories including scenic directional route, scenic distribution route and scenic connecting route. The influencing factors of scenic area road functional classification were analyzed, and the classification index was selected. Taking daily peak tourist reception as an index, scenic area road was classified into five classes including scenic directional route class I, scenic directional route class II, scenic distribution route class I, scenic distribution route class II and scenic connecting route. Meanwhile, the relationship among route class, daily peak tourist reception and the speed limit of sightseeing vehicles was established. The results show that the numbers of daily peak tourist reception of scenic directional route classes I and II are greater than 8×10^4 and $3.5 \times 10^4 \sim 8 \times 10^4$ people, and the design speeds are 60 and 50 km/h respectively. The numbers of daily peak tourist reception of scenic distribution route classes I and II are greater than 6×10^4 and $1 \times 10^4 \sim 6 \times 10^4$ people, and the design speeds are 40 and 30 km/h respectively. The number of daily peak tourist reception of scenic connecting route is less than 3.5×10^4 people, and the design speed is 20 km/h. The scenic area road functional classification system based on tourist travel demand can provide the important reference to scenic area road planning. 7 tabs, 1 fig, 23 refs.

摘要: 为了建立中国景区道路功能等级体系,以国内外公路功能等级体系为参考,深入分析景区道路功能分类的原因,阐明景区道路功能的本质。针对景区道路交通特性、景点吸引度和

游客需求,分析游客对景区道路功能的需求,提出面向游客出行需求的景区道路功能分类法,将景区道路功能分为景区直通线、景区疏通线、景区连通线 3 类。分析景区道路等级的影响因素,提取等级划分指标。以单日高峰游客接待量为指标,将景区道路划分为景区直通线I级、景区直通线II级、景区疏通线I级、景区疏通线II级、景区连通线 5 个等级,并确定了道路等级、单日高峰游客接待量和观光车限速之间的关系。研究表明:景区直通线I、II级道路对应的单日高峰游客接待量分别为大于 8 万人和 3.5 万~8 万人,设计速度分别为 60、50 km/h;景区疏通线I、II级道路对应的单日高峰游客接待量分别为大于 6 万人和 1 万~6 万人,设计速度分别为 40、30 km/h;景区连通线对应的单日高峰游客接待量为小于 3.5 万人,设计速度为 20 km/h。面向游客出行需求的景区道路功能等级体系可为景区道路规划提供重要参考。

入藏号: CSCD:6555498

地址: Han Yuejie, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Ru Han, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Wang Ronghua, College of Architecture and Civil Engineering, Beijing University of Technology, Beijing 100124, China.

地址: 韩跃杰, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

茹含, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

王荣华, 北京工业大学建筑工程学院, 北京 100124, 中国.

电子邮件地址: 337931500@qq.com; wangrh@bjut.edu.cn

电子邮件地址: 337931500@qq.com; wangrh@bjut.edu.cn

使用次数 (最近 180 天): 0

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作者: Weng Xiaolin; Li Hao; Shang Xuwen; Jia Yang; Zhou Shangqi; Hu Jibo

作者: 翁效林; 李豪; 尚许雯; 贾阳; 周尚琪; 胡继波

标题: Deformation properties of remolded loess under cyclic loading

标题: 循环荷载下重塑黄土变形特性

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作者关键词: subgrade engineering; remolded loess; cyclic loading; principal stress axis rotation; stress; strain; non-coaxiality; hollow cylindrical torsional shear apparatus

作者关键词: 路基工程; 重塑黄土; 循环荷载; 主应力轴旋转; 应力; 应变; 非共轴性; 空心圆柱扭剪仪

摘要: To study the effect of coupling changes in principal stress direction and magnitude on the stress-strain state and non-coaxiality of soil, a series of cyclic torsional shear tests were carried out on the saturated remolded loess by using a hollow cylindrical torsional shear apparatus, and the variation rules and influencing factors of stress-strain state and non-coaxial angle were analyzed. Experimental result shows that the axial strain is always in a compression state, the hoop strain accumulates negatively first and then positively, the radial strain is basically in a tension state, the tension and compression states of shear strain alternate, the fluctuation characteristics of axial, hoop and shear strain curves are obvious, while the fluctuation characteristic of radial strain curve is weak, indicating that each strain component shows different development laws under the cyclic loading. The axial and radial strains and the variation amplitudes of hoop and shear strains increase first and then decrease as the intermediate principal stress coefficient increases, indicating that the intermediate principal stress coefficient affects the cumulation of each strain component. With the increase of rotation range of principal stress direction angle, the axial and radial strains decrease gradually, the trend of hoop strain changing from negative to positive advances, and the variation amplitude of shear strain decreases gradually, indicating that the rotation range of principal stress direction angle affects the development trend of each strain component. The hysteresis phenomena of shear and normal differential stress-strain curves are obvious, and the stiffness consolidates cyclically, but the cyclic strengthening of shear stiffness is more obvious than that of normal differential stiffness, indicating that the secondary anisotropy occurs in the soil. This is an intrinsic cause of the non-coaxial phenomenon. The non-coaxial angle curve moves down first and then moves up as the intermediate principal stress coefficient increases, and moves up gradually as the cycle number increases. The variation range of non-coaxial angle curve increases as the deviating stress amplitude increases. Thus, the intermediate principal stress coefficient, cycle number and deviating stress amplitude can obviously affect the stress-strain state and non-coaxiality of saturated remolded loess, which should be considered in loess engineering design and constitutive relationship research. 1tab, 18figs, 32refs.

摘要: 为研究主应力方向和大小耦合变化对土体应力-应变状态及非共轴性的影响,采用空心圆柱扭剪仪对饱和重塑黄土开展一系列循环扭剪试验,分析了应力-应变状态和非共轴角的变化规律及影响因素。试验结果表明:轴向应变始终处于压缩状态,环向应变先负向累积再正向累积,径向应变基本处于受拉状态,剪切应变的受拉与受压状态交替出现,轴向、环向和剪切应变曲线的波动特性明显,而径向应变曲线的波动特性弱,说明循环荷载作用下各应变分量表现出不同的发展规律;轴向和径向应变及环向和剪切应变变化幅值随中主应力系数的增大先增大后减小,说明中主应力系数影响各应变分量的累积;随着主应力方向角旋转范围的增大,轴向和径向应变逐渐减小,环向应变由负向往正向变化的趋势提前,剪切应变变化幅值逐渐减小,说明主应力方向角旋转范围影响各应变分量的发展趋势;剪切和正偏应力-应变曲线滞回现象明显,且刚度发生循环强化,但剪切刚度的循环强化比正偏刚度更明显,说明土体出现次生各向异性,这是引起非共轴现象的内在因素;非共轴角变化曲线随中主应力系数的增大先下移后上移,随循环次数的增大而逐渐上移,随偏应力幅值的增大其变化范围增大。可见,循环荷载下中主应力系数、循环次数和偏应力幅值可显著影响饱和重塑黄土的应力-应变状态及非

共轴性,在黄土工程设计和本构关系研究中应加以考虑。

入藏号: CSCD:6532720

地址: Weng Xiaolin, Changan University, Key Laboratory of Special Region Highway Projects of Ministry of Education, Xian, Shaanxi 710064, China.

Li Hao, Changan University, Key Laboratory of Special Region Highway Projects of Ministry of Education, Xian, Shaanxi 710064, China.

Shang Xuwen, Changan University, Key Laboratory of Special Region Highway Projects of Ministry of Education, Xian, Shaanxi 710064, China.

Jia Yang, Changan University, Key Laboratory of Special Region Highway Projects of Ministry of Education, Xian, Shaanxi 710064, China.

Zhou Shangqi, Changan University, Key Laboratory of Special Region Highway Projects of Ministry of Education, Xian, Shaanxi 710064, China.

Hu Jibo, Changan University, Key Laboratory of Special Region Highway Projects of Ministry of Education, Xian, Shaanxi 710064, China.

地址: 翁效林, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

李豪, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

尚许雯, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

贾阳, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

周尚琪, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

胡继波, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: 49768532@qq.com

电子邮件地址: 49768532@qq.com

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作者: Han Yuejie; Ding Zhiyong; Wu You; Li Jun

作者: 韩跃杰; 丁智勇; 吴优; 李俊

标题: Influence of foam condition on foam expansion rate of base asphalt

标题: 发泡条件对基质沥青发泡膨胀率的影响

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作者关键词: pavement engineering; base asphalt; foaming cavity; distributed cloud image; foam expansion rate; water consumption

作者关键词: 路面工程; 基质沥青; 发泡腔; 分布云图; 发泡膨胀率; 用水量

摘要: A 3D modeling of asphalt generator was carried out by the modeling software Solidworks. The finite element simulation software Fluent was used to simulate the base asphalt foaming processes under different parameters, and the results from the experiment and the simulation were compared. The reliability of finite element simulation technology on the study of base asphalt foam expansion rate was analyzed. The finite element simulation was performed on the foaming cavity and fluid materials inside the foaming cavity. The distributed cloud images of temperature, velocity, pressure, and various phases in the foaming cavity were investigated by using the Fluent post-processing function. Simulation result shows that during the whole foaming process, the increase of base asphalt temperature results in the decrease of asphalt viscosity and the increase of water vapor in the foaming cavity. When the base asphalt temperature rises from 120 to 160°C, the foam expansion rate of base asphalt increases from 4 to 11, revealing a great impact of base asphalt temperature on the foam expansion rate. The increase of base asphalt flow rate serves to the increase of total amount of base asphalt in the foaming cavity and reduces the contact time and area between the base asphalts. When the entrance flow rate of base asphalt increases from 60 to 120 g·s⁻¹, the foam expansion rate of base asphalt fluctuates between 7 and 11, indicating that the change of base asphalt flow rate has a great impact on its foam expansion rate. When the water consumption increases from 2.0% to 3.5%, the foam expansion rate of base asphalt remains the same basically, indicating that the water consumption has little effect on the foam expansion rate of base asphalt. The lowest foam expansion rate obtained by the simulation is 3.57. At this time, the base asphalt flow rate is 120 g·s⁻¹, the base asphalt temperature is 120°C, and the water consumption is 3.0%. 13 tabs, 10 figs, 28 refs.

摘要: 通过建模软件 Solidworks 对沥青发生装置进行三维建模, 采用有限元仿真软件 Fluent 分析了不同参数条件下基质沥青的发泡过程, 并对比了试验结果和仿真结果, 分析了应用有限元仿真技术研究基质沥青发泡膨胀率的可靠性; 对发泡腔和发泡腔内各流体材料进行有限元仿真, 利用 Fluent 中的后处理功能得到了发泡腔的温度、速度、压力和各相的分布云图。仿真结果表明: 在整个发泡过程中, 基质沥青温度的增大使沥青黏度下降, 发泡腔内水蒸汽增加, 当基质沥青温度从 120°C 升高到 160°C 时, 基质沥青的发泡膨胀率从 4 增大到 11, 说明基质沥青温度的变化对其发泡膨胀率的影响很大; 基质沥青流量的增大起到增加发泡腔内基质沥青总量和减少基质沥青之间相互接触时间和接触面积的作用, 当基质沥青入口流量从 60 g·s⁻¹ 增大到 120 g·s⁻¹ 时, 基质沥青的发泡膨胀率为 7~11, 表明基质沥青流量的变化对其发泡膨胀率的影响很大; 当用水量从 2.0% 增大到 3.5% 时, 基质沥青的发泡膨胀率基本不变, 说明用水量对基质沥青发泡膨胀率的影响不大; 仿真得到的最低发泡膨胀率为 3.57, 此时发泡条件参数分别是基质沥青流量为 120 g·s⁻¹, 基质沥青温度为 120°C, 发泡用水量为 3.0%。

入藏号: CSCD:6532721

地址: Han Yuejie, Changan University, Key Laboratory of Special Region Highway Projects of Ministry of Education, Xian, Shaanxi 710064, China.

Ding Zhiyong, Changan University, Key Laboratory of Road Construction Technology and Equipment of Ministry of Education, Xian, Shaanxi 710064, China.

Wu You, Changan University, Key Laboratory of Road Construction Technology and Equipment

of Ministry of Education, Xian, Shaanxi 710064, China.

Li Jun, Changan University, Key Laboratory of Road Construction Technology and Equipment of Ministry of Education, Xian, Shaanxi 710064, China.

地址: 韩跃杰, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

丁智勇, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

吴优, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

李俊, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: 337931500@qq.com; dzy@chd.edu.cn

电子邮件地址: 337931500@qq.com; dzy@chd.edu.cn

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作者: Chen Yujing; Sha Aimin; Hu Kui; Liu Zhuangzhuang; Cao Shihao; Zhang Hua

作者: 陈玉静; 沙爱民; 胡魁; 刘状壮; 曹世豪; 张华

标题: Preparation and Performance of Pavement Heat-shielding Coating for Qinghai-Tibet Area

标题: 青藏地区路用遮热涂层的制备及性能

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作者关键词: Qinghai-Tibet area; asphalt pavement; compound heat-shielding coating (CHSC); hollow glass bead; wear resistance

作者关键词: 青藏地区; 沥青路面; 复合式遮热涂层(CHSC); 中空玻璃微珠; 耐磨性能

摘要: In order to reduce the stability damage of the underlying permafrost caused by asphalt pavement in Qinghai-Tibet area, an original creation of heat-shielding coating (HSC) was put forward in this work. By a self-developed cooling effect testing device, the optimal coating structure was selected and the optimum adding amount of the functional materials was determined. We also investigated the depth dependence of cooling effect, and by employing pendulum type frictiograph test and MMLS3 load-accelerating equipment, evaluated the anti-skid performance and wear resistance of the coating. The results show that the optimal coating structure is CHSC with a combination of an upper reflective layer and a lower insulative layer, which can reduce the surface temperature by 12.75 °C. Moreover, the upper layer of CHSC mixed with 15% (PVC) reflective functional materials and the lower layer of CHSC mixed with 10% (PVC)

insulative functional materials are recommended. CHSC can reduce the temperature by 9.6 °C at the depth of 5 cm and by 6.7 °C at the depth of 10 cm. The ceramic particles spread in the coating act as an anti-skid material, and the amount of 0.8 kg/m² can make CHSC achieve satisfactory anti-skid performance and wear resistance which are adequate for the requirement of pertinent standards. Our work can provide reference for the solution to the underlying permafrost problem in Qinghai-Tibet Area.

摘要: 为了缓解青藏地区下伏冻土由沥青路面引起的热稳定性破坏,首次提出了适用于青藏地区沥青路面的遮热涂层,通过自主设计的涂层降温性能测试装置优选了涂层的结构形式并确定了功能型材料的最佳掺量,并进一步研究了涂层的降温性能随深度的变化规律,通过摆式摩擦仪以及加速加载设备 MMLS3 评价了涂层的路用性能。结果表明:新型遮热涂层的优选结构形式是上层反射与下层隔热相结合的复合式遮热涂层(CHSC),降温效果能够达到 12.75°C;CHSC 涂层中反射功能型材料的最佳掺量为 15%(体积浓度),隔热功能型材料的最佳掺量为 10%(体积浓度);CHSC 涂层可以使道路内部深度 5cm 处降温 9.6°C,使内部深度 10cm 处降温 6.7°C;当陶瓷颗粒撒布量为 0.8kg/m² 时,所得涂层的抗滑系数最佳且其耐磨性能同时满足《沥青路面设计规范》的要求。因此,该研究为缓解我国青藏地区下伏冻土融化问题提供了参考。

入藏号: CSCD:6511901

地址: Chen Yujing, Changan University;;School of Highway,Changan University;;College of Civil Engineering and Architecture,Henan University of Technology, Key Laboratory for Special Area Highway Engineering of Ministry of Education;;;, Xian;;Xian;;Zhengzhou, ;;; 710064;;710064;;450001.

Sha Aimin, Changan University;;School of Highway,Changan University, Key Laboratory for Special Area Highway Engineering of Ministry of Education;;;, Xian;;Xian, ; 710064;;710064.

Liu Zhuangzhuang, Changan University;;School of Highway,Changan University, Key Laboratory for Special Area Highway Engineering of Ministry of Education;;;, Xian;;Xian, ; 710064;;710064.

Hu Kui, College of Civil Engineering and Architecture,Henan University of Technology, Zhengzhou, Henan 450001, China.

Cao Shihao, College of Civil Engineering and Architecture,Henan University of Technology, Zhengzhou, Henan 450001, China.

Zhang Hua, College of Civil Engineering and Architecture,Henan University of Technology, Zhengzhou, Henan 450001, China.

地址: 陈玉静, 长安大学;;长安大学公路学院;;河南工业大学土木建筑学院, 特殊地区公路工程教育部重点实验室;;;, 西安;;西安;;郑州, ;;; 710064;;710064;;450001.

沙爱民, 长安大学;;长安大学公路学院, 特殊地区公路工程教育部重点实验室;;, 西安;;西安, ; 710064;;710064.

刘状壮, 长安大学;;长安大学公路学院, 特殊地区公路工程教育部重点实验室;;, 西安;;西安, ; 710064;;710064.

胡魁, 河南工业大学土木建筑学院, 郑州, 河南 450001, 中国.

曹世豪, 河南工业大学土木建筑学院, 郑州, 河南 450001, 中国.

张华, 河南工业大学土木建筑学院, 郑州, 河南 450001, 中国.

电子邮件地址: emailams@163.com

电子邮件地址: emailams@163.com

使用次数 (最近 180 天): 1

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作者: Sun Min; Zheng Mulian; Bi Yufeng; Zhu Linlin; Gao Yuan

作者: 孙敏; 郑木莲; 毕玉峰; 朱琳琳; 高源

标题: Modification mechanism and performance of polyurethane modified asphalt

标题: 聚氨酯改性沥青改性机理和性能

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作者关键词: pavement engineering; pavement material; modification mechanism; polyurethane modified asphalt; viscosity-temperature property; shear rheological property

作者关键词: 路面工程; 路面材料; 改性机理; 聚氨酯改性沥青; 黏温特性; 剪切流变性能

摘要: To solve the problems such as poor storage stability, easy segregation and aging for polymer modified asphalt, the polyurethane (PU) was used to chemically modify the asphalt. The PU modified asphalt was prepared. The Fourier transform infrared spectroscopy (FTIR) test, dynamic thermomechanical analysis (DMA) test and differential scanning calorimetry (DSC) test were conducted to analyze the modification mechanism of PU modified asphalt. The performances of PU modified asphalt, SBS modified asphalt and 70# base asphalt were evaluated by the Brookfield rotary viscosity test, dynamic shear rheological (DSR) test, low-temperature bending beam rheological (BBR) test, rotating thin film oven test (RTFOT), and ultraviolet aging test. Research result shows that the disk sawtooth agitator can expose the active group well in the asphalt, and make the PU achieve better modification effect. There are mainly two reactions in the PU modified asphalt. One is the reaction between the isocyanate and polyol to form carbamate, the other is the addition reaction between the isocyanate and aromatic compounds in the asphalt. The high-temperature Brookfield viscosity of PU modified asphalt is higher than that of SBS modified asphalt at the same temperature. The rutting factor of PU modified asphalt at 64°C is about 6 times of that of SBS modified asphalt, showing that its high-temperature performance is excellent. The penetration ratio of PU modified asphalt before to after RTFOT reaches 85%. The softening point change scope of PU modified asphalt is 0.5°C, showing that its thermal oxygen aging resistance is excellent. In the ultraviolet aging test, the change scopes of softening point and penetration of PU modified asphalt are 1°C-4°C and 0.1-0.3 mm, respectively, indicating that its ultraviolet aging

resistance is excellent.

摘要: 为了解决聚合物改性沥青储存稳定性差、易离析、易老化等问题,利用聚氨酯(PU)对沥青进行化学改性;制备了 PU 改性沥青,采用傅里叶变换红外光谱(FTIR)、动态热机械分析(DMA)和差示扫描量热法(DSC)试验研究了 PU 改性沥青的改性机理,采用 Brookfield 旋转黏度试验、动态剪切流变(DSR)试验、低温弯曲梁流变(BBR)试验、旋转薄膜烘箱加热试验(RTFOT)和紫外老化试验等评价了 PU 改性沥青、SBS 改性沥青和 70 #基质沥青的性能。研究表明:圆盘锯齿式搅拌器可以很好地暴露沥青中的活性基团,使 PU 达到较好的改性效果;PU 改性沥青中主要存在 2 种反应,一是异氰酸酯与多元醇之间反应生成氨基甲酸酯,二是异氰酸酯与沥青质中的芳香族化合物之间发生加成反应;PU 改性沥青的高温布氏黏度高于同温度下的 SBS 改性沥青,且 64°C 时的抗车辙因子是 SBS 改性沥青的 6 倍左右,说明其高温性能非常优异;PU 改性沥青 RTFOT 前后针入度比达到了 85%,软化点变化幅度为 0.5°C,说明其抗热氧化性能非常优异;在紫外老化试验中,PU 改性沥青软化点和针入度变化范围分别为 1°C~4°C 和 0.1~0.3 mm,说明其抗紫外老化性能非常优异。

入藏号: CSCD:6492539

地址: Sun Min, Chang'an University;;Shandong Institute of Highway Technician, Key Laboratory for Special Area Highway Engineering of Ministry of Education;;, Xi'an;;Ji'nan, Shaanxi;;Shandong 710064;;250104.

Zheng Mulian, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Zhu Linlin, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Gao Yuan, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Bi Yufeng, Shandong Provincial Communications Planning and Design Institute, Ji'nan, Shandong 250031, China.

地址: 孙敏, 长安大学;;山东公路技师学院, 特殊地区公路工程教育部重点实验室;;, 西安;;济南, 陕西;;山东 710064;;250104, 中国.

郑木莲, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

朱琳琳, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

高源, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

毕玉峰, 山东省交通规划设计院, 济南, 山东 250031, 中国.

电子邮件地址: 51357064@qq.com; zhengml@chd.com.cn

电子邮件地址: 51357064@qq.com; zhengml@chd.com.cn

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作者: Lei Jun'an; Zheng Nanxiang; Ji Xiaoping; Yang Jun

作者: 雷俊安; 郑南翔; 纪小平; 杨俊

标题: Influence of Gradation on the Strength of Cement Stabilized Recycled Aggregate

标题: 级配对水泥稳定再生集料强度影响

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作者关键词: gradation; recycled aggregate; unconfined compressive strength; splitting strength; grey correlation; fractal dimension

作者关键词: 级配; 再生集料; 无侧限抗压强度; 劈裂强度; 灰色关联; 分形维数

摘要: In order to explore the effect of gradation on cement stabilized recycled aggregate, five gradations were evenly selected during the upper and lower limits of gradation that ruled in the specification and then unconfined compressive strength test and splitting strength test were carried out respectively. The test results show that the strength of the unconfined compressive strength and the splitting strength are obviously affected by the gradation, and the strength increases first and then decreases with the gradation from the upper limit to the lower limit. Through grey correlation analysis, it is found that the correlation between 4.75 ~ 9.5 mm particle size and strength is the largest. The correlation of particle size greater than 4.75 mm and unconfined compression strength is better, while less than 4.75 mm particle size is better associated with splitting strength. The relationship between gradation fractal dimension and strength is obtained by fitting. The best fractal dimension is determined to be 2.4914, and the best gradation is obtained by backstepping, which provides a reference for gradation design of cement stabilized recycled aggregate.

摘要: 目的探究级配对水泥稳定再生集料强度的影响. 方法在规范规定的级配上下限范围内均匀的选取 5 种级配, 分别进行水泥稳定再生集料的无侧限抗压强度试验和劈裂强度试验; 通过灰色理论分析了级配各组分与强度的关联性, 并拟合得到各级配分形维数与强度之间关系式. 结果级配对无侧限抗压强度、劈裂强度影响明显, 且随级配由上限到下限的变化强度呈现先增大后降低的趋势, 并在中上级配时达到最大. 通过灰色关联度分析发现 4.75 ~ 9.5 mm 粒径组和强度的关联性最大, 大于 4.75 mm 的粒径与无侧限抗压强度关联性更好, 而小于 4.75 mm 粒径与劈裂强度关联性更好. 拟合得到级配分形维数与强度之间二次多项关系式. 结论再生集料的最佳级配对应的分形维数为 2.4914, 所得结果可为水泥稳定再生集料的级配设计提供参考.

入藏号: CSCD:6487173

地址: Lei Jun'an, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Zheng Nanxiang, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Ji Xiaoping, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Yang Jun, School of Civil Engineering and Architecture, China Three Gorges University, Yichang, Hubei 443002, China.

地址: 雷俊安, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

郑南翔, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

纪小平, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

杨俊, 三峡大学土木与建筑学院, 宜昌, 湖北 443002, 中国.

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作者: Liu Zhuangzhuang; Sha Aimin; Jiang Wei

作者: 刘状壮; 沙爱民; 蒋玮

标题: Advances in Asphalt Pavements Containing Salts: Additives, Mixtures, Performances, and Evaluation

标题: 蓄盐沥青路面研究进展: 盐化物材料、混合料及其性能与评价

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作者关键词: road engineering; asphalt pavement containing salt; review; antifreeze asphalt concrete (AFAC); salt-based material; performance evaluation

作者关键词: 道路工程; 蓄盐沥青路面; 综述; 融雪抑冰混凝土; 盐化物; 性能评价

摘要: The snow or ice that forms on pavement surfaces in cold weather results in severe traffic accidents and economic losses. Asphalt pavement containing salts is a typical functional pavement that prevents ice or snow from covering pavement surfaces in cold weather, thus maintaining the skid resistance and traffic capacity of the roads. In this paper, the recent developments in antifreeze asphalt concretes (AFACs) are summarized, including additives, asphalt mixtures, engineering performance, and evaluation. The salt-based materials were classified according to the morphology and the encapsulant; next, the most frequently used design methods of asphalt mixtures containing salts were compared in terms of filler characteristics and interference between aggregates. Then, the rutting resistance, water stability, low-temperature cracking resistance, fatigue resistance, moisture

absorption, and skid resistance were reviewed and summarized, followed by a functional mechanism analysis of the degradation of the engineering performance caused by the presence of salts. Finally, the typically employed methods for the evaluation of the AFACs antifreeze performance and test methods were presented. This paper presents future research scopes and development directions based on the literature review of asphalt pavements containing salts, focusing on the design of additives, improvements in asphalt mixtures, degradation of the engineering performance, and antifreeze performance evaluation.

摘要: 寒冷环境下,路面积雪、结冰容易导致严重的交通事故并带来巨大的经济损失。蓄盐沥青路面是一种具有融雪抑冰能力的功能性路面,能够在寒冷环境下保障路表抗滑和道路通行能力。作者系统综述了蓄盐沥青路面的工作机理、盐化物材料、沥青混合料及其性能与评价方法研究进展。首先按照材料形态和盐分包裹材料,对盐化物材料进行分类,对比了几种常用的融雪抑冰沥青混合料设计方法,从填料特性与级配干扰的角度分析了盐化物材料掺入后沥青混合料级配参数的变化规律。在综述蓄盐后沥青混合料的高温稳定性、水稳定性、低温抗裂性、抗疲劳性、耐久性以及吸湿性和抗滑性等研究结论的基础上,分析了盐化物导致沥青混合料路用性能劣化的作用机制。最后介绍了常见的融雪抑冰性能评价与测试方法。在对现状综述的基础上,针对盐化物材料设计、沥青混合料改进、路用性能劣化机理以及融雪抑冰性能评价等关键内容,展望了蓄盐沥青路面技术的未来发展方向。

入藏号: CSCD:6480405

地址: Liu Zhuangzhuang, Chang'an University;;School of Highway, Chang'an University;;International Joint Laboratory for Sustainable Development of Highway Infrastructure in Special Regions, Key Laboratory of Highway Engineering in Special Region, Ministry of Education;;International Joint Laboratory for Sustainable Development of Highway Infrastructure in Special Regions, Xi'an;;Xi'an;;Xi'an, Shaanxi;;Shaanxi;;Shaanxi 710064;;710064;;710064.

Sha Aimin, Chang'an University;;School of Highway, Chang'an University;;International Joint Laboratory for Sustainable Development of Highway Infrastructure in Special Regions, Key Laboratory of Highway Engineering in Special Region, Ministry of Education;;International Joint Laboratory for Sustainable Development of Highway Infrastructure in Special Regions, Xi'an;;Xi'an;;Xi'an, Shaanxi;;Shaanxi;;Shaanxi 710064;;710064;;710064.

Jiang Wei, Chang'an University;;School of Highway, Chang'an University;;International Joint Laboratory for Sustainable Development of Highway Infrastructure in Special Regions, Key Laboratory of Highway Engineering in Special Region, Ministry of Education;;International Joint Laboratory for Sustainable Development of Highway Infrastructure in Special Regions, Xi'an;;Xi'an;;Xi'an, Shaanxi;;Shaanxi;;Shaanxi 710064;;710064;;710064.

地址: 刘状壮, 长安大学;;长安大学公路学院;;长安大学, 特殊地区公路工程教育部重点实验室;;特殊地区公路交通基础设施可持续发展国际合作联合实验室, 西安;;西安;;西安, 陕西;;陕西;;陕西 710064;;710064;;710064, 中国.

沙爱民, 长安大学;;长安大学公路学院;;长安大学, 特殊地区公路工程教育部重点实验室;;特殊地区公路交通基础设施可持续发展国际合作联合实验室, 西安;;西安;;西安, 陕西;;陕西;;陕西 710064;;710064;;710064, 中国.

蒋玮, 长安大学;;长安大学公路学院;;长安大学, 特殊地区公路工程教育部重点实验室;;特殊地区公路交通基础设施可持续发展国际合作联合实验室, 西安;;西安;;西安, 陕西;;陕西;;陕西 710064;;710064;;710064, 中国.

电子邮件地址: zzliu@chd.edu.cn; ams@chd.edu.cn

电子邮件地址: zzliu@chd.edu.cn; ams@chd.edu.cn

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作者: Jiang Yingjun; Han Zhanguang; Hu Yonglin

作者: 蒋应军; 韩占闯; 胡永林

标题: Design and evaluation of cold recycled mixture by vertical vibration forming method

标题: 冷再生混合料垂直振动成型法设计与评价

来源出版物: 南京理工大学学报. 自然科学版 卷: 43 期: 2 页: 186-192 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: cold recycled mixture; vertical vibration forming method; Marshall method; mechanical strength; maximum dry density

作者关键词: 冷再生混合料; 垂直振动成型方法; 马歇尔法; 力学强度; 最大干密度

摘要: In order to simulate the field compaction condition of emulsified asphalt mixture better, the vertical vibration forming method (VVTM) is used to compact the cold recycled mixture, and the reliability of the method is verified. The effects of the VVTM and the Marshall method on the physical and mechanical properties of the cold recycled emulsified asphalt mixture are compared and studied. The results show that the correlation between the mechanical strength of the VVTM specimen and the field core sample is up to 94.8%, and it is less than 60% for the Marshall specimen. Compared with the current method, the best moisture content of the VVTM moulding specimens decreases by 10%, the maximum dry density increases by 1.8%~2.3%, the optimal amount of emulsified asphalt decreases by 7%~10%, and the mechanical performance is improved by 32% at least. It is proved that the VVTM is more suitable for the evaluation on the mechanical properties of emulsified asphalt mixture than the Marshall method.

摘要: 为更好地模拟乳化沥青冷再生混合料现场压实工况, 采用垂直振动成型方法 (VVTM) 对冷再生混合料进行压实, 验证了方法的可靠性。对比研究了 VVTM 和马歇尔法对乳化沥青冷再生混合料物理和力学特性的影响。结果表明, VVTM 试件力学强度与现场芯样的相关性高达 94.8%, 马歇尔试件的相关性不足 60%。与现行方法的成型试件相比, VVTM 成型试件的最佳含水率降低 10%, 最大干密度提高 1.8%~2.3%, 乳化沥青最佳用量降低 7%~10%, 力学性能

提高 32%以上,说明 VVTM 比马歇尔法更适于评价乳化沥青冷再生混合料的力学性能。

入藏号: CSCD:6481089

地址: Jiang Yingjun, Chang'an University, Key Laboratory of Highway Engineering in Special Region of Ministry of Education, Xi'an, Shaanxi 710064, China.

Han Zhanchuang, Chang'an University, Key Laboratory of Highway Engineering in Special Region of Ministry of Education, Xi'an, Shaanxi 710064, China.

Hu Yonglin, Jindong District Highway Administration Bureau, Jinhua, Zhejiang 321110, China.

地址: 蒋应军, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

韩占闯, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

胡永林, 金东区公路管理局, 金华, 浙江 321110, 中国.

电子邮件地址: jyj@chd.edu.cn; 895615537@qq.com

电子邮件地址: jyj@chd.edu.cn; 895615537@qq.com

使用次数 (最近 180 天): 1

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作者: Pan Binghong; Dong Yijia; Zhao Yaru; Tang Lijiao; Yu Yingjie

作者: 潘兵宏; 董怡伽; 赵亚茹; 唐力焦; 余英杰

标题: Minimum Spacing Between Crossovers of Double Crossover Intersection in Diamond Interchange

标题: 菱形立交双钮型平面交叉口交叉结点最小间距

来源出版物: 北京工业大学学报 卷: 45 期: 3 页: 283-291 出版年: 2019

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文献类型: Article

作者关键词: traffic engineering; crossover spacing; double crossover intersection; diverging diamond interchange

作者关键词: 交通工程; 交叉结点间距; 双钮型平面交叉; 菱形互通式立交

摘要: To solve the problem of the inefficiency of the intersection in the diamond interchange, which often causes heavy traffic, and to reduce the traffic flow and optimize transportation organization simultaneously, the design specification of the double crossover intersection was studied based on the concept of the diverging diamond interchange. First, the traffic characteristics of double cross intersection and double crossover intersection were

analyzed, and the advantages of double crossover intersection were clarified. Second, combined with the lane changing trajectory of vehicle model, the opposite lane changing distance on crossover was put forward. Finally, the left-turn vehicle driving demand from main road was analyzed, and the process of entering the intersection was divided into the distance of waiting for the gap that can be inserted, the distance of drivers judging and taking measures, lane changing distance, and deceleration or queuing distance. The minimum spacing of crossovers were recommended according to traffic flow theory and queuing theory. Results show that the design speed is the main factor affecting the minimum spacing between crossovers of double crossover intersection, and the cross angle and the number of lanes have less influence on it.

摘要: 针对菱形互通式立体交叉中平面交叉交通组织效率低, 容易发生交通拥堵的现状, 以减少交通流干扰、优化交通组织为目的, 基于分叉式菱形互通式立交的设计概念, 对其采用的双钮型平面交叉的相关设计指标进行研究。首先, 对双十字平面交叉与双钮型平面交叉交通特性进行对比分析, 明确了双钮型平面交叉的优势。然后, 结合自由车流换道轨迹理论提出对向车道交叉转换间距。最后, 分析了主要道路左转车辆行驶需求, 将其进入平面交叉口的过程分为等待可插入间隙行驶距离、驾驶员判断及采取措施距离、变换车道行驶距离、减速行驶或排队等候距离 4 个部分, 并基于交通流理论、排队理论提出了交叉结点最小间距推荐值。研究结果表明: 双钮型平面交叉口交叉结点最小间距的主要影响因素为设计速度, 交叉角度与车道数量对其影响较小。

入藏号: CSCD:6473264

地址: Pan Binghong, Chang'an University;; School of Highway, Chang'an University, Key Laboratory of Highway Engineering in Special Area of Ministry of Education;; Xi'an;; Xi'an, ;; 710064;; 710064.

Dong Yijia, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Yaru, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Tang Lijiao, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Yu Yingjie, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 潘兵宏, 长安大学;; 长安大学公路学院, 特殊地区公路工程教育部重点实验室;; 西安;; 西安, ;; 710064;; 710064.

董怡伽, 长安大学公路学院, 西安, 陕西 710064, 中国.

赵亚茹, 长安大学公路学院, 西安, 陕西 710064, 中国.

唐力焦, 长安大学公路学院, 西安, 陕西 710064, 中国.

余英杰, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: kc20@GL.chd.edu.cn

电子邮件地址: kc20@GL.chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Li Wei; Han Sen; Huang Qibo; Yao Tengfei; Xu Ouming

作者: 李微; 韩森; 黄啟波; 姚腾飞; 徐鸥明

标题: The Skeleton Characteristics of Coarse Aggregates in Granular Thin-layer Asphalt Mixture

标题: 细粒式薄表层沥青混合料中粗集料的骨架特性

来源出版物: 材料导报 卷: 33 期: 2B 页: 617-624 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: road engineering; thin-layer asphalt mixture; coarse aggregate-asphalt mortar; internal friction angle phi, coarse aggregate content

作者关键词: 道路工程; 薄表层沥青混合料; 粗集料-沥青胶浆; 内摩阻角 phi; 粗集料配比

摘要: This work aimed to explore the skeleton characteristics of thin-layer asphalt mixture and to ensure the aggregate gradation stability of UTL-10. We introduced 7.5 mm sieve between 4.75 mm and 9.5 mm sieves, and carried out the dry-rodded test so as to analyze the voids in coarse aggregates (VCA) under different coarse aggregate contents. Meanwhile, we conducted uniaxial penetration test upon the coarse aggregate-asphalt mortar specimens, and thus the parameters related to shear strength of different coarse aggregate proportions were obtained. Consequently the indexes for the proportion control of coarse aggregate in ultra-thin asphalt mixture were determined, and the recommended ranges of coarse aggregates content were presented as well. The results indicated that the internal friction angle phi of coarse aggregate can be used to reflect the skeleton strength stability of coarse aggregate gradation. Meanwhile, by the combination of VCA and internal friction angle phi, the coarse aggregate proportion design of ultra-thin asphalt mixture can be effectively controlled. The UTL-13 recommended contents of the three coarse aggregate are 12.5%-22.2%, 37.5%-44.4% and 33.3%-50%, respectively. And the UTL-10 recommended contents of the three coarse aggregate are 10%-16.7%, 40%-50% and 33.3%-50% respectively.

摘要: 为研究薄表层沥青混合料的骨架特性,同时为保证公称最大粒径 9.5 mm(UTL-10)矿料级配的稳定性,在 4.75 mm 与 9.5 mm 筛孔中间增设 7.5 mm 筛孔,通过捣实密度试验分析了不同粗集料配比的集料骨架间隙率(VCA)。同时,提出了利用粗集料-沥青胶浆试件的单轴贯入试验来研究不同组合的粗集料抗剪强度相关参数,确定了薄表层粗集料的级配设计控制指标,最终给出了薄表层粗集料的推荐配比范围。结果表明:集料内摩阻角 phi 能够很好地反映粗集料级配的骨架强度稳定性;采用 VCA 和内摩阻角 phi 双重指标可以有效控制薄表层沥青混合料的粗集料配比设计;公称最大粒径为 13.2 mm(UTL-13)矿料级配三档集料含量的推荐范围分别为 12.5%~22.2%, 37.5%~44.4%, 33.3%~50%;UTL-10 三档集料含量的推荐范围分别为 10%~16.7%, 40%~50%, 33.3%~50%。

入藏号: CSCD:6471725

地址: Li Wei, Chang'an University, Key Laboratory for Special Areal Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Han Sen, Chang'an University, Key Laboratory for Special Areal Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Yao Tengfei, Chang'an University, Key Laboratory for Special Areal Highway Engineering of

Ministry of Education, Xi'an, Shaanxi 710064, China.

Huang Qibo, Transportation Portage College, Southeast University, Nanjing, Jiangsu 210096, China.

Xu Ouming, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 李微, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

韩森, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

姚腾飞, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

黄啟波, 东南大学交通运输学院, 南京, 江苏 210096, 中国.

徐鸥明, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: handsome.666@qq.com

电子邮件地址: handsome.666@qq.com

使用次数 (最近 180 天): 0

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作者: Li Ning; Ma Biao; Li Rui; Si Wei

作者: 李宁; 马翥; 李瑞; 司伟

标题: Study on Performance of Unbound Granular Materials under Single - stage and Multi-stage Loading Modes Based on PUMA

标题: 基于 PUMA 的单级和多级加载模式下碎石粒料性能研究

来源出版物: 公路交通科技 卷: 36 期: 3 页: 62-72 出版年: 2019

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文献类型: Article

作者关键词: road engineering; unbound granular material; precision unbound material analyzer (PUMA); permanent deformation; resilient modulus; single-stage loading model (SSLM); multi-stage loading mode (MSLM)

作者关键词: 道路工程; 碎石粒料; 精密非黏结材料分析仪; 永久变形; 弹性模量; 单级加载模式; 多级加载模式

摘要: To explore the performance of unbound granular materials, SSLM and MSLM are applied to carry out the repeated load tests of single-size, 2-size mixed and 3-size mixed unbound granular materials based on PUMA. The permanent deformation and elastic modulus of the first 400

loading cycles under the 2 loading modes are discussed and analyzed, the equivalent modulus of PUMA repeated load tests is compared with that of repeated CBR test, and the calculated modulus of constant confining pressure (CCP) model is compared with that of variable confining pressure (VCP) model in repeated load triaxial test. The result shows that (1) in MSLM, the permanent deformation of single-size gravel increases rapidly and then decreases when the loading strength is lower than 340 kPa, while the maximum of permanent deformation of the mixed gravels appears as the loading strength is lower than 200 kPa. (2) The increment of permanent deformation tends to single-peak change with the large-size aggregate. The permanent deformation of SSLM first 400 loading cycles is the main part of the total permanent deformation, and the proportion increases with the increase of the loading strength. It has little difference for the single-size and mixed gravel when the loading strength is under 240 kPa. After that, the permanent deformation of single-size gravel increases rapidly. (3) Compared with SSLM, the permanent deformation of MSLM is smaller. MSLM can improve the bearing capacity of the unbound granular materials and reveal the principle of 3-stage compaction for unbound granular materials. (4) Although the calculated equivalent modulus by the full-friction model is lower than those of the existing studies, it presents the same tendency and it is appropriate for the calculation of modulus of unbound granular materials. (5) The elastic modulus of CCP model is the largest among the 4 models, and the growth rate of elastic modulus is the highest for VCP model. The effect of confining pressure on the modulus is more significant when the loading strength is larger.

摘要: 通过精密非黏结材料分析仪(PUMA)开展碎石粒料的重复荷载试验,对单粒径、两档料填充和三档料填充碎石粒料进行单级加载模式(SSLM)和多级加载模式(MSLM)试验,研究碎石粒料材料性能,分析和讨论两种加载模式下前 400 次加载循环的永久变形和弹性模量,并对比了 PUMA 重复荷载试验与重复 CBR 两种等效模量及重复三轴试验常围压模型(CCP)和变围压模型(VCP)的计算模量。MSLM 加载结果表明,单粒径碎石粒料在荷载强度低于 340 kPa 时,永久变形快速增长,之后降低,而填充碎石粒料在荷载低于 200 kPa 就会出现永久变形最大值;集料粒径越大,永久变形增量趋向于单峰变化。SSLM 加载的前 400 次永久变形占总永久变形的主要部分,且比例随荷载强度升高;荷载强度低于 240 kPa 时,单粒径碎石和填充碎石粒料的永久变形差别不大,当超过 240 kPa 后,单粒径碎石粒料的永久变形快速增长;相比 SSLM,MSLM 加载模式的永久变形均较小,MSLM 加载模式可以提高粒料材料的承载能力,并揭示粒料材料的三阶段压实原理;采用完全摩擦模型计算的等效模量值低于已有研究结果,但它们呈现相同的趋势,适用于粒料材料模量计算;CCP 的弹性模量最大,VCP 的弹性模量增长速率最高,荷载强度越大,围压对模量的影响越显著。

入藏号: CSCD:6444727

地址: Li Ning, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Ma Biao, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Li Rui, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Si Wei, Chang'an University, Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 李宁, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

马骥, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

李瑞, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

司伟, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: lining_sn@163.com

电子邮件地址: lining_sn@163.com

使用次数 (最近 180 天): 0

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作者: Guo Yinchuan; Shen Aiqin; Zheng Panfei; Li Peng

作者: 郭寅川; 申爱琴; 郑盼飞; 李鹏

标题: Study on Salt-freeze Resistance of Bridge Deck Concrete in Alpine Region

标题: 高寒地区桥面板水泥混凝土抗盐冻性能研究

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作者关键词: bridge engineering; recommended mixing ratio; orthogonal method; alpine region; bridge deck; salt-freeze resistance

作者关键词: 桥梁工程; 推荐配合比; 正交法; 高寒地区; 桥面板; 抗盐冻性

摘要: Aiming at the severe cold weather and chloride-eroded working environment of bridge deck concrete in alpine area of Xinjiang, the orthogonal factor table of bridge deck concrete mixing ratio and the test scheme of salt-freezing-water coupling on concrete are designed. The influences of water consumption, water-binder ratio, air-entraining agent content and fly ash content on the salt-freeze resistance performance of bridge deck concrete are analyzed by using the denudation and the dynamic elastic modulus loss of concrete after salt freezing. In addition, the influence of salt freezing on the performance of concrete is analyzed through the internal structure, mechanical property and the wear resistance change rule of concrete. Combining with the performance damage test, the salt-freeze resistance performance improvement mechanism of bridge deck concrete is analyzed, and the recommended value of the mixing ratio of bridge deck concrete based on salt-freeze performance design is proposed. The test result shows that (1) the water consumption and the of air-entraining agent content play the decisive role in the salt-freeze resistance performance of bridge deck concrete, and the variance analysis values are 92.80 and 59.35 respectively; (2) as the water consumption increased from 144 kg/m³ to 156 kg/m³, the

relative dynamic modulus of concrete decreased by 4.85%,the denudation increased from 1.68 kg/m² to 1.93 kg/m²,with the increase of approximately 14.8%; (3) as the air-entraining agent content increased from 0.42 to 1.2,and the relative dynamic elastic modulus of concrete increased by 4.4%; (4) the amount of salt-freeze denudation of concrete is linearly related to the relative dynamic elastic modulus,and the relative dynamic elastic modulus is gradually reduced as the denudation increases; (5) after 300 freeze-thaw cycles,the flexural strength loss rate of concrete exceeded 17%,the water-binder ratio increased from 0.34 to 0.4,and the bending strength loss rate increased from 21% to 33%; (6) for the 3 water-binder ratios,the wear of concrete after 100 salt-freeze cycles increased by 6%,indicating that although salt-freezing can accelerate the speed of mortar layer erosion on the concrete surface,the wear of the mortar layer below the concrete denudation surface is not obvious.

摘要: 针对新疆高寒地区桥面板水泥混凝土处于气候严寒和氯盐侵蚀的工作环境,设计桥面板混凝土配合比正交因素表以及混凝土盐冻、水耦合试验方案。通过混凝土盐冻后剥蚀量和动弹性模量损失,分析用水量、水胶比、引气剂掺量以及粉煤灰掺量对桥面板混凝土抗盐冻性能的影响规律。通过混凝土内部结构、力学性能以及耐磨性变化规律分析盐冻对混凝土的性能影响规律。结合性能损伤试验,分析桥面板混凝土抗盐冻性能改善机理,提出基于抗盐冻性能设计的桥面板混凝土配合比建议值。试验结果表明:用水量和引气剂掺量对桥面板混凝土的抗盐冻性能起决定性作用,方差分析值分别为 92.80 和 59.35;用水量由 144 kg/m³ 增至 156 kg/m³,混凝土相对动弹模量减小了 4.85%,剥蚀量由 1.68 kg/m² 增至 1.93 kg/m²,增幅约 14.8%;引气剂掺量从 0.4 增至 1.2,混凝土的相对动弹模量增幅达到 4.4%;混凝土盐冻剥蚀量与相对动弹模量呈线性关系,随着剥蚀量的增加相对动弹模量逐渐减低;经过 300 次冻融循环后,混凝土的抗弯拉强度损失率均超过 17%,水胶比由 0.34 增至 0.4,混凝土的抗弯拉强度损失率由 21%增至 33%;3 种水胶比时,100 次盐冻循环后混凝土的磨损量提高了 6%,说明盐冻虽然能加快混凝土表面砂浆层剥蚀速度,但对混凝土剥蚀面以下砂浆层磨损不明显。

入藏号: CSCD:6444728

地址: Guo Yinchuan, Chang'an University;;Louisiana Transportation Research Center,Louisiana State University, Key Laboratory of Highway Engineering in Special Region of Ministry of Education;; Xi'an;;Baton Rouge, Shaanxi;;USA 710064;;70803.

Shen Aiqin, Chang'an University, Key Laboratory of Highway Engineering in Special Region of Ministry of Education, Xi'an, Shaanxi 710064, China.

Zheng Panfei, Chang'an University, Key Laboratory of Highway Engineering in Special Region of Ministry of Education, Xi'an, Shaanxi 710064, China.

Li Peng, Chang'an University, Key Laboratory of Highway Engineering in Special Region of Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 郭寅川, 长安大学;;路易斯安那州立大学路易斯安那州交通研究中心, 特殊地区公路工程教育部重点实验室;; 西安;;巴吞鲁日, 陕西;; 710064;;70803, 中国.

申爱琴, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

郑盼飞, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

李鹏, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: silver007007@163.com

电子邮件地址: silver007007@163.com

使用次数 (最近 180 天): 0

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作者: Lei Junan; Yang Jun

作者: 雷俊安; 杨俊

标题: Triaxial Test on Weathered Sand from Three Gorges Reservoir Area Stabilized by Lime-Flyash

标题: 二灰稳定三峡库区风化砂三轴试验研究

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作者关键词: lime-fly ash; weathered sand; triaxial test; internal friction angle; cohesion; Three Gorges Reservoir area

作者关键词: 二灰; 风化砂; 三轴试验; 内摩擦角; 黏聚力; 三峡库区

摘要: Unconsolidated-undrained triaxial shear test was conducted on weathered sand from the Three Gorges Reservoir area stabilized by lime-fly ash. The ratio of lime to fly ash was 1 : 2, 1 : 3, 1 : 4, and the corresponding lime dosage was 4%, 5%, and 6%. The shear strength indexes of weathered sand stabilized by different dosages of lime-fly ash were obtained, and then the results of triaxial test were compared with those obtained by direct shear test. Conclusions are as follows: 1) the stress-strain curve of weathered sand stabilized by lime-fly ash displays strain softening feature under different confining pressures; 2) the change of lime-fly ash content in specimens exerts little impact on the internal friction angle, but dramatic impact on cohesion; 3) at a stable lime content, cohesion increases with the rise of fly ash content, while internal friction angle increases but then declines with the rise of fly ash content. Comparison between triaxial test and direct shear test results reveals that the cohesion obtained by triaxial test is greater than that by direct shear test, but the value of internal frictional angle shows little difference.

摘要: 以三峡库区风化砂为研究对象, 将其用石灰与粉煤灰质量比为 1 : 2, 1 : 3, 1 : 4 的二灰进行稳定加固处理, 其中石灰剂量分别为 4%, 5%, 6%, 然后进行不固结不排水三轴剪切试验, 得到不同二灰掺量下的风化砂抗剪强度指标, 并将三轴试验结果与直剪试验结果进行对比分析。结果表明: 二灰稳定风化砂试件在不同围压下的应力-应变关系表现为应变软化型; 二灰掺量的改变对二灰稳定风化砂内摩擦角的变化影响较小, 而对黏聚力的变化影响较剧烈; 当石灰的掺入比例一定时, 黏聚力随着粉煤灰掺量的增大而增大, 而内摩擦角随着粉煤灰掺量的增大呈现先增大后减小的趋势。对比三轴试验和直剪试验结果发现, 通过三轴试验得到的黏聚力大于直剪试验得到的黏聚力, 但二者得到的内摩擦角相差不大。研究结果可为三峡库区废弃

风化砂的再生利用提供参考。

入藏号: CSCD:6444477

地址: Lei Junan, Chang'an University, Key Laboratory of Ministry of Education for Highway Engineering in Special Area, Xi'an, Shaanxi 710064, China.

Yang Jun, School of Civil Engineering and Architecture, China Three Gorges University, Yichang, Hubei 443002, China.

地址: 雷俊安, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

杨俊, 三峡大学土木与建筑学院, 宜昌, 湖北 443002, 中国.

电子邮件地址: lja0421@foxmail.com

电子邮件地址: lja0421@foxmail.com

使用次数 (最近 180 天): 0

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作者: Hui Bing; Liang Haimei; Tsai Yichang

作者: 惠冰; 梁海媚; 蔡宜长

标题: Three-dimensional indicators calculation method for asphalt pavement shoving

标题: 沥青路面拥包三维指标计算方法

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作者关键词: asphalt pavement; shoving; three-dimensional laser; three-dimensional indicators; laser longitudinal spacing

作者关键词: 沥青路面; 拥包; 三维激光; 三维指标; 激光纵向间距

摘要: To comprehensively and accurately evaluate the severity degree of asphalt pavement shoving, as well as realize the automatic calculation of the corresponding three-dimensional indicators, the indoor three-dimensional laser detection equipment was used to obtain high-precision and high-density surface laser point cloud data of shoving models, and the Lowess algorithm was adopted for data preprocessing. The RANSAC algorithm was then utilized to extract the contour data of the bottom of the shoving, and the three-dimensional model of the shoving was established based on the HARR matrix. On this basis, the height-difference method and the micro-element approximation algorithm were used to calculate the three-dimensional indicators such as the maximum height, bottom area, uplift volume, and the maximum slope of the

driving direction of the shoving. The calculation results of the three-dimensional indicators of two severity levels of light and heavy were compared, and the influence of laser line longitudinal spacing on calculation error was studied. Results show that when the longitudinal spacing of the laser line was 0.5 mm, the calculated relative errors of the maximum height, bottom area, uplift volume, and the maximum slope of the driving direction were less than 3.28%, 2.17%, 3.76%, and 1.97%, respectively. As the spacing increased to 10 mm, the relative error of the three-dimensional indicators of the shoving gradually increased due to the partial missing of the shoving model. When the spacing was 5 mm, the maximum relative error of the three-dimensional indicators was 3.49%, 4.65%, 7.11%, and 7.27%, respectively. When the spacing was 10 mm, the relative errors of the uplift volume and the maximum slope of the driving direction both exceeded 10%. It is recommended that when using three-dimensional laser technology to measure shoving, the longitudinal spacing should be not more than 5 mm to ensure the accuracy of the calculation results of the three-dimensional indicators. The three-dimensional indicators calculation method can evaluate the severity of the shoving and assess traffic safety risk.

摘要: 为全面、准确评价沥青路面拥包严重程度,实现三维指标的自动计算,利用室内三维激光检测设备获取高精度、高密度的拥包模型激光点云数据,采用 Lowess 算法进行数据预处理,再利用 RANSAC 算法获取拥包下底面轮廓数据,基于 HARR 矩阵建立拥包三维模型.在此基础上,利用高差法和微元逼近法分别计算了拥包的最大高度、下底面积、隆起体积与行车方向最大坡度等三维指标;对比轻、重两个严重等级的拥包三维指标计算结果,研究激光线纵向间距对指标计算误差的影响规律.结果表明:当激光线纵向间距为 0.5 mm 时,拥包最大高度、下底面积、隆起体积和行车方向最大坡度的相对误差分别不超过 3.28%、2.17%、3.76%和 1.97%;随着激光线纵向间距逐渐增大至 10 mm,拥包三维重构模型产生部分缺失,导致拥包三维指标相对误差逐渐增大;当间距为 5 mm 时,三维指标计算最大相对误差分别为 3.49%、4.65%和 7.11%和 7.27%;当间距为 10 mm 时,隆起体积和行车方向最大坡度的相对误差均超过 10%;建议采用三维激光技术对拥包进行检测时,纵向间距设置不大于 5 mm,以保证拥包三维指标计算结果准确性. 三维指标计算方法可评价拥包严重程度,评估行车安全风险.

入藏号: CSCD:6645177

地址: Hui Bing, School of Highway, Chang'an University;;Key Laboratory of Ministry of Education of Highway Engineering in Special Area, ;;Key Laboratory of Ministry of Education of Highway Engineering in Special Area, Xi'an;;Xi'an, ;; 710064;;710064.

Liang Haimei, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Tsai Yichang, School of Highway, Chang'an University;;School of Civil and Environmental Engineering, Georgia Institute of Technology, ;; Xi'an;;Atlanta, ;;America 710064;;30314.

地址: 惠冰, 长安大学公路学院;;特殊地区公路工程教育部重点实验室, ;;特殊地区公路工程教育部重点实验室, 西安;;西安, ;; 710064;;710064.

梁海媚, 长安大学公路学院, 西安, 陕西 710064, 中国.

蔡宜长, 长安大学公路学院;;佐治亚理工学院土木环境工程系, ;; 西安;;亚特兰大, ;; 710064;;30314.

电子邮件地址: 858411435@qq.com

电子邮件地址: 858411435@qq.com

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作者: Feng Zhongju; Dong Yunxiu; He Jingbin; Liu Chuang; Zhang Fuqiang; Li Xiaoxiong

作者: 冯忠居; 董芸秀; 何静斌; 刘闯; 张福强; 李孝雄

标题: Shaking table test of saturated fine sand liquefaction under strong earthquake

标题: 强震作用下饱和粉细砂液化振动台试验

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作者关键词: 饱和粉细砂; 强震区; 液化; 振动台试验; 孔压比; 判别方法

摘要: Aiming at liquefaction of saturated fine sand in meizoseismal area and taking the Puqian Bridge project as the test site, this study simulated the vibration response of the free field under seismic action by the vibration table model test and the laminated shear model box. The variation law of pore pressure ratio of saturated fine sand at different depths under ground vibration intensity of 0.15g ~ 0.80g (g represents gravity acceleration) was analyzed, and the liquefaction discrimination method of saturated fine sand was discussed. Results show that the growth of ultra-quiet pore water pressure and pore pressure ratio of saturated fine sand lagged behind ground motion stress, and the deeper the sand was, the longer the lag time. The saturated fine sand with a depth of 5 cm, 60 cm, and 110 cm was liquefied when the local vibration intensity was greater than or equal to 0.15g, 0.20g, and 0.25g respectively, and the pore pressure ratio stability value was greater than or equal to 0.8, which was proposed as a critical pore pressure ratio of saturated fine sand liquefaction. The liquefaction determination results of the existing common methods were discussed and a new method for discriminating the liquefaction of saturated fine sand by the criterion of saturated fine sand depth, ground motion intensity, and pore pressure ratio was proposed. It provides technical reference for similar projects and scientific basis for rational design and construction of bridge foundation before paving.

摘要: 针对强震区饱和粉细砂液化问题, 依托海南铺前大桥实体工程, 基于振动台模型试验, 选用叠层剪切式模型箱, 模拟自由场在地震作用下的振动反应, 分析 0.15g ~ 0.80g 地震动强度下不同深度饱和细粉砂孔压比的变化规律, 探讨饱和粉细砂的液化判别方法. 结果表明: 饱和粉细砂超静孔隙水压力、孔压比的增长滞后于地震动应力, 且粉细砂深度越深, 滞后时间越长, 上覆土层厚度对于饱和粉细砂的抗液化性能有重要影响; 深度为 5 cm、60 cm 和 110 cm 的饱

和粉细砂,当地震动强度分别 $\geq 0.15g$ 、 $0.20g$ 和 $0.25g$ 时发生液化,此时孔压比稳定值均 ≥ 0.8 ,提出以 0.8 作为饱和粉细砂液化的临界孔压比;对比讨论现有常用方法的液化判定结果,提出一种以饱和粉细砂深度、地震动强度和孔压比为判据的饱和粉细砂液化判别新方法,可为铺前大桥基础的合理设计与施工提供科学依据,也可为类似工程提供技术支持.

入藏号: CSCD:6645187

地址: Feng Zhongju, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

He Jingbin, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Dong Yunxiu, School of Highway, Chang'an University;;School of Civil Engineering, Longdong University, ;; Xi'an;;Qingyang, ;;Gansu 710064;;745000.

Liu Chuang, Department of Transport of Hainan Province, Haikou, Hainan 570216, China.

Zhang Fuqiang, Department of Transport of Hainan Province, Haikou, Hainan 570216, China.

Li Xiaoxiong, School of Geographic Information and Tourism, Chuzhou University, Chuzhou, Anhui 239000, China.

地址: 冯忠居, 长安大学公路学院, 西安, 陕西 710064, 中国.

何静斌, 长安大学公路学院, 西安, 陕西 710064, 中国.

董芸秀, 长安大学公路学院;;陇东学院土木工程学院, ;; 西安;;庆阳, ;;甘肃 710064;;745000.

刘闯, 海南省交通运输厅, 海口, 海南 570216, 中国.

张福强, 海南省交通运输厅, 海口, 海南 570216, 中国.

李孝雄, 滁州学院地理信息与旅游学院, 滁州, 安徽 239000, 中国.

电子邮件地址: Dongyunxiu_0524@163.com

电子邮件地址: Dongyunxiu_0524@163.com

使用次数 (最近 180 天): 0

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作者: Yang Zhijun; Xie Yongli; Fan Xiang; Lu Yixin

作者: 杨治军; 谢永利; 范祥; 刘毅鑫

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作者关键词: finite element analysis; branch pile; uplift bearing capacity; depth of first plate; uplift load-displacement curve

作者关键词: 有限元模拟; 支盘桩; 抗拔承载力; 首盘深度; 上拔荷载-位移曲线

摘要: The determination of the first plate depth has great practical significance in the actual engineering, with the extensive application of the anti-drawing branch pile in the engineering field. Based on the numerical calculation theories of elastoplastic constitutive relation of rock and soil, ABAQUS finite element software was used to establish the model of pile and soil axis symmetry. Considering the initial stress field, the model of pile-soil interface bonding was defined. Under the condition of specified displacement of pile top, the variation of uplift bearing capacity of the pile support pile was analyzed, and the influence of the first plate depth on the uplift capacity of the pile support pile was obtained. The comparative analysis of the up-and-down load-displacement curves of different pile lengths shows that: With the increase of displacement which occur on pile top for the branched piles with different depths of first plate, the uplift bearing capacity decreases with the increase of the first plate depth before the ultimate uplift load is reached, and when the ultimate uplift load is reached, the uplift bearing capacity increases with the increase of the first plate depth; For the branch piles with different lengths, the first plate depth value is 24%~30% of the pile length (the double plates pile is the total pile length and the three plates pile is the secondary depth), and the uplift bearing capacity reaches the maximum; Under the optimal first plate depth, regardless of the number of branch plates, when the soil around the pile is clay and saturated, the uplift bearing capacity provided by the unit pile length of the branch-plate pile is 7.5% higher than that of the straight pile. It provides theoretical support for the length design of branch-plate pile in practical engineering.

摘要: 基于岩土弹塑性本构关系的数值计算理论,运用 ABAQUS 有限元软件,建立桩土轴对称模型。在指定桩顶位移条件下,分析支盘桩抗拔承载力的变化情况,得到首盘深度对支盘桩抗拔承载力的影响规律。研究表明:对于不同首盘深度的支盘桩,随着桩顶位移的逐步增加,在未达到极限抗拔荷载值之前,其抗拔承载力随着首盘深度的增大而减小,在达到极限抗拔荷载之后,其抗拔承载力随着首盘深度增加而增大;对于长度不同的支盘桩,首盘深度值为桩长(双盘桩为总桩长、三盘桩为次盘深度)的 24%~30%时,抗拔承载力达到最大;在最优首盘深度的条件下,无论支盘数目多少,当桩周土为黏土且处于饱和状态,支盘桩的单位桩长所提供的抗拔承载力,相比于直桩提高了 7.5%,结果可为实际工程中支盘桩的长度设计提供理论支撑。

入藏号: CSCD:6643638

地址: Yang Zhijun, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Xie Yongli, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Fan Xiang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Lu Yixin, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 杨治军, 长安大学公路学院, 西安, 陕西 710064, 中国.

谢永利, 长安大学公路学院, 西安, 陕西 710064, 中国.

范祥, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘毅鑫, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: xieyl@263.net

电子邮件地址: xieyl@263.net

使用次数 (最近 180 天): 0

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作者: Zhang Qi; Chen Hong; Liu Zhizhen; Zhang Min

作者: 张琦; 陈红; 刘至真; 张敏

标题: Analysis of Effects of Rainfall on Origin-destinationbased Travel Time Reliability

标题: 降雨量对 OD 行程时间可靠性影响分析

来源出版物: 交通运输系统工程与信息 卷: 19 期: 6 页: 243-249 出版年: 2019

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文献类型: Article

作者关键词: traffic engineering; origin-destination-based travel time reliability; rainfall; Gaussian mixture model; buffer index; buffer index variation ratio

作者关键词: 交通工程; OD 行程时间可靠性; 降雨量; 高斯混合模型; 缓冲指数; 缓冲指数变化率

摘要: With the purpose of investigating the effects of various rainfalls on the origin-destination(OD)-based travel time reliability (TTR) in detail, Gaussian mixture models of OD-based travel time were constructed based on three-year travel time data of ten OD pairs in Boston, USA, shared by Uber movement, and the hourly historical weather provided by WeatherUnderground website. And the model parameters, K -value and percentile-value were solved by expectation-maximum algorithm, the P-value (greater than 0.500 0) after K-S test and bisection method, respectively. Additionally, buffer index variation ratio (BIVR) is proposed for quantitative analysis. The results show that: rain can reduce the overall ODTTR, and the reduction effect increases with the rainfall increase, but the gaps are unobvious; Despite lower probability, ODTTR may be improved when rain as a secondary factor; Light rain can be regarded as normal weather; The ODTTR of rainy days is significantly lower than that of normal weather, so residents should reserve more time for travel in rainy days (except light rain).

摘要: 为详细研究降雨量对 OD 行程时间可靠性的影响,基于 Uber 出行共享的 3 年美国波士顿 10 对 OD 行程时间数据及 WeatherUnderground 网站提供的小时历史天气,构建了 OD 行程时间高斯混合模型(GMM).模型参数利用 EM 法进行求解,K 值根据 K-S 检验后的 P 值(大于 0.500 0)进行确定,模型分位数利用二分法进行求解.提出一种基于缓冲指数(BI)的新指标缓冲指数变化率(BIVR)作为定量评估指标.结果表明:降雨会降低总体 OD 行程时间可靠性,降低效果随降雨量提高而增强,但增强效果并不明显;尽管可能性较低,但当降雨处于次要影响因素

时可能提高可靠性;小雨天气可视为正常天气;雨天可靠性显著低于正常天气,居民在雨天(除小雨外)出行应预留更多时间.

入藏号: CSCD:6639025

地址: Zhang Qi, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Hong, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Zhizhen, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Min, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 张琦, 长安大学公路学院, 西安, 陕西 710064, 中国.

陈红, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘至真, 长安大学公路学院, 西安, 陕西 710064, 中国.

张敏, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: glch@chd.edu.cn

电子邮件地址: glch@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Ye Fei; Han Xin; Qin Nan; Gao Xiang

作者: 叶飞; 韩鑫; 秦楠; 高翔

标题: Displacement Infiltration Diffusion Model of Binghamian Grouts as Backfill Grouting of Shield Tunnel

标题: 盾构壁后注浆宾汉姆浆液驱替渗透扩散模型

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语言: Chinese

文献类型: Article

作者关键词: shield tunnel; backfill grouting; infiltration; displacement effect

作者关键词: 盾构隧道; 壁后注浆; 渗透; 驱替效应

摘要: With Bingham grout as the study object, this paper deduces the spherical displacement infiltration diffusion model by applying generalized Darcy's law and theories of seepage mechanics based on the displacement effect of grout for groundwater. Through examples, the characteristics of the grout infiltration diffusion when considering the grout displacement effect is

analyzed, and the main factors affecting the grout infiltration diffusion is analyzed. The results show that when the grout displacement effect is considered, the grout pressure in the diffusion front decreases along the concave curve with the increase of the diffusion distance. Although the change of frontal grout pressure is small, it has a great influence on the grout diffusion radius, and the grout diffusion distance shortens about 23% at 1h.

摘要: 以宾汉姆流型浆液为研究对象, 基于浆液对地下水的驱替效应, 运用广义达西定律及渗流力学相关理论, 推导了壁后注浆球形驱替渗透扩散模型. 通过算例分析了考虑浆液驱替效应时浆液的渗流扩散特征, 并针对影响浆液渗透扩散的主要因素进行了分析. 结果表明: 考虑浆液驱替效应时, 扩散锋面浆液压力随着扩散距离的增加沿下凹形曲线递减, 虽然锋面浆液压力变化量较小, 但对浆液的扩散半径影响较大, 注浆 1h 时浆液扩散距离减小约 23%.

入藏号: CSCD:6640135

地址: Ye Fei, School of highway Changan University, Xian, 710064.

Han Xin, School of highway Changan University, Xian, 710064.

Qin Nan, School of highway Changan University, Xian, 710064.

Gao Xiang, CCCC Second Highway Consultants Co., Ltd., Wuhan, Hubei 430056, China.

地址: 叶飞, 长安大学公路学院, 西安, 陕西 710064, 中国.

韩鑫, 长安大学公路学院, 西安, 陕西 710064, 中国.

秦楠, 长安大学公路学院, 西安, 陕西 710064, 中国.

高翔, 中交第二公路勘察设计研究院有限公司, 武汉, 湖北 430056, 中国.

电子邮件地址: xianyefei@126.com; hanxin@chd.edu.cn

电子邮件地址: xianyefei@126.com; hanxin@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Guo Yinchuan; Shen Aiqin; Zhai Chaowei; Li Peng

作者: 郭寅川; 申爱琴; 翟超伟; 李鹏

标题: Abrasion resistance and microstructure of road concrete under different design parameters

标题: 不同设计参数道路混凝土耐磨性与微观结构

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语言: Chinese

文献类型: Article

作者关键词: road engineering; abrasion resistance; mercury intrusion porosimetry; mortar volume component; microstructure; correlation

作者关键词: 道路工程; 耐磨性; 压汞试验; 砂浆体积分数; 微观结构; 相关性

摘要: In order to study the correlations between the microstructure and abrasion resistance of concrete pavement, the influence of mortar layer on the abrasion resistance of concrete pavement was considered, and the mortar volume component was used as an important design parameter for the abrasion resistance of concrete pavement, the compressive strength test and abrasion resistance test were used for the concrete pavement with different mortar volume components and water-cement ratios, in addition, the digital image processing technology, mercury intrusion porosimetry and scanning electron microscope have been used to study the change laws of the stomatal structure, pore structure and micro topography under different design parameters, and the correlations between microstructure and abrasion resistance of road concrete have been analyzed. The results show that the compressive strength of road concrete improves with the increase of the mortar volume component or the decrease of water-cement ratio, and the abrasion resistance of road concrete improves with the increase of mortar volume component or the reduction of water-cement ratio, and the effect of mortar volume component on abrasion resistance is more significant. When the mortar volume component increases from 0.52 to 0.58, the compressive strength of road concrete improves by 23% and the abrasion resistance increases by 50%. When the water-cement ratio decreases from 0.46 to 0.40, the compressive strength of road concrete improves by 21% and the abrasion resistance increases by 41%. With the increase of the mortar volume component and the decrease of water-cement ratio, the parameters of stomatal structure and pore structure of concrete reduce gradually, and the percentage of <100 nm pores increases, so the microstructure of concrete improves and internal structure of concrete tends to be dense, which is conducive to enhance the abrasion resistance of road concrete. The correlations between abrasion value and stomatal structure is different from that between abrasion value and pore structure. Further, the abrasion resistance has strongest correlations with the average stomatal size, followed by the correlations with the stomatal spacing coefficient, and has weak correlations with the total stomatal rate. However, the abrasion value has the strongest correlations with the percentage of 50 to 100 nm pores, followed by the characteristic parameters of each pore structure, and has weak correlations with the percentage of >200 nm pores.

摘要: 为研究道路混凝土微观结构与其耐磨性之间的相关性,基于道路混凝土路表砂浆层对其耐磨性的影响,提出以砂浆体积分数作为道路混凝土耐磨性设计参数,对不同砂浆体积分数和水灰比条件下的道路混凝土进行抗压强度和耐磨性试验,借助数字图像处理技术、压汞试验和扫描电镜研究了不同设计参数条件下的道路混凝土气孔结构、孔结构及微观形貌的变化规律,并对其微观结构与耐磨性之间的相关性进行了分析。研究表明:道路混凝土的抗压强度及耐磨性会随着砂浆体积分数增大而提高,而减小水灰比也可提高混凝土的抗压强度和耐磨性,且砂浆体积分数对耐磨性的影响更为显著;砂浆体积分数从 0.52 增大至 0.58 时,道路混凝土抗压强度提高 23%,耐磨性增强 50%;水灰比从 0.46 减小至 0.40 时,道路混凝土抗压强度提高 21%,耐磨性增强 41%;随着砂浆体积分数增大和水灰比减小,混凝土内部孔结构和气孔结构特征参数均逐渐减小,小于 100 nm 的孔占比增大,道路混凝土微观结构得到改善,混凝土内部结构趋于密实,有利于增强道路混凝土耐磨性;道路混凝土磨耗量与其气孔结构和孔结构相关性具有一定差异,其中磨耗量与平均气孔孔径相关性最强,与气孔间距系数相关性次之,与总气孔率相关性较弱;而磨耗量与 50~100 nm 的孔占比相关性最强,与各孔结构特征参数相关性次之,与大于 200 nm 的孔占比相关性较弱。

入藏号: CSCD:6633948

地址: Guo Yinchuan, School of Highway,Chang'an University;;Louisiana Transportation Research Center,Louisiana State University, ;; Xi'an;;Baton Rouge, Shaanxi;;USA 710064;;LA70803.

Shen Ai Qin, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Li Peng, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhai Chaowei, School of Highway,Chang'an University;;Henan Provincial Communications Planning & Design Institute Co.Ltd, ;; Xi'an;;Zhengzhou, Shaanxi;;Henan 710064;;451464.

地址: 郭寅川, 长安大学公路学院;;路易斯安那州立大学路易斯安那州交通研究中心, ;; 西安;;巴吞鲁日, 陕西;; 710064;;LA70803, 中国.

申爱琴, 长安大学公路学院, 西安, 陕西 710064, 中国.

李鹏, 长安大学公路学院, 西安, 陕西 710064, 中国.

翟超伟, 长安大学公路学院;;河南省交通规划设计研究院股份有限公司, ;; 西安;;郑州, 陕西;;河南 710064;;451464, 中国.

电子邮件地址: silver007007@163.com

电子邮件地址: silver007007@163.com

使用次数 (最近 180 天): 0

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作者: Ma Yiping; Liu Yongjian; Liu Jiang

作者: 马印平; 刘永健; 刘江

标题: Multi-scale Finite Element Model Updating of CFST Composite Truss Bridge Based on Response Surface Method

标题: 基于响应面法的钢管混凝土组合桁梁桥多尺度有限元模型修正

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作者关键词: bridge engineering; CFST composite truss bridge; response surface method; finite element model updating; field test

作者关键词: 桥梁工程; 钢管混凝土组合桁梁桥; 响应面法; 有限元模型修正; 实桥试验

摘要: In order to propose a finite element model(FEM)of a concrete-filled steel tubular(CFST)bridge with high efficiency and accuracy,an updating method combined with field

test and multi-scale FEM was presented. Firstly, a multi-scale ABAQUS FEM of a CFST composite truss bridge was developed based on practical engineering. The FEM model included three scale levels: the whole bridge, deck of the composite girder, and members of the CFST truss. The elastic modulus and thickness of the concrete deck, elastic modulus of the truss chord, elastic modulus of steel, and the loads of loading vehicles were chosen as the five updating parameters by considering the structural characteristics and construction errors of CFST structures. Deflection at mid-span, stress of the hollow bottom chord member, stress of the CFST bottom chord member at the pier top, stress of the compression brace at the pier top, and longitudinal stress of the deck were chosen as the five objective functions by considering the conditions of the field test. Secondly, the central composite design method was applied to generate a sample set of updating parameters, and each sample was imported into the FEM for calculation. The response surface method was then used to establish the second-order polynomial function between the updating parameters and objective function. The response surface equation was also obtained by parameter significance analysis. Finally, the structural parameters of the three scale levels from the multiscale FEM were updated synchronously based on the bridge field test. The results show that the updated parameters coincided well with the conditions of practical bridge construction. The calculated results of the updated multi-scale FEM agreed with the field test results. The updated FEM has higher accuracy, which can truly reflect the mechanical behavior of bridge structures in practical engineering. The proposed updating method provides a reasonable analytical method for health monitoring, state assessment, and damage detection during the operation stage of bridge structures.

摘要: 为建立适用于钢管混凝土桥梁的高效、高精度有限元分析模型,提出一种基于响应面法的全桥多尺度有限元模型修正方法。首先以一座钢管混凝土组合桁梁桥为工程背景建立包含全桥、组合桁梁桥面板以及钢管混凝土桁架杆件 3 个尺度的 ABAQUS 全桥多尺度有限元模型。在考虑钢管混凝土结构的特点和施工误差的基础上选取桥面板混凝土弹模、厚度,桁架弦杆内混凝土弹模,钢材弹模以及加载车辆荷载 5 个影响因素作为待修正参数;根据实桥试验条件选择中跨跨中挠度、下弦空管弦杆应力、墩顶钢管混凝土弦杆应力、墩顶受压腹杆应力以及桥面板顺桥向应力 5 个目标函数。其次采用中心复合设计方法生成了待修正参数的样本集,并将每组参数样本代入有限元模型进行计算。进而采用响应面法建立待修正结构参数和目标函数的 2 次多项式函数关系,结合参数显著性分析得到响应面方程。最后结合实桥试验结果对多尺度有限元模型 3 个尺度上的结构参数进行同步修正。结果表明:修正后的参数变化情况与依托工程的实际施工情况相符;采用修正后的参数建立的多尺度有限元模型计算值与实桥试验结果吻合良好;修正后的有限元模型具有较高的精度,可真实反映实际工程中桥梁结构的受力状态。该修正方法可为桥梁结构运营期间的健康监测、状态评估、损伤检测提供可靠的分析手段。

入藏号: CSCD:6632833

地址: Ma Jinping, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Yongjian, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Jiang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 马印平, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘永健, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘江, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: myfmyh1@qq.com; liuyongjian@chd.edu.cn

电子邮件地址: myfmyh1@qq.com; liuyongjian@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Peng Hui; Zhao Yajun

作者: 彭辉; 赵亚军

标题: Comparative Evaluation of Urban Public Traffic Benefits Based on DEA Model

标题: 基于 DEA 模型的城市公交交通效益对比评价

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作者关键词: traffic engineering; public transit; traffic benefits; DEA model; index system; super-efficiency analysis

作者关键词: 交通工程; 公共交通; 交通效益; DEA 模型; 指标体系; 超效率分析

摘要: Aiming at the problems of different cities with different benefits of conventional public transport and low benefits of some cities, the DEA model with 10 indexes as influencing factors was established on the basis of the statistical data of public transport in each city, considering the influence objects such as travelers, government departments and public transport companies. The 10 indexes included the daily average passenger traffic volume of conventional public transport on the ground, the ownership rate of public transport for ten thousand people, the density of public transport network, the coverage rate of stations, the share rate of public transport for residents, and the public transport lines, waiting time per capita, average transfer times, non-linear coefficient, and daily average exhaust emissions. The public transport operation conditions of 8 cities in China were evaluated and relevant conclusions were obtained. The research shows that the data envelopment analysis method (DEA) is suitable for super-efficiency analysis of conventional bus traffic benefits in different cities. The analysis shows that the efficiency value of Xian is the largest and Shantou is the smallest; in addition, the public transport efficiency values of Xining, Taiyuan and Jilin are roughly the same. The research results are helpful to find out the reasons for the low efficiency of urban public transport and provide theoretical basis for improving the service level of urban public transport operation.

摘要: 针对不同城市常规公交交通效益大小不一、部分城市交通效益较低等问题, 基于各城市公交统计数据, 兼顾出行者、政府部门、公交公司等影响对象, 建立以地面常规公交日均客运

量、万人公交拥有率、公交线网密度、站点覆盖率、居民出行公交分担率、公交线路数、人均候车时间、平均换乘次数、非直线系数、日均尾气排放量 10 个指标为影响因素的 DEA 模型,对全国 8 个城市的公交运营情况进行评价并得出相关结论。研究表明:数据包络分析方法(DEA)适用于对不同城市的常规公交交通效益进行超效率分析,分析得到西安的效率值最大,汕头的效率值最小,另外西宁、太原、吉林 3 个城市公交交通效率值大致相同;研究结果有助于寻求导致城市公交交通效益较低的原因,为提高城市公交运营服务水平提供理论基础。

入藏号: CSCD:6634281

地址: Peng Hui, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Yajun, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 彭辉, 长安大学公路学院, 西安, 陕西 710064, 中国.

赵亚军, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: 1986353057@qq.com

电子邮件地址: 1986353057@qq.com

使用次数 (最近 180 天): 0

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作者: Qu Guangzhen; Zhou Guangli; Huang Pingming; Han Wanshui; Gong Wenlong; Yuan Yangguang

作者: 渠广镇; 周广利; 黄平明; 韩万水; 巩文龙; 袁阳光

标题: In-house destructive test of dismantled component of existing hollow slab bridge

标题: 在役空心板桥梁拆除构件室内破坏试验

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作者关键词: 桥梁工程; 在役空心板桥梁; 破坏试验; 全过程静动力特性; 模态柔度差; 承载力

摘要: In order to accurately assess the residual bearing capacity of the hollow slab beam after 24 years of service,a hollow slab girder bridge of Jiqing Highway Reconstruction Project was demolished and transported to the laboratory for failure test.The key position static response indicators such as beam deflection,steel strain,concrete strain,crack development etc,of the hollow

slab were tested during the whole test, and the dynamic characteristics of the beam under the main load step were tested too. The results show that the mid-span vertical displacement-moment curve as an obvious double folding line change. The bending moment corresponding with the actual plastic turning point are 2.5 times and 4.09 times as the design values of two kinds of design vehicle loads, Highway-class I and Automobile-over 20 respectively. The entering to plastic stage of the hollow slab is mainly caused by the yielding of part of the tensile reinforcements. During the destructive test, the neutral axis of the slab shift up about 6.9 cm from the original location, which induce that the compressive strain of the concrete of the superior border firstly increasing with the loading level and then decreases. Before entering the plastic stage, the width of the main crack of the web increase relatively slowly and is basically below 0.3 mm, and then the crack grow quickly, however the growth of the mid-span bending moment is slow. In terms of dynamic characteristics, the self-vibration frequency of the hollow slab in the preliminary test is weak, and after entering the plastic working stage, the first-order frequency of the hollow slab decrease significantly. Based on the modal flexibility difference, the hollow slab damage before entering the plastic working stage can be further quantified. The actual flexural capacity of the hollow slab beam which determined by the failure test is 1.52 times the normal calculated bearing capacity.

摘要: 为准确评估服役 24 年后空心板梁的剩余承载能力, 将济青(济南-青岛)高速公路改扩建工程中一空心板梁桥拆除并运回实验室进行破坏试验, 对空心板关键位置的静力响应指标, 如梁体挠度、钢筋应变、混凝土应变及裂缝发展等进行测试, 同时对梁体在主要荷载步下的动力特性进行测试。研究结果表明: 空心板跨中挠度-正弯矩曲线呈明显的双折线变化规律, 实际塑性转折点对应弯矩值分别为公路-I级、汽-超 20 设计荷载效应的 2.50 倍及 4.09 倍; 空心板进入塑性阶段主要由部分钢筋率先屈服所引起; 破坏试验过程中, 空心板中性轴由最初位置上移了 6.9 cm, 受此影响, 距离梁底较高的混凝土压应变呈现先增后减的变化规律; 进入塑性阶段前, 腹板主裂缝宽度增长相对缓慢且基本在 0.3 mm 以下, 之后裂缝增长明显而跨中弯矩增长很小; 就动力特性而言, 前期试验中空心板自振频率变化微弱, 而进入塑性阶段后, 空心板一阶振动频率下降明显, 基于模态柔度差可进一步对进入塑性阶段前的空心板损伤程度进行量化; 由破坏试验所确定空心板梁实际抗弯承载力为规范计算承载力的 1.52 倍。

入藏号: CSCD:6633954

地址: Qu Guangzhen, School of Highway, Chang'an University, Shandong Transportation Research Institute, Xi'an, Jinan, Shaanxi, Shandong 710064, 250012.

Zhou Guangli, Shandong Transportation Research Institute, Jinan, Shandong 250012, China.

Gong Wenlong, Shandong Transportation Research Institute, Jinan, Shandong 250012, China.

Huang Pingming, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Han Wanshui, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Yuan Yangguang, School of Civil Engineering, Xi'an University of Architecture and Technology, Xi'an, Shaanxi 710055, China.

地址: 渠广镇, 长安大学公路学院; 山东省交通科学研究院, 西安; 济南, 陕西; 山东 710064; 250012, 中国.

周广利, 山东省交通科学研究院, 济南, 山东 250012, 中国.

巩文龙, 山东省交通科学研究院, 济南, 山东 250012, 中国.

黄平明, 长安大学公路学院, 西安, 陕西 710064, 中国.

韩万水, 长安大学公路学院, 西安, 陕西 710064, 中国.

袁阳光, 西安建筑科技大学土木工程学院, 西安, 陕西 710055, 中国.

电子邮件地址: quguangzhen@126.com

电子邮件地址: quguangzhen@126.com

使用次数 (最近 180 天): 0

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作者: Song Chaojie; Zhang Gang; Qin Zhiyuan; He Shuanhai; Cheng Huacai; Huang Qiao; Yao Weifa

作者: 宋超杰; 张岗; 秦智源; 贺拴海; 程华才; 黄侨; 姚伟发

标题: Fire resistance of steel-concrete composite continuous bridge girder

标题: 钢板组合连续桥梁的耐火极限

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作者关键词: 桥梁工程; 钢板组合连续桥梁; 有限元; 火灾; 耐火极限

摘要: Aimed at the serious threat to steel bridge caused by tanker fire, a four-span double-ribbed steel-concrete composite continuous bridge girder (4*35 m) was selected as research object. According to characteristics of tanker fire, the closest HC temperature-time curve was selected, and four fire modes of tanker fire were restored according to the actual fire characteristics. The finite element model was established using thermodynamic coupling calculation method and validated by experimental results. Firstly, the temperature field of steel-concrete composite bridge girder under tanker fire was analyzed. Then, the calculation method of flexural capacity of double-ribbed steel-concrete composite bridge girder was proposed, and degradation of flexural capacity in positive moment region under tanker fire was calculated based on the results of temperature field. In addition, the deflection progression of steel-concrete composite bridge girder under different fire scenarios was analyzed, and fire resistance of steel-concrete composite bridge girder was obtained, using flexural capacity and deflection failure criterion. Finally, the failure modes of the steel-concrete composite bridge girder under different fire scenarios were studied. The results show that the temperature rise of steel is much larger than that of concrete. The steel-concrete composite bridge girder presents an obvious temperature

gradient along the girder depth and its maximum value is 1 020 °C. The thermal bowing caused by temperature gradient is the main reason for deflection of steel-concrete composite bridge girder at the initial stage of fire. Flexural capacity decreases slowly at the initial stage of fire, after entering high temperature stage, flexural capacity decreases rapidly. Finally, at about 30 min, failure of the steel-concrete composite bridge girder occurs, when flexural capacity drops below the bending moment resulting from applied load. The general trend of deflection progression can be grouped into three stages, fire exposure length of side span has great influence on deflection progression of the composite girder, and the faster deflection increases with the larger fire exposure length. Using deflection criterion to judge failure of composite bridge girder is unsafe compared with flexural capacity criterion, and deflection criterion is revised based on flexural capacity criterion. Side span exposed to tanker fire presents fully collapse and mid-span presents large deflection of concrete slab and swell of steel girder.

摘要: 针对油罐车火灾对钢结构桥梁造成的严重威胁,选取四跨双肋钢板组合连续梁(4*35 m)作为研究对象。根据油罐车火灾燃烧特点选取最为贴近的碳氢(HC)火灾升温曲线,以实际受火特征还原了4种受火模式,采用热-力耦合计算方法,建立有限元模型,并对模型有效性进行了验证。首先分析了油罐车火灾作用下钢板组合梁的温度场,然后推导了火灾下双肋钢板组合梁塑性抗弯承载力计算方法,基于温度场分析结果计算了油罐车火灾下钢板组合梁正弯矩区域的抗弯承载能力衰退曲线,分析4种火灾作用下钢板组合梁的挠度变化过程,采用抗弯承载力和挠度破坏准则得出组合梁的耐火极限;最后对4种火灾场景下钢板组合梁的破坏形态进行了分析。研究表明:油罐车火灾下,钢材整体升温幅度远大于混凝土,组合梁截面沿梁高方向出现明显的温度梯度,其最大值为1 020 °C,这种温度梯度导致的热拱是钢板组合梁在延火初期下挠的主要原因;截面抗弯承载力在延火初期降低缓慢,在进入高温阶段后截面抗弯承载力急剧降低,最终在30 min左右降低至荷载效应以下,组合梁破坏;在火灾作用下组合梁挠度总体呈三阶段发展,边跨受火长度对组合梁挠度变化影响较大,边跨受火长度越大,挠度增长越快;采用挠度准则判断组合梁的破坏相较于抗力准则偏于不安全,并基于抗力破坏准则对挠度准则进行了修正;边跨在火灾作用下表现为整体垮塌破坏,中跨受火表现为混凝土板的挠曲破坏和钢梁的鼓胀破坏。

入藏号: CSCD:6633957

地址: Song Chaojie, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Gang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Qin Zhiyuan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

He Shuanhai, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Cheng Huacai, Anhui Highway Test and Research Center Co.Ltd., Hefei, Anhui 230601, China.

Huang Qiao, School of Transportation, Southeast University, Nanjing, Jiangsu 210096, China.

Yao Weifa, School of Transportation, Southeast University, Nanjing, Jiangsu 210096, China.

地址: 宋超杰, 长安大学公路学院, 西安, 陕西 710064, 中国.

张岗, 长安大学公路学院, 西安, 陕西 710064, 中国.

秦智源, 长安大学公路学院, 西安, 陕西 710064, 中国.

贺拴海, 长安大学公路学院, 西安, 陕西 710064, 中国.

程华才, 安徽省高速公路试验检测科研中心有限公司, 合肥, 安徽 230601, 中国.

黄侨, 东南大学交通学院, 南京, 江苏 210096, 中国.

姚伟发, 东南大学交通学院, 南京, 江苏 210096, 中国.

电子邮件地址: scj3660@126.com; zhangg_2004@126.com

电子邮件地址: scj3660@126.com; zhangg_2004@126.com

使用次数 (最近 180 天): 0

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作者: Bi Jiefu; Zheng Nanxiang; Dong Shi; Wu Xiaoxin

作者: 毕洁夫; 郑南翔; 董是; 吴晓鑫

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语言: Chinese

文献类型: Article

作者关键词: asphalt mixture; water stability performance; large samples analysis; rank-sum test; least-significant difference test(LSD)

作者关键词: 沥青混合料; 水稳定性; 大样本分析; 秩和检验; 最小显著性差异法检验(LSD)

摘要: The type and quality of asphalt and coarse aggregate are the key factors determining the quality of asphalt pavement. In order to quantitatively characterize the influence of different asphalt models, manufacturers and coarse aggregate properties on the stability of asphalt mixture water, the significance level of the difference in the water stability of asphalt mixture between the same type and different places of origin is analyzed. Methods based on a large sample of asphalt mixture production proportion database, this work adopts the big data analysis method to quantitatively study the influence of different asphalt and aggregate parameters on the water stability of the mixture. Firstly, the difference of water stability index between different asphalt and coarse aggregate combinations was analyzed by rank-sum test, and then the difference level of water stability of the same asphalt mixture of different manufacturers was studied by generalized factor variance analysis. The results showed that, for the water stability of various mixtures, (a) basalt and limestone have demonstrated similar performance, (b) modified asphalt is superior to matrix asphalt, (c) SUP is superior to AC, (d) the smaller the nominal particle size, the better the water stability, (e) asphalt manufacturers have no significant influence on the water stability of asphalt mixtures. The analysis method based on large samples is applicable to the analysis of water stability of asphalt mixture. The influence of asphalt penetration grade, nominal maximum particle size and gradation, on MS0 are obviously more significant than those of TSR.

摘要: 沥青与粗集料的种类与质量是决定沥青路面质量的关键因素,为定量表征不同沥青型号、生产厂家、粗集料性质等对沥青混合料水稳定性的影响,分析相同种类、不同产地沥青混合料水稳定性差异的显著性水平。本研究基于大样本的沥青混合料生产配合比数据库,采用大数据分析,定量研究沥青与集料各参数差异对混合料水稳定性的影响程度。首先通过秩和检验法分析了不同沥青与粗集料种类组合之间水稳定性指标的差异性,然后通过广义因素方差分析法研究了不同厂家相同型号沥青混合料水稳定性的差异水平。研究表明,对于各种混合料的水稳定性:玄武岩与石灰岩性能相当;改性沥青优于普通沥青;标准沥青混合料(SUP)优于基质沥青(AC);公称粒径越小水稳定性越好;沥青生产厂家对沥青混合料的水稳定性影响不显著。基于大样本的分析方法适用于沥青混合料水稳定性分析,沥青标号、最大公称粒径及级配对混合料的浸水残留稳定比(MSO)的影响显著性高于对其冻融劈裂强度比(TSR)的影响显著性。

入藏号: CSCD:6631118

地址: Bi Jiefu, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Zheng Nanxiang, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Dong Shi, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Wu Xiaoxin, School of Transportation Engineering,Shenyang Jianzhu University, Shenyang, Liaoning 110168, China.

地址: 毕洁夫, 长安大学公路学院, 西安, 陕西 710064, 中国.

郑南翔, 长安大学公路学院, 西安, 陕西 710064, 中国.

董是, 长安大学公路学院, 西安, 陕西 710064, 中国.

吴晓鑫, 沈阳建筑大学土木工程学院, 沈阳, 辽宁 110168, 中国.

电子邮件地址: emailznx@163.com

电子邮件地址: emailznx@163.com

使用次数 (最近 180 天): 0

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作者: Feng Zhongju; Hu Haibo; Dong Yunxiu; Dai Liangjun; Feng Kai; Wen Junqiang

作者: 冯忠居; 胡海波; 董芸秀; 戴良军; 冯凯; 文军强

标题: Calculation Method for Vertical Bearing Capacity of Hollow Independent Composite Pile with Super-large Diameter

标题: 超大直径空心独立复合桩的竖向承载力计算方法

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作者关键词: hollow independent composite pile with super-large diameter; bearing capacity; equivalent elastic modulus; hyperbolic model; load transfer; comprehensive impact factor

作者关键词: 超大直径空心独立复合桩; 承载力; 等效弹性模量; 双曲线模型; 荷载传递法; 综合影响因子

摘要: The hollow independent composite pile with super-large diameter is a new type of pile foundation jointly carried by a hollow pile, an external cement mixing pile, and grouting soil around the pile. Numerical computation and theoretical calculation were performed in this paper to determine the vertical ultimate bearing capacity of this type of pile under different conditions in Jianghuai area of Anhui Province. Introducing the concept of equivalent elastic modulus to equate the non-homogeneous elastic modulus as the homogeneous elastic modulus will significantly reduce the complexity of calculating the vertical ultimate bearing capacity. Pile diameter and pile length have great impact on the vertical ultimate bearing capacity. The impact factor D_L which takes pile diameter and pile length into consideration makes the modified theoretical formula more reliable.

摘要: 超大直径空心独立复合桩是由空心桩、外围水泥搅拌桩和桩周注浆土体共同承载的新型桩基础。为确定该新型复合桩在安徽省江淮地区不同工况下的竖向极限承载力,引入等效弹性模量,提出了超大直径空心独立复合桩承载力计算方法;在此基础上,对比了数值计算和理论计算结果,提出能综合反映桩身尺寸影响的复合桩竖向极限承载力公式。研究表明:引入等效弹性模量这一概念将非均质的弹性模量等效为均质的弹性模量,将显著降低超大直径空心独立复合桩竖向极限承载力计算的复杂性,桩径和桩长对超大直径空心独立复合桩的竖向极限承载力产生较大影响;引入综合考虑桩径和桩长的影响因子 D_L ,使得改进的理论公式更加可靠。计算方法为今后类似工程的桩基承载力预估提供了理论参考。

入藏号: CSCD:6629585

地址: Feng Zhongju, School of Highway, Changan University, Xian, 710064.

Hu Haibo, School of Highway, Changan University, Xian, 710064.

Feng Kai, School of Highway, Changan University, Xian, 710064.

Wen Junqiang, School of Highway, Changan University, Xian, 710064.

Dong Yunxiu, School of Highway, Changan University;; School of Civil Engineering, Longdong University, ;; Xian;; Qingyang, ;; 710064;; 745000.

Dai Liangjun, Anhui Construction Engineering Group, Hefei, Anhui 230000, China.

地址: 冯忠居, 长安大学公路学院, 西安, 陕西 710064, 中国.

胡海波, 长安大学公路学院, 西安, 陕西 710064, 中国.

冯凯, 长安大学公路学院, 西安, 陕西 710064, 中国.

文军强, 长安大学公路学院, 西安, 陕西 710064, 中国.

董芸秀, 长安大学公路学院;; 陇东学院土木工程学院, ;; 西安;; 庆阳, ;; 甘肃 710064;; 745000.

戴良军, 安徽建工集团有限公司, 合肥, 安徽 230000, 中国.

电子邮件地址: ysf@gl.chd.edu.cn; 706628847@qq.com

电子邮件地址: ysf@gl.chd.edu.cn; 706628847@qq.com

使用次数 (最近 180 天): 0

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作者: Chang Kun; Wang Xuancang

作者: 常琨; 王选仓

标题: Study on Quantitative Evaluation Method of Adhesion of SBS Modified Asphalt RTFOT Aging

标题: SBS 改性沥青 RTFOT 老化黏附性量化评价方法研究

来源出版物: 公路交通科技 卷: 36 期: 12 页: 29-36 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: road engineering; adhesion; quantitative evaluation; photoelectric colorimetry; surface free energy; water stability

作者关键词: 道路工程; 黏附性; 量化评价; 光电比色法; 表面自由能; 水稳定性

摘要: In order to study the influence of asphalt aging on adhesion, achieve quantitative evaluation, and improve the deficiency of qualitative analysis in the traditional boiling method test, the thermal oxidation aging of asphalt with 5% SBS content at different time is simulated by delay RTFOT. The adhesion rates of SBS modified asphalt with different aging time and 3 aggregates are calculated by photoelectricity colorimetric method to analyze the influence of asphalt aging on aggregate adhesion. The variations of contact angle, surface free energy and its components of aged SBS modified asphalt are studied by surface free energy theory. The variations of water stability of short-term aged and long-term aged SBS modified are studied through oven heating test. The result shows that (1) The adhesion rate of SBS modified asphalt and aggregate decreases gradually with the aging time prolonging, and the adhesion from strong to weak under the same condition is: limestone, basalt, diorite. (2) The contact angle between SBS modified asphalt and test liquid increases. The surface free energy, its dispersion component and polar component show decrease trend, and the decrease range in initial aging stage is greater than in the subsequent aging. After aging for 360 minutes, the surface free energy, dispersion component and polar component are decreased by 21.5%, 14.5% and 78.2% respectively. (3) The experimental results of photoelectric colorimetry and surface free energy theory are consistent, indicating that the quantitative evaluation of adhesion of aged SBS modified asphalt is accurate and reasonable. (4) With the extension of aging time, the residual stability and the ratio of freeze-thaw splitting strengths of SBS modified asphalt mixture decrease gradually, i. e., the water

stability of aged SBS modified asphalt mixture is decreased, which again proves that our quantitative evaluation result of SBS modified asphalt adhesion is accurate and effective.

摘要: 为了研究沥青老化对黏附性的影响,并实现量化评价,从而改善传统水煮法试验只能定性分析的不足,通过延时 RTFOT 试验对 SBS 含量为 5% 的改性沥青模拟不同时间的热氧老化,采用光电比色法计算了不同老化时间的 SBS 改性沥青与 3 种集料的黏附率,分析了沥青老化对集料黏附性的影响。采用表面自由能理论研究了 SBS 改性沥青老化后接触角、表面自由能及其分量的变化规律。并通过烘箱加热法试验研究了 SBS 改性沥青混合料短期老化和长期老化后水稳定性的变化规律。研究表明:随着老化时间的延长,SBS 改性沥青与集料的黏附率会逐渐降低,不同集料在同等情况下与老化后的 SBS 改性沥青黏附性强弱依次为:石灰岩、玄武岩、闪长岩; SBS 改性沥青与测试液体间的接触角变大,表面自由能及其色散分量、极性分量均呈现降幅先大后小的下降趋势,在老化 360 min 后,其表面自由能、色散分量和极性分量分别下降了 21.5%,14.5%,78.2%;光电比色法和表面自由能理论的试验结果一致,表明采用这两种方法进行 SBS 改性沥青老化后黏附性量化评价是准确合理的;随着老化时间延长,SBS 改性沥青混合料的残留稳定度和冻融劈裂强度比逐渐下降,即老化降低了沥青混合料的水稳定性,这也再次证实了本研究的 SBS 改性沥青黏附性量化评价结果是准确有效的。

入藏号: CSCD:6625885

地址: Chang Kun, School of Highway, Chang'an University;; Beijing Jiaoke Highway Consultants Ltd., ;; Xi'an;; Shaanxi;; Beijing 710064;; 100191.

Wang Xuancang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 常琨, 长安大学公路学院;; 北京交科公路勘察设计院有限公司, ;; 西安;; 陕西;; 北京 710064;; 100191, 中国.

王选仓, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: 422982740@qq.com

电子邮件地址: 422982740@qq.com

使用次数 (最近 180 天): 0

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作者: Feng Zhongju; Li Shaojie; Dong Yunxiu; Hao Yumeng; Hu Haibo

作者: 冯忠居; 李少杰; 董芸秀; 郝宇萌; 胡海波

标题: Vertical Earth Pressure Distribution Characteristics and Calculation Theory of High Fill Culvert

标题: 高填方盖板涵垂直土压力分布特性及计算理论

来源出版物: 公路交通科技 卷: 36 期: 12 页: 69-78 出版年: 2019

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作者关键词: bridge engineering; distribution characteristics of vertical earth pressure; model test; finite element; high fill cover culvert

作者关键词: 桥梁工程; 垂直土压力分布特性; 模型试验; 有限元; 高填方盖板涵

摘要: In order to study the distribution characteristics of vertical earth pressure on the top of high fill culvert and improve the calculation method of earth pressure of high fill culvert, centrifugal model test and finite element software are used to analyze the vertical earth pressure distribution and the deformation rule of fill on culvert cover plate at different filling heights, and reveal the causes of vertical earth pressure distribution on the top of cover culvert. The relationships between non-uniformity coefficient of earth pressure on culvert top and fill height, elastic modulus, Poisson's ratio, bulk density and internal friction angle are studied by orthogonal test. The vertical earth pressure analysis model of high fill cover culvert considering the distribution characteristics of earth pressure on culvert top is established, and the calculation formula of vertical earth pressure on culvert top is deduced. The result shows that (1) the vertical earth pressure on the top of cover culvert is saddle-shaped along the span, the vertical earth pressures on both ends of culvert top can reach about twice the vertical earth pressure at the center of culvert top, and the stress concentration on both sides of the culvert top is obviously higher than that near the culvert top center; (2) the influence of additional earth pressure near culvert top edge is greater than that near culvert top center, which is the cause of uneven distribution of vertical earth pressure on culvert top; (3) with the increase of fill height and bulk density, the non-uniform coefficient of earth pressure on culvert top increases first and then decreases; (4) the non-uniformity coefficient of earth pressure on culvert top is negatively correlated with internal friction angle and Poisson's ratio of filling soil, while it is positively correlated with the elastic modulus of filling soil; (5) the order of sensitivity of different filling parameters to the non-uniformity coefficient of earth pressure on culvert top is: internal friction angle > filling height > elastic modulus > Poisson's ratio > bulk density; (6) the variation rule of vertical earth pressure on culvert top calculated by the proposed formula is in good agreement with the result of numerical simulation and model test.

摘要: 为研究高填方盖板涵涵顶垂直土压力的分布特性,改进盖板涵土压力计算方法,采用离心模型试验与有限元软件分析不同填高下盖板涵涵顶垂直土压力分布形式与填土变形规律,揭示盖板涵涵顶垂直土压力分布特性的成因,通过正交试验研究涵顶土压力不均匀系数与填土高度、弹性模量、泊松比、容重以及内摩擦角的关系,建立考虑涵顶土压力分布特性的高填方盖板涵垂直土压力分析模型,得出盖板涵涵顶垂直土压力计算公式。结果表明:盖板涵涵顶垂直土压力沿跨径呈马鞍形分布,涵顶两端垂直土压力总体可达涵顶中心垂直土压力的2倍左右,涵顶两侧土压力应力集中程度明显高于涵顶中心附近;涵顶边缘附近受附加土压力的影响大于涵顶中心附近,此为涵顶垂直土压力为不均匀分布的成因;随着填土高度与容重的增加,涵顶土压力不均匀系数先增加后减小;涵顶土压力不均匀系数与填土的内摩擦角、泊松比呈负相关,与填土的弹性模量呈正相关;对涵顶土压力不均匀系数敏感程度的大小顺序为:内摩擦角>填土高度>弹性模量>泊松比>容重;文中公式计算得出的涵顶垂直土压力变化规律与数值模拟及模型试验成果较为吻合。

入藏号: CSCD:6625890

地址: Feng Zhongju, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Dong Yunxiu, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Hu Haibo, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Li Shaojie, China Railway Construction Group Co., Ltd., Beijing 100040, China.

Hao Yumeng, CCCC Second Highway Consultants Co., Ltd., Wuhan, Hubei 710065, China.

地址: 冯忠居, 长安大学公路学院, 西安, 陕西 710064, 中国.

董芸秀, 长安大学公路学院, 西安, 陕西 710064, 中国.

胡海波, 长安大学公路学院, 西安, 陕西 710064, 中国.

李少杰, 中铁建设集团有限公司, 北京 100040, 中国.

郝宇萌, 中交第二公路勘察设计研究院有限公司, 武汉, 湖北 710065, 中国.

电子邮件地址: ysf@gl.chd.edu.cn

电子邮件地址: ysf@gl.chd.edu.cn

使用次数 (最近 180 天): 0

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引用的参考文献数: 21

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作者: Sun Shengjiang; Zhu Changhua; Mei Kuihua

作者: 孙胜江; 朱长华; 梅葵花

标题: Anti-collision performance of basalt fiber composite beam-column guardrails

标题: 玄武岩纤维复合材料梁-柱式护栏防撞性能

来源出版物: 振动与冲击 卷: 38 期: 21 页: 265-270 出版年: 2019

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作者关键词: bridge; numerical simulation; guardrail; collision acceleration; energy absorption

作者关键词: 桥梁; 玄武岩纤维复合材料; 数值模拟; 护栏; 碰撞加速度; 能量吸收

摘要: Aiming at problems of poor performance and short service life of bridge guardrails during use,a continuous basalt fiber composite guardrail was proposed.Firstly,the collision simulation system of the proposed guardrail was established,and then the collision process of the guardrail was simulated with the nonlinear explicit dynamics software LS-DYNA.Finally,the simulation results of the proposed guardrail were compared with those of a steel guardrail.The results showed that the proposed systems hourglass energy is less than 10% of the total energy in collision process,so the finite element simulation process has a good simulation performance;in collision process,vehicles do not have phenomena of pass over guardrail,astride it,or pass through it,so the guardrail has a good guiding performance;in collision process,the longitudinal and transverse

acceleration values at the seat position are less than the standard allowable values,so the guardrail has a good buffer function for vehicles;compared to steel guardrails,the proposed guardrail can better reduce vehicles acceleration and absorb collision energy,so the anti-collision performance of the proposed guardrail is better than that of steel guardrail.

摘要: 针对目前桥梁护栏在使用过程中出现的碰撞性能差、使用寿命短等问题,提出连续玄武岩纤维复合材料(BFRP)护栏。首先建立护栏碰撞仿真体系,然后利用非线性显式动力学软件 LS-DYNA 模拟 BFRP 护栏碰撞过程,并与钢制梁柱式护栏作对比。结果表明,碰撞过程中系统沙漏能小于 10%的总能量,有限元模拟过程具有良好的仿真性能;在碰撞过程中车辆没有出现翻越、骑跨及穿越护栏的现象,BFRP 护栏具有良好的导向性能;在碰撞过程中座椅位置处的纵横向加速度值均小于规范容许值,BFRP 护栏对车辆有着良好的缓冲功能;相比钢护栏,BFRP 护栏在碰撞过程中能够更好地降低车辆的加速度值,能够更好地吸收碰撞能量,因此 BFRP 护栏防撞性能要优于钢护栏。

入藏号: CSCD:6620814

地址: Sun Shengjiang, School of Highway,Changan University, Xian, 710064.

Mei Kuihua, School of Highway,Changan University, Xian, 710064.

Zhu Changhua, School of Highway,Changan University;;Shandong Provincial Communications Planning and Design Institute, ;; Xian;;Jinan, ;; 710064;;250031.

地址: 孙胜江, 长安大学公路学院, 西安, 陕西 710064, 中国.

梅葵花, 长安大学公路学院, 西安, 陕西 710064, 中国.

朱长华, 长安大学公路学院;;山东省交通规划设计院, ;; 西安;;济南, ;; 710064;;250031.

使用次数 (最近 180 天): 0

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作者: Ye Hongyu; Wang Xuancang; Fang Naren; Ma Xiaoning

作者: 叶宏宇; 王选仓; 房娜仁; 马晓宁

标题: Road deicing technology with microwave heating in winter

标题: 基于微波作用的道路冬季化冰技术

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语言: Chinese

文献类型: Article

作者关键词: road engineering; microwave deicing technology; finite element modelling; indoor

experiments; road maintenance in winter; wave-absorbing material; optimal application scheme

作者关键词: 道路工程; 微波化冰技术; 有限元模拟; 室内试验; 道路冬季养护; 吸波材料; 最佳应用方案

摘要: Currently in China, there exist some problems in road deicing technologies in winter. Traditional measures such as mechanical deicing would destroy the pavement structure. Techniques taking advantage of natural energy as solar energy are expansive. However, microwave deicing is a new, high-efficiency and pavement-protective way for road maintenance. Based on road microwave deicing mechanism, ABAQUS finite element modelling and indoor experiments are taken as main research means in this paper. Wave-absorbing abilities of ordinary asphalt pavement and cement pavement are analyzed. And then, influences of factors on road deicing effect are obtained. The results show that the influencing factors are microwave frequency, microwave output power, distance from microwave output port to the surface of pavement, ambient temperature, ice thickness, and the degree of ice purity. The wave-absorbing abilities of three kinds of magnetic metals are analyzed, including ferrous oxide (Fe_3O_4), hydroxyl iron powder RW, and hydroxyl iron powder YW1. Improvement of microwave deicing effect after mixing a certain number of the three materials into road surface is researched. With all the researches above, for regions whose minimum temperature above -30°C in winter, the optimal application scheme of road microwave deicing technology is put forward.

摘要: 现阶段我国道路冬季除冰技术存在的问题包括: 机械除冰雪等传统方法易使路面结构破坏、太阳能融雪等利用天然能量处治冰雪方法投入费用较高。微波化冰技术是一种具有较高工作效率、有效保护路面结构的道路冬季养护新技术。基于道路微波化冰机理, 以 ABAQUS 有限元模拟与室内试验为主要研究方法, 分析了普通沥青路面与水泥路面对微波的吸收能力, 得到了微波频率、微波输出功率、微波导出口距路表距离、外界温度、结冰厚度、结冰纯净度等因素对道路微波化冰效果的影响, 研究了 3 种磁性金属材料四氧化三铁(Fe_3O_4)、羟基铁粉 RW 和羟基铁粉 YW1 的吸波能力及将它们掺入路表结构后对道路微波化冰效果的改善作用。最后提出了冬季最低温度高于 -30°C 地区道路微波化冰技术最佳应用方案。

入藏号: CSCD:6618313

地址: Ye Hongyu, School of Highway, Changan University, Xian, 710064.

Wang Xuancang, School of Highway, Changan University, Xian, 710064.

Fang Naren, School of Highway, Changan University, Xian, 710064.

Ma Xiaoning, School of Highway, Changan University, Xian, 710064.

地址: 叶宏宇, 长安大学公路学院, 西安, 陕西 710064, 中国.

王选仓, 长安大学公路学院, 西安, 陕西 710064, 中国.

房娜仁, 长安大学公路学院, 西安, 陕西 710064, 中国.

马晓宁, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: yehongyu298@126.com; wxc2005@163.com

电子邮件地址: yehongyu298@126.com; wxc2005@163.com

使用次数 (最近 180 天): 1

使用次数 (2013 年至今): 1

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作者: Dai Xuezheng; Wang Yan; Peng Zhipeng; Cheng Hongbo

作者: 戴学臻; 王妍; 彭志鹏; 成洪博

标题: Prediction Method of Car Ownership Based on Double Logistic Curve Model

标题: 基于双重 Logistic 曲线模型汽车保有量预测方法

来源出版物: 重庆交通大学学报. 自然科学版 卷: 38 期: 11 页: 21-26 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: traffic engineering; Logical curve; population number; car ownership; analogy analysis; prediction

作者关键词: 交通工程; Logistic 曲线; 人口数量; 汽车保有量; 类比分析法; 预测

摘要: The development of economy and the improvement of people's living standard led to a rapid growth of car ownership, which caused many problems such as urban traffic jam, energy shortage and environmental pollution. The premise of solving these problems was the objective and accurate prediction of car ownership in the future. In order to ensure the accuracy of prediction, the double Logistic curve model was used to predict the number of households. By analyzing the quantitative relationship between the number of households and the number of cars, the maximum range of car ownership in the future was determined. Finally, combining with the historical data of cars in Xi'an over the years, the future car ownership in Xi'an was forecasted. The prediction results show that the proposed method can objectively and dynamically reflect the development trend of car ownership in the future according to the trend of population growth. The car ownership in Xi'an will also grow rapidly, and the extreme value of car ownership will reach about 6.26 million in the coming year.

摘要: 经济发展和人民生活水平提高使得汽车保有量急速上升, 从而引发城市交通拥堵、能源短缺、环境污染等诸多问题, 解决这些问题的前提是对未来年小汽车保有量客观、准确的预测。为了保证预测的准确性, 采用双重 Logistic 曲线模型预测人口户数, 通过分析人口户数与小汽车保有量之间的定量关系确定未来年小汽车保有量最大值范围; 并结合西安市历年小汽车历史数据对未来西安市小汽车保有量进行预测。预测结果表明: 该方法能根据人口增长趋势客观、动态地反映未来汽车保有量的发展趋势。西安市小汽车保有量还会快速增长, 未来年小汽车保有量极值将达到 626 万辆左右。

入藏号: CSCD:6618743

地址: Dai Xuezheng, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Yan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Peng Zhipeng, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Cheng Hongbo, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 戴学臻, 长安大学公路学院, 西安, 陕西 710064, 中国.

王妍, 长安大学公路学院, 西安, 陕西 710064, 中国.

彭志鹏, 长安大学公路学院, 西安, 陕西 710064, 中国.

成洪博, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: 699855166@qq.com; 1248485497@qq.com

电子邮件地址: 699855166@qq.com; 1248485497@qq.com

使用次数 (最近 180 天): 0

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作者: Yan Lei; Cao Lei; Yang Kai

作者: 闫磊; 曹磊; 杨恺

标题: Seismic Fragility Analysis of Self-anchored Suspension Bridge Based on Incremental Dynamic Analysis

标题: 基于 IDA 的自锚式悬索桥地震易损性分析

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语言: Chinese

文献类型: Article

作者关键词: bridge engineering; seismic fragility; incremental dynamic analysis method; self-anchored suspension bridge; fragility curve

作者关键词: 桥梁工程; 地震易损性; 增量动力法; 自锚式悬索桥; 易损性曲线

摘要: Self-anchored suspension bridge is a kind of flexible structure system with high-order statically indeterminate structure. Current codes only give seismic design principles, and there are few related vulnerability studies. Taking the threetower self-anchored suspension bridge as the research object, the finite element dynamic model of the structure was established. Based on PEER strong earthquake database, 10 ground motion records were selected. Incremental dynamic analysis (IDA) method was used to establish the seismic vulnerability curves of piers, supports, pylons and suspension members along the bridge. The vulnerability curves of bridge system were established by first-order reliability theory. The results show that the damage probability of piers and supports is higher under the action of seismic wave along the bridge. From easy to difficult, the damage probabilities of components are bearings, P_1, P_5 piers, hangers, side towers, and middle towers. The overall damage probability of the structure is obviously higher than that of the components

under different damage indices.

摘要: 自锚式悬索桥作为一种高次超静定的柔性结构体系,现行规范仅给出抗震设计原则且相关易损性研究较少。以三塔自锚式悬索桥为研究对象,建立结构有限元动力模型,基于 PEER 强震数据库选取了 10 条地震动记录,采用增量动力分析(IDA)方法建立了桥墩、支座、桥塔及吊索构件的顺桥向地震易损性曲线,运用一阶可靠度理论建立桥梁系统的易损性曲线。研究表明:顺桥向地震波作用下桥墩、支座发生损伤的概率较高,构件损伤概率从易到难依次为支座、P_1、P_5 桥墩、吊索、边塔、中塔;在不同损伤指标下结构整体损伤概率明显高于构件损伤概率。

入藏号: CSCD:6618746

地址: Yan Lei, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Cao Lei, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Yang Kai, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 闫磊, 长安大学公路学院, 西安, 陕西 710064, 中国.

曹磊, 长安大学公路学院, 西安, 陕西 710064, 中国.

杨恺, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: yanlei@chd.edu.cn; 674356702@qq.com

电子邮件地址: yanlei@chd.edu.cn; 674356702@qq.com

使用次数 (最近 180 天): 0

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作者: Feng Zhongju; Wang Xiqing; Lu Jia; Zhang Xiaozhou; Chang Yinghong

作者: 冯忠居; 王溪清; 芦佳; 张晓轴; 常应宏

标题: Field Test and Numerical Simulation of Retaining Wall on Widening Subgrade in Mountain Area

标题: 山区加宽路基挡土墙现场试验及数值模拟分析

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作者关键词: highway engineering; mountain road; subgrade widening; retaining wall; numerical simulation

作者关键词: 道路工程; 山区公路; 加宽路基; 挡土墙; 数值模拟

摘要: Aiming at the problem of gravity shoulder retaining wall setting under widening and rebuilding roadbed of mountainous highway, the analysis model was established by field test and numerical simulation, combining with G307 reconstruction and extension project. The stress and deformation characteristics of subgrade and retaining wall were studied. The reliability of the numerical analysis results was verified by comparing the numerical simulation results with the field measured values. At the same time, the related design and construction parameters were analyzed. The results show that the stability of the fill subgrade decreases with the widening width within a certain width limit; the stability of roadbed and retaining wall can be greatly improved by reasonably controlling the compaction degree and the selection of filling materials; the working performance of the roadbed and retaining wall can be improved by controlling the excavation of the soil mass of the old roadbed slope; the horizontal displacement of the wall body can be reduced by replacing the foundation with a certain depth.

摘要: 针对山区公路路基加宽改建中的重力式路肩挡土墙问题,笔者结合 G307 改扩建工程,通过现场试验,并采用数值模拟方法建立分析模型,对路基和挡土墙的受力与变形特性进行研究,将数值模拟结果与现场实测值进行对比,验证了数值分析结果的可靠性,同时对相关设计及施工参数进行影响性分析。结果表明:在一定宽度限制内,填方路基的稳定性随着加宽宽度的增加而降低;合理控制压实度及填料的选择可以较大幅度的提高路基及挡土墙的稳定性;控制老路基边坡土体的开挖,可以改善路基和挡土墙的工作性能;对地基进行一定深度的换填处理,可以减小墙身水平位移量。

入藏号: CSCD:6618751

地址: Feng Zhongju, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Xiqing, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Lu Jia, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Xiaozhou, Yulin Highway Administration of Shaanxi Province, Yulin, Shaanxi 710009, China.

Chang Yinghong, Yulin Highway Administration of Shaanxi Province, Yulin, Shaanxi 710009, China.

地址: 冯忠居, 长安大学公路学院, 西安, 陕西 710064, 中国.

王溪清, 长安大学公路学院, 西安, 陕西 710064, 中国.

芦佳, 长安大学公路学院, 西安, 陕西 710064, 中国.

张晓轴, 陕西省榆林公路管理局, 榆林, 陕西 710009, 中国.

常应宏, 陕西省榆林公路管理局, 榆林, 陕西 710009, 中国.

电子邮件地址: ysf@gl.chd.edu.cn

电子邮件地址: ysf@gl.chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Yang Shaowei; Chen Hao; Pan Binghong; Lai Hongzhi; Zhao Yaru

作者: 杨少伟; 陈浩; 潘兵宏; 赖泓志; 赵亚茹

标题: Minimum Length of Highway Common Segment

标题: 高速公路共用段最小长度研究

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文献类型: Article

作者关键词: road engineering; highway; common segment; calculation model; minimum length

作者关键词: 道路工程; 高速公路; 共用段; 计算模型; 最小长度

摘要: In order to avoid the traffic disorder and safety accident caused by the short length of the highway common section, the construction of the highway common segment was analyzed and the influence factors of the minimum length of highway common segment were studied. The maximum length of interleaving area was determined by analyzing the configuration and the ratio of interleaving flow. Based on the most unfavorable driving conditions of drivers, the distance needed for safe lane change between common segments of highway was studied. The calculation method of waiting for insertable gap was established by using the theory of calculus, probability and traffic flow. By analyzing the maximum length of interleaving area and the safe lane change, the calculation model for calculating the minimum length of the highway common segment was established. Based on the number of lanes, the construction of common segment and the design speed, the recommended value of minimum length of common segment was proposed. The results show that with the increase of the design speed and the number of lanes, the length of the weaving area and the length required for lane change increase, and the minimum length of highway common segment is longer.

摘要: 为了避免因高速公路共用段长度设置过短而造成的交通紊乱和安全隐患,对高速公路共用段构造的分析,探究了高速公路共用段最小长度的影响因素。分析共用段交织区的构型和交织流量比,确定了交织区的最大长度。基于驾驶员最不利行驶状况,研究高速公路共用路段之间的间距安全换道所需的距离。运用微积分、概率论和交通流理论创建了等待可插入间隙计算方法。通过对交织区最大长度和安全换道分析,建立了计算高速公路共用段最小长度的计算模型。提出了基于车道数、共用段构造和设计速度的高速公路共用段最小长度的建议值。研究表明:随着设计速度和车道数的增加,交织区长度和换道所需长度均增加,高速公路共用段最小长度越长。

入藏号: CSCD:6618757

地址: Yang Shaowei, School of Highway, Chang'an University;; Chang'an University, ;; Key Laboratory of Highway Engineering in Special Area of Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710064;; 710064.

Pan Binghong, School of Highway, Chang'an University;; Chang'an University, ;; Key Laboratory of Highway Engineering in Special Area of Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi

710064;;710064.

Chen Hao, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Lai Hongzhi, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Yaru, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 杨少伟, 长安大学公路学院;;长安大学, ;;特殊地区公路工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

潘兵宏, 长安大学公路学院;;长安大学, ;;特殊地区公路工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

陈浩, 长安大学公路学院, 西安, 陕西 710064, 中国.

赖泓志, 长安大学公路学院, 西安, 陕西 710064, 中国.

赵亚茹, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: gl06@chd.edu.cn; 454152368@qq.com

电子邮件地址: gl06@chd.edu.cn; 454152368@qq.com

使用次数 (最近 180 天): 0

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作者: Xiao Kailong; Wu Xiaoguang; An Pinghe; Shi Yuanxu

作者: 肖凯龙; 邬晓光; 安平和; 时元绪

标题: Method of mode difference change rate of superposition curvature for multi-beam bridge detection

标题: 多梁式桥梁检测的叠加曲率模态差变化率方法

来源出版物: 重庆大学学报. 自然科学版 卷: 42 期: 11 页: 108-116 出版年: 2019

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作者关键词: highway bridge; change rate of superposition curvature mode difference; numerical calculation; damage identification; multi-beam structure; modal node

作者关键词: 公路桥梁; 叠加曲率模态差变化率; 数值计算; 损伤识别; 多梁式结构; 模态节点

摘要: Most of the present studies on bridge damage identification using curvature modes only take one-dimensional single-beam structure as the research object. In this paper the idea of G-M method

is put forward and the wide multi-beam structure is transformed into orthotropic plate based on thin plate vibration theory. The curvature expressions of the two orthotropic directions of the structure are obtained by analogy beam bending theory. In consideration of the deficiencies of the damage identification of the bridge by using single-order curvature mode difference index, two-direction multi-order curvature mode change rate superposition index for damage identification is used instead, and finally the finite element software Ansys is adopted to establish a bridge model to calculate the unit location, multi-location and different degree of damage under various working conditions. Matlab plotting results show that the index along the bridge longitudinal superposition is more accurate with less disturbance to the data of undamaged location and more index independence, and it can be used to locate the damage of wide multi-beam structure.

摘要: 鉴于应用曲率模态的桥梁损伤识别研究大多以一维单梁式结构为研究对象,提出利用 G-M 法的思想并基于薄板振动理论将多梁式结构转化为正交异性板后,类比梁弯曲理论得到该结构两正交方向曲率表达式,通过分析采用单阶曲率模态差指标进行桥梁损伤识别的不足,考虑利用多阶曲率模态变化率叠加指标进行损伤识别,最后采用有限元软件 Ansys 建立桥梁模型计算单位置、多位置不同损伤程度的多种工况。Matlab 绘图结果表明:沿桥梁纵向叠加指标识别更为精确,对未损伤位置数据扰动更小,指标独立性高,可利用该指标进行多梁式结构的损伤定位。

入藏号: CSCD:6619727

地址: Xiao Kailong, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wu Xiaoguang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Shi Yuanxu, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

An Pinghe, Xi'an Highway Research Institute, Xi'an, Shaanxi 710064, China.

地址: 肖凯龙, 长安大学公路学院, 西安, 陕西 710064, 中国.

邬晓光, 长安大学公路学院, 西安, 陕西 710064, 中国.

时元绪, 长安大学公路学院, 西安, 陕西 710064, 中国.

安平和平, 西安公路研究院, 西安, 陕西 710064, 中国.

电子邮件地址: wxgwst.cn@126.com

电子邮件地址: wxgwst.cn@126.com

使用次数 (最近 180 天): 0

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作者: Li Guangling; Han Wanshui; Chen Xiao; Xu Xin; Liu Xiuping

作者: 李光玲; 韩万水; 陈笑; 许昕; 刘修平

标题: Longitudinal deformation of expansion joint of suspension bridge under wind and random

traffic flow

标题: 风和随机车流下悬索桥伸缩缝纵向变形

来源出版物: 交通运输工程学报 卷: 19 期: 5 页: 21-32 出版年: 2019

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作者关键词: bridge engineering; expansion joint; longitudinal deformation; simulation; windrandom traffic flow-steel truss suspension bridge analysis system; hourly maximum displacement; cumulative displacement; life evaluation

作者关键词: 桥梁工程; 伸缩缝; 纵向变形; 仿真; 风-随机车流-钢桁悬索桥分析系统; 时位移极值; 累计位移; 寿命评估

摘要: To dynamically simulate and evaluate the longitudinal deformation performance of expansion joint of long-span steel truss suspension bridge under the combining action of wind and random traffic flow at operation stage,an analysis system of wind-random traffic flow-steel truss suspension bridge was established.Based on the existing wind-vehicle-bridge coupling vibration analysis system of single beam,the spring element was introduced to simulate the expansion joint,and the analysis system was improved from the single beam to the grillage method via two aspects of the vehicle-bridge coupling relationship and the fine loading of wind on steel truss girder section.The traffic flow load was simulated and reproduced based on the monitoring data. The dynamic displacement time history response of expansion joint of a typical long-span steel truss suspension bridge under the action of random traffic flow was calculated through the established analysis system.The correlation between the cumulative displacement and traffic flow weight was obtained and verified.Taking the thickness of wear-resisting material of sliding support as the evaluation indicator,the critical value of cumulative displacement of expansion joint was determined,and the normal service life of expansion joint was evaluated.The parameter sensitivity analysis on the longitudinal deformation performance of expansion joint under different wind speeds and random traffic flow was carried out.Analysis result shows that the hourly maximum displacement of expansion joint under the random traffic flow is far less than the designed allowance-880-880mm.The cumulative displacement of expansion joint is positively correlated with the traffic flow load in corresponding period.Under the combining action of wind and random traffic flow,when the wind speed is less than $15\text{m}\cdot\text{s}^{-1}$,the main load factor affecting the longitudinal deformation of expansion joint is random traffic flow load.When the wind speed is greater than $15\text{m}\cdot\text{s}^{-1}$, the main load factor is wind load.Both the hourly maximum displacement and hourly cumulative displacement of expansion joint increase with the increase of wind speed.When the wind speed increases to $20\text{m}\cdot\text{s}^{-1}$,the longitudinal deformation of expansion joint generated by the wind load is approximately 2times of that under the traffic flow load.The established wind-random traffic flow-steel truss suspension bridge analysis system can provide a numerical analysis platform for dynamic simulation and performance evaluation on the longitudinal deformation of expansion joint under operation loads.19figs,31refs.

摘要: 为动态仿真与评估运营阶段风和随机车流联合作用下大跨钢桁悬索桥伸缩缝纵向变形,建立了风-随机车流-钢桁悬索桥分析系统;基于已有单主梁风-车-桥耦合振动分析系统,引

入弹簧单元模拟伸缩缝,并从车-桥耦合关系和钢桁梁横断面风荷载精细化加载 2 个方面将分析系统从单主梁提升为梁格法;基于监测数据仿真重现了交通流荷载,采用建立的分析系统计算了一座典型大跨钢桁悬索桥伸缩缝在随机车流作用下的动态位移时程响应,获取并验证了累计位移与交通流质量的相关关系;以滑动支承耐磨材料厚度为评估指标确定了伸缩缝累计位移临界值,评估了伸缩缝的正常工作寿命;在不同风速和随机车流作用下对伸缩缝纵向变形性能进行了参数敏感性分析。分析结果表明:伸缩缝在随机车流作用下的时位移极值远小于设计允许伸缩范围-880~880mm;伸缩缝累计位移与其对应时段内的交通流荷载具有正相关性;在风与随机车流联合作用下,风速小于 $15\text{m}\cdot\text{s}^{-1}$ 时,影响伸缩缝纵向变形的主要荷载因素为随机车流,风速大于 $15\text{m}\cdot\text{s}^{-1}$ 时,主要荷载因素为风荷载;伸缩缝时位移极值与时累计位移随风速的增大均呈增大趋势;当风速增大至 $20\text{m}\cdot\text{s}^{-1}$ 时,风荷载产生的伸缩缝纵向变形近似为车流荷载下的 2 倍;建立的风-随机车流-钢桁悬索桥分析系统可为运营荷载下伸缩缝纵向变形的动态仿真与性能评估提供数值分析平台。

入藏号: CSCD:6613786

地址: Li Guangling, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Han Wanshui, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Xiao, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Xu Xin, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Xiuping, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 李光玲, 长安大学公路学院, 西安, 陕西 710064, 中国.

韩万水, 长安大学公路学院, 西安, 陕西 710064, 中国.

陈笑, 长安大学公路学院, 西安, 陕西 710064, 中国.

许昕, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘修平, 长安大学公路学院, 西安, 陕西 710064, 中国.

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作者: Han Xingbo; Xia Yongxu; Wang Yongdong; Ye Fei

作者: 韩兴博; 夏永旭; 王永东; 叶飞

标题: Probabilistic degradation model for tunnel lining flexural capacity

标题: 隧道衬砌抗弯承载能力概率劣化模型

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作者关键词: tunnel lining; flexural capacity; reliability degradation model; finite element method-Monte-Carlo simulation; statistics characteristics

作者关键词: 隧道衬砌; 抗弯承载能力; 可靠度劣化模型; 有限元-蒙特卡洛模拟; 统计特征

摘要: A reliability analysis framework with the consideration of the time influence and the uncertainties of the parameters was established. A time-variant flexural capacity model was obtained by considering the reduction of the cross-sectional area of the steel bar and the decrease of the bond strength of the steel-concrete caused by environmental erosion. A time-variant probabilistic model was established with the consideration of the uncertainties of the parameters. Accuracy and computational efficiency of the theoretical approach were investigated by using Monte-Carlo simulation (MCS) method. The distribution of the flexural capacity was also discussed through the analysis of the simulation results. The load model of the reliability analysis was established using the finite element analysis with the load reverse and stress release method. The joint committee (JC) method was used to form the degradation reliability analysis framework of the lining flexural capacity calculation. The influence of the chloride erosion on the lining time-variant and probabilistic flexural capacity was investigated by an engineering case. Results show that mean value and standard deviation of the flexural capacity both decrease with the increase of the time. The simulation data has a better agreement with the lognormal distribution than with the normal distribution when both normal and lognormal distributed variables exist. The reliability of the lining subjected to negative bending moment is higher than that of the positive bending moment.

摘要: 提出同时考虑时间效应与参数不确定性的隧道衬砌可靠度分析框架.考虑衬砌受环境侵蚀引起的钢筋截面面积减少以及钢筋-混凝土黏结力下降,得到其抗弯承载能力时变模型.考虑模型中参数不确定性,建立时变概率模型.采用蒙特卡洛模拟(MCS)方法对理论模型的准确性以及计算效率进行验证.分析模拟结果,对抗弯承载能力的分布进行讨论.通过有限元分析,使用反转应力荷载释放法得到可靠度分析的荷载模型.采用当量正态化(JC)法,构建隧道衬砌抗弯承载能力劣化可靠度分析框架.通过算例对地下水氯离子侵蚀下衬砌抗弯承载能力的时变概率特征进行研究.结果表明,随时间增长抗弯承载力的均值和标准差均减小;当初始计算变量同时存在正态变量与对数正态变量时,抗弯承载力计算结果更服从对数正态分布;衬砌负弯矩区域可靠度远高于正弯矩区域.

入藏号: CSCD:6614946

地址: Han Xingbo, School of Highway, Chang'an University;;School of Civil and Environmental Engineering, The University of New South Wales, ;; Xi'an;;Sydney, ;;Australia 710064;;2552.

Xia Yongxu, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Yongdong, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Ye Fei, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 韩兴博, 长安大学公路学院;;新南威尔士大学土木工程与环境学院, ;; 西安;;悉尼, 陕西;; 710064;;2552, 中国.

夏永旭, 长安大学公路学院, 西安, 陕西 710064, 中国.

王永东, 长安大学公路学院, 西安, 陕西 710064, 中国.

叶飞, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: Xingbo.han@chd.edu.cn; yongxuxia@126.com

电子邮件地址: Xingbo.han@chd.edu.cn; yongxuxia@126.com

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作者: Zhao Jing; Wu Wangjie; Wang Xuancang; Li Shanqiang; Fang Naren; Deng Ruixiang

作者: 赵静; 吴旺杰; 王选仓; 李善强; 房娜仁; 邓瑞祥

标题: Prediction method of pavement performance based on same dimension gray recurrence dynamic model

标题: 基于等维灰数递补模型的路面性能预测方法

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作者关键词: road engineering; grey GM(1,1) model; same dimension gray recurrence dynamic model; pavement usage performance; performance prediction; precision

作者关键词: 道路工程; 灰色 GM(1,1)模型; 等维灰数递补模型; 路面使用性能; 性能预测; 精度

摘要: In order to accurately grasp the change trend of asphalt pavement performance index,taking the rutting depth index (RDI) as an example,we establish a gray recurrence dynamic model with equivalent dimension which can use the new data effectively and dynamically.The model is used to predict the indexes such as pavement condition index (PCI),driving quality index (RQI) and skidding resistance index (SRI).The results show that in step 3,the minimum error probabilities of RDI,PCI,RQI and SRI are all 1,and the posterior prescription variance ratios are:0.111 7,1,0.065 4,1,0.201 8,and 0.113 0,respectively.It is proved that with the increase of recursive steps,the accuracy of the prediction result of the model becomes higher,and the error becomes less,which shows that the method can accurately predict the road performance.

摘要: 为了准确掌握沥青路面使用性能指标的变化趋势,以车辙指数(rutting depth index,RDI)为例提出了能够有效动态使用新数据的等维灰数递补模型.利用该模型对路面状况指数(pavement condition index,PCI)、行驶质量指数(riding quality index,RQI)和横向力指数(skidding resistance index,SRI)等指标进行了预测.结果表明,使用等维灰数递补模型对 RDI、PCI、RQI 和 SRI 预测在第 3 步时,最小误差概率均为 1,后验方差比分别为 0.1117、0.0654、0.2018 和 0.1130.证明了随着步数的增加,其预测结果精度越高、误差越小,表明该方法能够准确地预测路面性能.

入藏号: CSCD:6615886

地址: Zhao Jing, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wu Wangjie, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Xuancang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Fang Naren, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Deng Ruixiang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Shanqiang, School of Highway, Chang'an University;; Guangdong Hua Lu Transportation Technology Co.Ltd., ;; Xi'an;; Guangzhou, Shaanxi;; Guangdong 710064;; 510420.

地址: 赵静, 长安大学公路学院, 西安, 陕西 710064, 中国.

吴旺杰, 长安大学公路学院, 西安, 陕西 710064, 中国.

王选仓, 长安大学公路学院, 西安, 陕西 710064, 中国.

房娜仁, 长安大学公路学院, 西安, 陕西 710064, 中国.

邓瑞祥, 长安大学公路学院, 西安, 陕西 710064, 中国.

李善强, 长安大学公路学院;; 广东华路交通科技有限公司, ;; 西安;; 广州, 陕西;; 广东 710064;; 510420, 中国.

电子邮件地址: 1040490114@qq.com; wxc2005@163.com

电子邮件地址: 1040490114@qq.com; wxc2005@163.com

使用次数 (最近 180 天): 0

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作者: Shi Yuanxu; Wu Xiaoguang; Deng Qiyuan; Li Yuanjun

作者: 时元绪; 邬晓光; 邓淇元; 李院军

标题: Research on shear lag effect of simply supported box girder considering main girder damage

标题: 考虑主梁损伤的简支箱梁剪力滞效应研究

来源出版物: 铁道科学与工程学报 卷: 16 期: 8 页: 1998-2005 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: bridge engineering; simply supported box girder bridge; shear lag effect; finite element; variational method; stepped stiffness model

作者关键词: 桥梁工程; 简支箱梁桥; 剪力滞效应; 有限元; 变分法; 阶梯形刚度模型

摘要: The stiffness of section will change under the condition of the main girder damage. In order to calculate the bending normal stress considering shear lag effect in the case of damaged main girder of simply supported box girder in service, this paper presented a deflection calculation method based on ladder stiffness model and introduced a reduction coefficient ζ_{tai} of bending stiffness of main girder considering the damage of main girder. The calculated deflection and reduction coefficient of bending stiffness of the main girder considering damage of the main girder were substituted into the shear lag variational equation, and a formula of bending normal stress of simply supported box girder considering shear lag effect after damage of the main girder was obtained, and the influence of different bending stiffness of the main girder on the bending normal stress of the upper flange was analyzed. In order to verify the correctness of this method, bending stress of flange plate calculated by method of this paper was compared with the results of solid finite element method and real bridge data. The results show that the calculated results of this paper's method are in good agreement with those of the solid finite element method and with the measured values. In addition, this paper draws the conclusion that with the reduction of the stiffness of the main girder, the increase of the stress value of the upper flange is increasing. When the stiffness of the main girder is reduced by 60%, the increase of the stress value of the upper flange plate is more than 5%.

摘要: 针对主梁在发生损伤情况下截面刚度将发生变化,为计算在役简支箱梁发生主梁损伤情况下的考虑剪力滞效应的弯曲正应力,基于阶梯形刚度模型挠度计算方法,并引入一个主梁抗弯刚度折减系数 ζ_{tai} ,将考虑主梁损伤后的计算挠度和主梁抗弯刚度折减系数代入剪力滞变分方程中,得到一种主梁发生损伤后考虑剪力滞效应的简支箱梁的弯曲正应力公式,并分析主梁不同刚度对上翼缘弯曲正应力的影响。为验证此方法的正确性,将用本文计算方法得到的翼缘板弯曲正应力与实体有限元结果、实桥数据进行对比。研究结果表明:此方法的计算结果与实体有限元结果吻合度较高,与实测值也基本吻合。得出随着主梁刚度不断折减,上翼缘应力值增幅不断加大,当主梁刚度折减到 60%时,上翼缘板应力值增幅均大于 5%。

入藏号: CSCD:6613973

地址: Shi Yuanxu, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wu Xiaoguang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Deng Qiyuan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Yuanjun, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 时元绪, 长安大学公路学院, 西安, 陕西 710064, 中国.

邬晓光, 长安大学公路学院, 西安, 陕西 710064, 中国.

邓淇元, 长安大学公路学院, 西安, 陕西 710064, 中国.

李院军, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: wxgwst.cn@126.com

电子邮件地址: wxgwst.cn@126.com

使用次数 (最近 180 天): 0

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作者: Wu Xiaoguang; Huang Cheng; Li Yuanjun; Yin Yue

作者: 邬晓光; 黄成; 李院军; 殷悦

标题: Calculation of load transverse distribution of widening T-beam bridge considering old bridge damage

标题: 考虑旧桥损伤的拼宽 T 梁桥荷载横向分布计算

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文献类型: Article

作者关键词: bridge engineering; transverse distribution factor; rigid-jointed beam method; stiffness damage; wet joint stiffness damage

作者关键词: 桥梁工程; 横向分布系数; 刚接梁法; 刚度损伤; 湿接缝损伤

摘要: The existing research on the load transverse distribution of widening bridge is based on the traditional calculation method of the transverse distribution, and there are few studies on the calculation of load transverse distribution of widening T-beam bridge under the condition of old bridge damage. In order to improve the calculation accuracy of the internal force of widening T-beam bridge, considering stiffness damage of wet-joint and stiffness damage of main girder, the reduction ratio of vertical shear force and girder stiffness were determined by load test and visual inspection. Finally, reasonable computing method was deduced on the basis of traditional rigid-jointed beam method. Relying on a 9-girder simply supported T-beam bridge with unilateral widening, the transverse distribution factor calculated by method of this study were compared with calculation results of traditional rigid-jointed beam method、finite element numerical simulation、load test method. The results show: When calculating the transverse distribution factor of widening T-beam bridge, the old bridge damage should be considered, and the calculation method deduced by this study can reflect the actual stress of widening bridge; The transverse distribution factor of widening bridge calculated by traditional rigid-jointed beam method are unsafe.

摘要: 现有关于拼宽桥梁荷载横向分布的研究多基于传统的横向分布计算方法,考虑旧桥损伤条件下的拼宽 T 梁桥荷载横向分布计算少有研究。为了提高拼宽 T 梁桥内力计算精度,考虑旧桥湿接缝损伤和主梁刚度损伤,并根据荷载试验与外观调查确定竖向剪力折减系数和主梁刚度分配系数,在传统刚接梁法理论的基础上推导出合理的计算方法。依托一座单侧拼宽的 9 梁式简支 T 梁桥,将计算得到的横向分布系数与传统刚接梁法、有限元数值法、荷载试验法计算结果进行比较。研究结果表明:计算拼宽 T 梁桥横向分布系数时,需考虑旧桥损伤的影响,本研究推导的计算方法能够较好地反映拼宽桥梁的实际受力;采用传统刚接梁法计算的拼宽桥梁横向分布系数结果偏于不安全。

入藏号: CSCD:6614003

地址: Wu Xiaoguang, Highway School, Chang'an University, Xi'an, Shaanxi 710000, China.

Huang Cheng, Highway School, Chang'an University, Xi'an, Shaanxi 710000, China.

Li Yuanjun, Highway School, Chang'an University, Xi'an, Shaanxi 710000, China.

Yin Yue, Highway School, Chang'an University, Xi'an, Shaanxi 710000, China.

地址: 邬晓光, 长安大学公路学院, 西安, 陕西 710000, 中国.

黄成, 长安大学公路学院, 西安, 陕西 710000, 中国.

李院军, 长安大学公路学院, 西安, 陕西 710000, 中国.

殷悦, 长安大学公路学院, 西安, 陕西 710000, 中国.

电子邮件地址: wxgwst.cn@126.com

电子邮件地址: wxgwst.cn@126.com

使用次数 (最近 180 天): 1

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作者: Gao Guangzhong; Zhu Ledong; Wu Hao; Li Jiawu

作者: 高广中; 朱乐东; 吴昊; 李加武

标题: Aerodynamic Nonlinearities of Coupled Soft Flutter of a Flat Closed-box Bridge Section

标题: 扁平箱梁断面弯扭耦合软颤振非线性特性研究

来源出版物: 中国公路学报 卷: 32 期: 10 页: 125-134 出版年: 2019

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作者关键词: bridge engineering; soft flutter; spring-suspended sectional model test; nonlinear self-excited vibration; limit cycle oscillation

作者关键词: 桥梁工程; 软颤振; 弹簧悬挂节段模型试验; 非线性自激振动; 极限环振荡

摘要: To study the nonlinear characteristics of soft flutter of long-span bridges, springsuspended sectional model tests were conducted to investigate the soft flutter behaviors of a typical flat closed-box girder bridge deck with a width-to-depth ratio of 10.7. A novel, high precision aerodynamic-force measurement technique was adopted. This technique enabled synchronous measurement of the aerodynamic force and displacement with interiorly installing force balances to reduce the component of inertial force acting on force balances and hence increase the measurement precision of the self-excited force. Experimental results indicated that a flat closed-box section underwent soft flutter under attack angles of 5°, 3°, and 0°. The observed soft flutter exhibited limit cycle oscillations (LCOs) with a continuous increase of amplitude along with

wind velocity;with the increase of attack angle,the onset wind speed of soft flutter and the slope of the amplitude versus wind speed curve both decreased.Soft flutter occurred in the torsional mode;some higher order harmonic components were present in the heaving and torsional displacement spectrum,but these were very slight and thus ignorable when compared with the fundamental component.An obvious heave-torsion coupling effect was observed in the soft flutter of the investigated flat closed-box bridge section and the coupling increased with increasing wind speed.During post-flutter LCOs,the sectional model was found to vibrate in a quasilinear complex torsional mode.With increasing amplitude,the modulus of the complex torsional mode was reduced by 15%but the phase changed very little(by<3%).Based on the technique of synchronous measurement of aerodynamic force and displacement with interiorly installing force balances,the measured nonlinear self-excited force signals were found to accurately predict coupled soft flutter responses.The measured self-excited lift and torque were found to contain significant higher order harmonic components.

摘要: 针对大跨度桥梁软颤振非线性特性,采用弹簧悬挂节段模型风洞试验法,研究了典型扁平箱梁断面(宽高比 10.7 : 1)在均匀流场下的软颤振响应,并采用一种新型的高精度测力技术---内置天平同步测力测振法测量了非线性颤振自激力时程,该测力技术可大幅降低天平信号中的惯性力成分,提高自激力的测量精度。试验结果表明:扁平流线型箱梁断面在风攻角 5°、3°和 0°时均出现了软颤振响应,观测到的软颤振现象表现为自限幅的极限环振荡,振幅随着风速的增加而增大,随着风攻角的增大,软颤振起振风速降低,振幅增加的斜率变缓;软颤振振动出现在扭转模态,竖向和扭转位移均存在一定的高次谐波成分,但与基频相比较为微弱,可以忽略;扁平箱梁断面的软颤振具有显著的弯扭自由度耦合特性,弯扭耦合程度随风速增加而增大,在软颤振振幅发展过程中,节段模型仍然以线性扭转复模态的形式振动,扭转复模态向量的幅值变化较为明显(约 15%),需要考虑其随振幅的缓变特性,相位特性变化非常微弱(相位差变化小于 3%),可以忽略。基于内置天平同步测力测振技术,测量得到的非线性自激力信号能够较为精确地计算软颤振振动位移时程,具有较高的精度,自激升力和自激扭矩均在大振幅下表现出显著的高次谐波成分。

入藏号: CSCD:6612493

地址: Gao Guangzhong, School of Highway,Chang'an University;;School of Civil Engineering, Tongji University, ;; Xi'an;;, Shaanxi;;Shanghai 710064;;200092.

Zhu Ledong, School of Civil Engineering, Tongji University;;Tongji University;;Tongji University, ;;State Key Laboratory of Disaster Reduction in Civil Engineering;;Key Laboratory of Transport Industry of Bridge Wind Resistance Technology, ;;;, Shanghai;;Shanghai;;Shanghai 200092;;200092;;200092.

Wu Hao, China Resources Land Co.,Ltd., Shanghai 200122, China.

Li Jiawu, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 高广中, 长安大学公路学院;;同济大学土木工程学院, ;;, 西安;;, 陕西;;上海 710064;;200092, 中国.

朱乐东, 同济大学土木工程学院;;同济大学;;同济大学, ;;土木工程防灾国家重点实验室;;桥梁结构抗风技术交通行业重点实验室, ;;;, 上海;;上海;;上海 200092;;200092;;200092, 中国.

吴昊, 华润置地华东大区温州公司, 上海 200122, 中国.

李加武, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: ggz@chd.edu.cn

电子邮件地址: ggz@chd.edu.cn

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作者: Shen Zhengfeng; Hu Zhaotong; Li Jiawu; Xue Xiaofeng; Gao Guangzhong

作者: 沈正峰; 胡兆同; 李加武; 薛晓锋; 高广中

标题: Controlling the Modal Coupled Buffeting Response of the Long Span Dense-frequency Cable-stayed Bridge by MDTMD

标题: 大跨度密频斜拉桥模态耦合抖振 MDTMD 控制

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作者关键词: MDTMD; bridge engineering; closed-frequency cable-stayed bridge; multimodal buffeting control; MDTMD; frequency spacing; control bandwidth; optimal parameter

作者关键词: 桥梁工程; 密频斜拉桥; 多模态抖振控制; 频率间距; 控制频宽; 最优参数

摘要: To perform buffeting control on a long-span dense-frequency cable-stayed bridge, this paper derived the multi degrees-of-freedom multimodal coupled buffeting frequency governing equation with generalized relative displacement based on the principle of virtual work. Summarized the tuned mass damper(TMD)optimal parameters with the displacement as the optimal target in the literature, and improved the traditional dual-frequency TMD (DTMD) model. The paper proposed an evaluation standard for the stroke of the DTMD and a method for selecting the control bandwidth using the peak distribution of the frequency response function. Comparative studies were conducted on the effects of various parameter optimization schemes and DTMD frequency spacing on buffeting vibration reduction. The research results show that the distribution characteristics of the buffeting spectral density of the dense-frequency cable-stayed bridge are different from those of the general cable-stayed bridge. The saddle-valley energy of the response spectrum between the various modal frequencies cannot be ignored. Each mode shape has a different contribution to the buffeting response of different positions of the main beam. The lower the structure damping ratio, the better the vibration reduction effect under the single DTMD(SDTMD)condition. The energy frequency shift phenomenon of the frequency response function will appear in the SDTMD control. The comparative analysis results show that the

multimodal multiple tuned mass damper (MDTMD) control is superior to the single-mode MDTMD control. The improved DTMD achieves good vibration reduction at the same time in two degrees-of-freedom, which is more advantageous than the traditional DTMD. According to the uniform distribution, quadratic parabola distribution, and equal area of the frequency response function integral, the effect of the DTMD frequency spacing on the buffeting vibration reduction effect are discussed. The results show that reasonable frequency spacing has a better vibration reduction effect under the same conditions. The results obtained by the single mode and multimodal control show that the Krenk solution is superior to the Den Hartog solution in the overall vibration reduction effect. The DTMD parameter design refers to the Den Hartog solution in the new version of the Wind-Resistant Design Specification for Highway Bridges (JTG/T 3360-01-2018) standard, which should lead to a moderate increase the DTMD damping ratio. The damping ratio increased by no less than 15%.

摘要: 为了对大跨度密频斜拉桥抖振进行控制, 基于虚功原理推导出以广义相对位移为未知量的多自由度多模态耦合抖振频域控制方程, 总结文献中以位移为最优目标的调谐阻尼器 (TMD) 最优参数解析解, 改进传统双频 TMD (DTMD) 模型, 提出衡量 DTMD 自身冲程大小的评价标准和采用频响函数峰值分布情况选取控制频宽, 对比研究各种参数优化方案和 DTMD 频率间距对抖振减振效果的影响。研究结果表明, 密频斜拉桥抖振响应谱密度峰值的分布特性和一般斜拉桥有明显不同, 响应谱在各阶振型频率之间的鞍谷能量不可忽视, 各阶振型对主梁不同位置的抖振响应贡献具有差异性。结构阻尼比越小, 单个 DTMD (SDTMD) 减振效果越好, SDTMD 控制会出现频响函数能量频移现象。多模态多重调谐质量阻尼器 (MDTMD) 控制要优于单模态 MDTMD 控制, 改进的 DTMD 能够在 2 个方向同时达到良好的减振效果, 比传统的 DTMD 更具优势。分析 DTMD 频率间距按照均匀分布、二次抛物线分布和频响函数积分等面积分布计算的抖振响应控制效果表明, 合理的频率间距能够在相同条件下获得更好的减振效果。单模态和多模态控制得出的结果都表明, Krenk 解在综合减振效果上要优于 Den Hartog 解, 采用公路桥梁抗风设计规范 (JTG/T 3360-01-2018) 中 Den Hartog 解进行 DTMD 参数设计时, 应增加 DTMD 的设计阻尼比, 且增幅不少于 15%。

入藏号: CSCD:6612494

地址: Shen Zhengfeng, School of Highway, Chang'an University;; Chang'an University, ;; Key Laboratory for Bridge and Tunnel of Shaanxi Province, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710064;; 710064.

Hu Zhaotong, School of Highway, Chang'an University;; Chang'an University, ;; Key Laboratory for Bridge and Tunnel of Shaanxi Province, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710064;; 710064.

Li Jiawu, School of Highway, Chang'an University;; Chang'an University, ;; Key Laboratory for Bridge and Tunnel of Shaanxi Province, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710064;; 710064.

Xue Xiaofeng, School of Highway, Chang'an University;; Chang'an University, ;; Key Laboratory for Bridge and Tunnel of Shaanxi Province, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710064;; 710064.

Gao Guangzhong, School of Highway, Chang'an University;; Chang'an University, ;; Key Laboratory for Bridge and Tunnel of Shaanxi Province, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710064;; 710064.

地址: 沈正峰, 长安大学公路学院;; 长安大学, ;; 陕西省公路桥梁与隧道重点实验室, 西安;; 西安, 陕西;; 陕西 710064;; 710064, 中国.

胡兆同, 长安大学公路学院;; 长安大学, ;; 陕西省公路桥梁与隧道重点实验室, 西安;; 西安, 陕西;; 陕西 710064;; 710064, 中国.

李加武, 长安大学公路学院;; 长安大学, ;; 陕西省公路桥梁与隧道重点实验室, 西安;; 西安, 陕

西;;陕西 710064;;710064, 中国.

薛晓锋, 长安大学公路学院;;长安大学, ;;陕西省公路桥梁与隧道重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

高广中, 长安大学公路学院;;长安大学, ;;陕西省公路桥梁与隧道重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

电子邮件地址: jieao115@163.com; hzt@gl.chd.edu.cn

电子邮件地址: jieao115@163.com; hzt@gl.chd.edu.cn

使用次数 (最近 180 天): 1

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作者: Li Ning; Sheng Aiqing; Zhou Bing; Huang Wei; Pan Xingdong

作者: 李宁; 申爱琴; 周彬; 黄伟; 潘兴东

标题: Evaluation of Aging Properties of PR Modified Asphalt Based on Rheological and Microscopic Analysis

标题: 基于流变和微观分析的 PR 改性沥青老化性能评价

来源出版物: 材料科学与工程学报 卷: 37 期: 5 页: 812-816 出版年: 2019

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作者关键词: asphalt; thermal oxidative aging; photooxidation aging; GPC; molecular weight distribution

作者关键词: 沥青; 热氧老化; 光氧老化; 凝胶色谱; 分子量分布

摘要: Rubber resin(PR)modified asphalt was obtained by a kind of specially treated PR and SBR with simple mechanical mixing.An ultraviolet aging oven was designed and developed.First of all,the thermal oxidative and photooxidation aging of the asphalt were simulated by using film aging oven and ultraviolet aging oven.The conventional properties test,rheological test and gel chromatography molecular weight distribution of PR modified asphalt before and after aging were compared.The results show that the modification of PR can improve the aging property of asphalt.Its aging resistance can be improved by even the small performance changes of the penetration.The softening point of the asphalt after aging changes little and its higher temperature levels becomes higher after aging by the test of RTFOT,which is consistent with that the molecular weight distribution curve of PR modified asphalt is smaller.The average molecular weight and

dispersity of asphalt can be used to characterize the macroscopic properties of asphalt. The greater the molecular weight, and the greater the dispersion, the smaller the temperature sensitivity, and the better the aging resistance of the asphalt will be.

摘要: 针对自主研发的橡胶树脂(PR)改性沥青进行了老化性能研究。采用薄膜老化烘箱和自主设计研发的紫外老化烘箱模拟沥青的热氧老化和光氧老化过程,对老化前后的 PR 改性沥青进行了常规性能试验、流变试验和凝胶色谱的试验对比。结果表明:PR 改性技术能够很好地提高沥青的抗老化性能;PR 改性沥青老化后针入度、软化点性能改变不大且 RTFOT 老化后高温等级较高,另外 PR 改性沥青的分子量分布曲线变化较小,其耐老化性能得到明显改善;可以采用沥青的重均分子量和分散度进行宏观性能的部分表征,沥青重均分子量和分散度越大,沥青温度敏感性越小,耐老化性能越好。

入藏号: CSCD:6609815

地址: Li Ning, School of Highway, Chang'an University, Yunnan Research Institute of Highway Science and Technology, Xi'an, Kunming, 710064, 650051.

Sheng Aiqing, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhou Bing, Yunnan Research Institute of Highway Science and Technology, Kunming, Yunnan 650051, China.

Huang Wei, Yunnan Highway Engineering Test Center, Kunming, Yunnan 650051, China.

Pan Xingdong, Yunnan Highway Engineering Test Center, Kunming, Yunnan 650051, China.

地址: 李宁, 长安大学公路学院; 云南省公路科学技术研究院, 西安; 昆明, 陕西; 云南 710064; 650051, 中国.

申爱琴, 长安大学公路学院, 西安, 陕西 710064, 中国.

周彬, 云南省公路科学技术研究院, 昆明, 云南 650051, 中国.

黄伟, 云南公路工程试验检测中心, 昆明, 云南 650051, 中国.

潘兴东, 云南公路工程试验检测中心, 昆明, 云南 650051, 中国.

电子邮件地址: 15812131798@qq.com

电子邮件地址: 15812131798@qq.com

使用次数 (最近 180 天): 0

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作者: Feng Zhongju; Li Shaojie; Hao Yumeng; Dong Yunxiu; Fang Yuanwei; Hu Haibo; Pan Fang; Li Jun

作者: 冯忠居; 李少杰; 郝宇萌; 董芸秀; 方元伟; 胡海波; 潘放; 李军

标题: Bearing Capacity of Foundation Affected by Buried Depth of Culvert

标题: 上埋式涵洞基础埋深效应下的地基承载力研究

来源出版物: 长江科学院院报 卷: 36 期: 11 页: 83-90 出版年: 2019

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文献类型: Article

作者关键词: buried culvert; burial depth effect; bearing capacity of foundation; finite element analysis; field test

作者关键词: 上埋式涵洞; 埋深效应; 地基承载力; 有限元分析; 现场试验

摘要: In an attempt to identifying the influence of buried depth of culvert on the bearing capacity of foundation, a formula for the bearing capacity of buried culvert is deduced based on Terzaghi's theory and Gu Anquan's formula. Moreover, the allowable value of foundation's bearing capacity is determined by analyzing the change of loadsettlement curve against soil fill height using finite element approach. The allowable bearing capacity of foundation obtained by finite element method is compared with those by different calculation methods. In addition, the influence of shear strength of foundation soil on bearing capacity of foundation in different calculation methods is discussed. Finally, the rationality of the formula is verified by an engineering example. The research findings are as follows: (1) The side soil fill reinforces the shear strength of foundation soil and improves the bearing capacity of the culvert foundation. Such improvement is influenced by the additional soil pressure on the soil fill. (2) With the increase of internal friction angle, the bearing capacity of foundation increases nonlinearly, while with the increase of cohesion, bearing capacity increases in an approximately linear trend, and the impact of internal friction angle is much larger than that of cohesion. The influence of the internal friction angle on the bearing capacity of the foundation is significantly greater than that of the cohesive force. (3) The bearing capacity calculated by the formula proposed in this paper is in good agreement with the calculated value by finite element method, and also is much larger than the earth pressure at culvert base, which accords with the actual situation of the culvert foundation in a safe state.

摘要: 为探明上埋式涵洞基础埋置深度对地基承载力的影响,基于太沙基理论与顾安全公式,推导了适用于上埋式涵洞的地基承载力公式。利用有限元软件,分析了地基土的荷载-沉降(P-S)曲线随填土高度的变化规律,确定地基承载力容许值,将不同计算方法得出的地基承载力容许值与有限元计算值进行对比分析,同时分析了涵顶和基底土压力随填土高度的变化规律,探讨了不同计算方法下地基土的抗剪强度对地基承载力的影响,通过工程实例验证本文公式的合理性。研究表明:①涵洞侧填土增强了地基土的抗剪强度,使涵洞地基承载力得到提高,其提高程度受到涵洞侧填土附加土压力的影响;②随着地基土的内摩擦角和黏聚力的增加,地基承载力分别呈非线性和近似线性增长趋势,且内摩擦角对地基承载力的影响程度明显大于黏聚力;③本文公式计算的地基承载力与有限元计算值符合较好,且本文公式得出的地基承载力远远大于涵洞基底土压力,符合现场涵洞地基处于安全状态的实际情况。研究成果可为确定上埋式涵洞地基承载力提供理论支撑。

入藏号: CSCD:6607956

地址: Feng Zhongju, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Hao Yumeng, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Dong Yunxiu, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Fang Yuanwei, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Hu Haibo, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Shaojie, China Railway Construction Group Co., Ltd., Beijing 100040, China.

Pan Fang, Guangdong Baotou-Maoming Expressway Co.,Ltd., Guangzhou, Guangdong 510000, China.

Li Jun, Guangdong Baotou-Maoming Expressway Co.,Ltd., Guangzhou, Guangdong 510000, China.

地址: 冯忠居, 长安大学公路学院, 西安, 陕西 710064, 中国.

郝宇萌, 长安大学公路学院, 西安, 陕西 710064, 中国.

董芸秀, 长安大学公路学院, 西安, 陕西 710064, 中国.

方元伟, 长安大学公路学院, 西安, 陕西 710064, 中国.

胡海波, 长安大学公路学院, 西安, 陕西 710064, 中国.

李少杰, 中铁建设集团有限公司, 北京 100040, 中国.

潘放, 广东包茂高速公路有限公司, 广州, 广东 510000, 中国.

李军, 广东包茂高速公路有限公司, 广州, 广东 510000, 中国.

电子邮件地址: ysf@gl.chd.edu.cn; 1181470168@qq.com

电子邮件地址: ysf@gl.chd.edu.cn; 1181470168@qq.com

使用次数 (最近 180 天): 0

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作者: Yu Xiaoguang; Hu Zhaotong; Xing Guohua; Xie Pengyu; Mu Zhuohui

作者: 于晓光; 胡兆同; 邢国华; 谢鹏宇; 穆卓辉

标题: Study onbond performance of aluminum alloy reinforced concrete beams based on crack width-slip theory

标题: 基于缝宽-滑移理论的铝合金配筋混凝土梁粘结性能研究

来源出版物: 世界地震工程 卷: 35 期: 3 页: 83-90 出版年: 2019

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作者关键词: reinforcement ratio; aluminum alloy bar; crack width; bond performance

作者关键词: 配筋率; 铝合金筋; 裂缝宽度; 粘结性能

摘要: The bond performance of aluminum alloy bars and concrete is an important factor influencing the bearing capacity of concrete beams reinforced with aluminum alloy bars. A static load test was conducted on nine concrete beams reinforced with aluminum alloy bars and two reinforced concrete beams. The development of the cracks in the beams during the loading process was analyzed. Based on the crack width-slip theory, the bonding performance of the

tested beams was investigated. The results show that the crack width of the reinforced concrete beams under the same load is smaller than that of concrete beams reinforced with aluminum alloy bars, and the bonding performance between steel bar and concrete is better than that between the aluminum alloy bar and concrete. The tension of the longitudinal reinforcement in the concrete beam is essentially the resultant force of the bond forces in the unit body after the cracking of the concrete beam. The bond slip between the longitudinal bars and concrete is directly related to the bond force, and the relationship between the amount of bond slip and the bond force can be obtained by the algebraic and integral calculations.

摘要: 铝合金筋与混凝土的粘结性能是影响铝合金配筋新型混凝土梁承载力的重要因素。对 9 根铝合金配筋混凝土梁和 2 根钢筋混凝土对比梁进行了静载试验,分析混凝土梁在加载过程中的裂缝发展情况,基于缝宽-滑移理论研究试验梁的粘结性能。研究表明:同级荷载作用下,钢筋混凝土梁的裂缝宽度小于铝合金配筋混凝土梁,钢筋与混凝土的粘结性能优于铝合金与混凝土的粘结性能;混凝土梁中纵筋所受拉力,实质上是混凝土开裂后,单元体内部粘结力的合力;纵筋与混凝土的粘结滑移量与粘结力直接相关,可通过代数和微积分计算得到二者的对应关系。

入藏号: CSCD:6599606

地址: Yu Xiaoguang, School of Highway, Changan University; Changan University; Inner Mongolia Communications Construction Engineering Quality Supervision Bureau, ; Key Laboratory of Bridge Detection & Reinforcement Technology of Ministry of Transport; Xi'an; Xi'an; Hohhot, ; ; 710064; 710064; 010051.

Hu Zhaotong, School of Highway, Changan University, Xi'an, Shaanxi 710064, China.

Xing Guohua, School of Highway, Changan University, Xi'an, Shaanxi 710064, China.

Xie Pengyu, School of Highway, Changan University, Xi'an, Shaanxi 710064, China.

Mu Zhuohui, Inner Mongolia Communications Construction Engineering Quality Supervision Bureau, Hohhot, Inner Mongolia 010051, China.

地址: 于晓光, 长安大学公路学院; 长安大学; 内蒙古自治区交通建设工程质量监督局, ; 旧桥检测与加固技术交通行业重点实验室, ; 西安; 西安; 呼和浩特, 陕西; 陕西; 内蒙古 710064; 710064; 010051, 中国.

胡兆同, 长安大学公路学院, 西安, 陕西 710064, 中国.

邢国华, 长安大学公路学院, 西安, 陕西 710064, 中国.

谢鹏宇, 长安大学公路学院, 西安, 陕西 710064, 中国.

穆卓辉, 内蒙古自治区交通建设工程质量监督局, 呼和浩特, 内蒙古 010051, 中国.

电子邮件地址: 349425055@qq.com

电子邮件地址: 349425055@qq.com

使用次数 (最近 180 天): 0

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作者: Wu Song; Han Sen; Wang Kang; Zhang Chen; Yao Yangyi; Huang Ke; Li Yang

作者: 吴松; 韩森; 王康; 张琛; 姚杨宜; 黄可; 李杨

标题: Research on preparation and evaluation method of hydrophobic antifreeze pavement sealing layer

标题: 疏水防冻路面封层制备与评价方法研究

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作者关键词: road engineering; hydrophobic agent; emulsified asphalt; antifreeze pavement; road performance

作者关键词: 道路工程; 疏水剂; 乳化沥青; 防冻路面; 路用性能

摘要: Aiming at the traffic accident caused by snow and ice in winter roads in China, a hydrophobic antifreeze pavement sealing layer (HAPSL) is prepared. For comparing its hydrophobic effect and characterizing the hydrophobic performance, the water drop slip time experiment is employed. For showing effect of the adhesion between the ice and pavement, and the ice suppression performance, the interlaminar shear test, direct pull-out test and steel ball slamming anti-icing test are employed. For verifying the stability and anti-slip performance, the rutting test, low temperature bending creep test, freeze-thaw split test, sand patching method and pendulum type friction coefficient measuring instrument(BPT) test are employed. The results declare that the HAPSL has strong hydrophobic and anti-icing performance, and can delay the road freezing and reduce the adhesion between ice and pavement. The HAPSL has certain adverse effects on stability and slip resistance, but all meet the requirements of the specification to ensure the common use of the road. The HAPSL can be applied to hydrophobic pavements and might provide reference for research of hydrophobic pavement and self-melting snow pavements.

摘要: 针对我国冬季道路降雪结冰导致交通事故的问题,研究制备了一种疏水防冻路面封层(hydrophobic antifreeze pavement sealing layer,HAPSL).测试水滴滑落时间比较其疏水效果,表征疏水性能;采用层间剪切试验、直接拉拔试验和钢球捶击防覆冰试验比较其降低冰层与路面间黏附力的效果,表征防冻性能.采用车辙试验、低温弯曲蠕变试验、冻融劈裂试验以及铺砂法、摆式摩擦仪(BPT)分别验证稳定性和抗滑性能.结果表明:HAPSL 具有较强的疏水及防冰抑冰性能,能够延缓道路结冰,降低冰层与路面间的黏附力;虽然对稳定性和抗滑性能有一定的不利影响,但均满足规范要求,能够确保道路的正常使用.HAPSL 具有实用价值,可为其他疏水路面、自融雪路面的研究和铺筑提供参考.

入藏号: CSCD:6597792

地址: Wu Song, Highway School, Chang'an University, Xi'an, Shaanxi 710064, China.

Han Sen, Highway School, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Chen, Highway School, Chang'an University, Xi'an, Shaanxi 710064, China.

Yao Yangyi, Highway School, Chang'an University, Xi'an, Shaanxi 710064, China.

Huang Ke, Highway School, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Yang, Highway School, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Kang, College of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 吴松, 长安大学公路学院, 西安, 陕西 710064, 中国.

韩森, 长安大学公路学院, 西安, 陕西 710064, 中国.

张琛, 长安大学公路学院, 西安, 陕西 710064, 中国.

姚杨宜, 长安大学公路学院, 西安, 陕西 710064, 中国.

黄可, 长安大学公路学院, 西安, 陕西 710064, 中国.

李杨, 长安大学公路学院, 西安, 陕西 710064, 中国.

王康, 长安大学理学院, 西安, 陕西 710064, 中国.

电子邮件地址: 1576638950@qq.com; hysam_hs@chd.edu.cn

电子邮件地址: 1576638950@qq.com; hysam_hs@chd.edu.cn

使用次数 (最近 180 天): 1

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作者: Li Yu; Li Chen

作者: 李宇; 李琛

标题: Influence of Seismic Response Parameters on Seismically-Isolated Girder Bridge Under Near-Fault Ground Motions

标题: 近断层地震作用下隔震梁桥地震响应参数影响研究

来源出版物: 桥梁建设 卷: 49 期: 5 页: 68-72 出版年: 2019

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来源出版物: Bridge Construction 卷: 49 期: 5 页: 68-72 出版年: 2019

文献号: 1003-4722(2019)49:5<68:JDCDZZ>2.0.TX;2-X

语言: Chinese

文献类型: Article

作者关键词: simply-supported girder bridge; near-fault ground motion; high damping rubber bearing; seismic response; pier height; pier mass; equivalent isolation degree; isolation effect

作者关键词: 简支梁桥; 近断层地震; 高阻尼橡胶支座; 地震响应; 桥墩高度; 桥墩质量; 等效隔震度; 隔震效果

摘要: In order to study the seismic isolation effect of high damping rubber(HDR)bearings with different design parameters on girder bridge under the near-fault ground motions,the equivalent single-pier models of girder bridges with HDR bearings are established by using the SAP 2000software.The records of typical near-fault ground motions are selected as seismic waves input to analyze the effects of pier height,pier mass and equivalent isolation degree on the seismic

response of girder bridges with HDR bearings. The results show that the HDR bearings have a good isolation effect. The higher the pier, the greater the peak displacement at pier top after seismic isolation. HDR bearings can effectively reduce the seismic response of low piers to the near-fault ground motions. However, when the pier height exceeds 35m or pier mass is increased, the isolation effect of the HDR bearings will decrease. The greater the equivalent isolation degree, the better the isolation effect of the HDR bearings. When the HDR bearings are applied to the seismic isolation design of bridges, the equivalent isolation degree should be set greater than 3.0.

摘要: 为了研究近断层地震作用下高阻尼橡胶(HDR)支座隔震梁桥在不同设计参数下的隔震效果,采用 SAP 2000 软件建立 HDR 支座隔震简支梁桥的等效单墩模型,选取典型近断层地震记录作为输入地震波,分析桥墩高度、桥墩质量和等效隔震度对 HDR 支座隔震梁桥地震响应的影响。结果表明:HDR 支座具有良好的隔震效果;桥墩越高,隔震后的墩顶位移峰值越大;HDR 支座能有效降低低矮桥墩的近断层地震响应,但当墩高超过 35m 或桥墩质量增大后,HDR 支座的隔震效果就降低;等效隔震度越大,HDR 支座的隔震效果越好;桥梁采用 HDR 支座进行隔震时,应保证等效隔震度大于 3.0。

入藏号: CSCD:6598751

地址: Li Yu, Highway School, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Chen, School of Architecture, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 李宇, 长安大学公路学院, 西安, 陕西 710064, 中国.

李琛, 长安大学建筑学院, 西安, 陕西 710061, 中国.

电子邮件地址: liyu@chd.edu.cn; 67974697@qq.com

电子邮件地址: liyu@chd.edu.cn; 67974697@qq.com

使用次数 (最近 180 天): 0

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作者: Liu Bin; Liu Yongjian; Yang Yuehua; Cao Mingming; Wang Kangning

作者: 刘彬; 刘永健; 杨岳华; 曹明明; 王康宁

标题: Design of PBL-Stiffened Steel Truss-Concrete Composite Girder Bridge with Truss Made of Rectangular Steel Tubes

标题: PBL 加劲型矩形钢管混凝土组合桁梁桥设计

来源出版物: 桥梁建设 卷: 49 期: 5 页: 97-102 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: composite truss girder bridge; overpass; rectangular concrete-filled steel structure; PBL stiffening rib; optimization of hogging moment region; optimization of panel point; PBL hybrid connecting technique

作者关键词: 组合桁梁桥; 跨线桥; 矩形钢管混凝土结构; PBL 加劲肋; 负弯矩区优化; 节点优化; PBL 混合连接技术

摘要: The Huangyan Bridge is a highway overpass with three spans of 24,40 and 24m. Structurally, it is a continuous rigid-frame system with main girder formed of steel trusses and concrete slabs. The steel trusses are made from rectangular steel tubes partially stiffened by PBL connectors. The piers are Y-shaped piers formed of rectangular concrete-filled steel tubes, like a tree, underneath which are the rhombic pile caps and bored pile foundations. PBL longitudinal ribs are added to the lower chord of the truss in the hogging moment region and the rectangular steel tubes of the piers, and these tubes are also filled with concrete to form a PBL stiffened rectangular reinforced concrete cross section, thus to improve the load bearing capacity of the components and enhance the local buckling performance of the steel tubes bearing compressive force. To improve the load bearing capacity of the panel points of the PBL stiffened concrete-filled steel tubes and better change the failure mode of the panel points, the main tubes are filled with concrete, and the width of the branch tubes and the main tubes are kept the same. The concrete slabs are connected with the main truss via the closed PBL connectors in the upper chord, and the pier is fixed with the pile cap with the PBL connectors concentrated in the longitudinal and transverse direction in check pattern.

摘要: 高速公路跨线桥黄延桥为(24+40+24)m 连续刚构体系 PBL 加劲型矩形钢管混凝土组合桁梁桥。该桥主梁采用矩形钢管桁架和混凝土行车道板构成的组合桁梁;桥墩采用 Y 形双肢矩形钢管混凝土树状桥墩,下设菱形承台+钻孔灌注桩基础。在负弯矩区下弦杆和 Y 形桥墩的矩形钢管内设置 PBL 纵肋并灌注混凝土,形成 PBL 加劲型矩形钢管混凝土断面,以提高杆件承载力、改善受压钢管局部屈曲性能。为提高该桥 PBL 加劲型矩形钢管混凝土节点的承载力、改善节点的失效模式,采取主管内灌注混凝土和支管与主管同宽两项优化措施。混凝土桥面板通过上弦闭口 PBL 开孔预埋钢板连接件与主桁相连。桥墩通过纵、横向呈方格网络集中布置的 PBL 开孔钢板与承台固结。

入藏号: CSCD:6598756

地址: Liu Bin, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Yongjian, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Yang Yuehua, Construction Headquarters of Hangzhou Section of Zhejiang Transportation Group, Hangzhou, Zhejiang 310012, China.

Cao Mingming, China Railway Bridge Science Research Institute, Ltd., Wuhan, Hubei 430034, China.

Wang Kangning, China Railway Bridge Science Research Institute, Ltd., Wuhan, Hubei 430034, China.

地址: 刘彬, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘永健, 长安大学公路学院, 西安, 陕西 710064, 中国.

杨岳华, 浙江省交通集团杭州板块建设指挥部, 杭州, 浙江 310012, 中国.

曹明明, 中铁大桥科学研究院有限公司, 武汉, 湖北 430034, 中国.

王康宁, 中铁大桥科学研究院有限公司, 武汉, 湖北 430034, 中国.

电子邮箱地址: 513499836@qq.com; lyj.chd@gmail.com; tzyyh0011@126.com;

179962613@qq.com; 1049214938@qq.com

电 子 邮 件 地 址 : 513499836@qq.com; lyj.chd@gmail.com; tzyyh0011@126.com;
179962613@qq.com; 1049214938@qq.com

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作者: Tian Zhun; Zhang Shengrui

作者: 田准; 张生瑞

标题: Identification and ranking of accident black spots using advanced empirical Bayes method

标题: 优化经验贝叶斯事故黑点识别与排序方法

来源出版物: 长安大学学报. 自然科学版 卷: 39 期: 5 页: 115-126 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: traffic engineering; traffic safety; signalized intersection; black spot identification and ranking; empirical Bayes; traffic accident statistical analysis

作者关键词: 交通工程; 交通安全; 信号交叉口; 事故黑点识别与排序; 经验贝叶斯; 交通事故统计与分析

摘要: To accurately and effectively identify and rank traffic accident black spots, an accident-data-based and an accident-prediction-model-based advanced empirical Bayes method was proposed. In addition, the practicability of the identification methods has been optimized. Furthermore, risk of accident involvement and safety benefits of treatment, two ranking criteria of black spots were suggested. Accident data for signalized intersections in two cities were collected. The accident-data-based advanced empirical Bayes method was used to identify total accident black spots and fatal and injury accident black spots in city A. The total number of accident black spots identified in city A were subsequently ranked according to the risk of accident involvement. Concurrently, black spots in city B were identified by the accident-prediction-model-based advanced empirical Bayes method, and were ranked according to risk of accident involvement and safety benefits of treatment two criteria. The results show that 24 total accident black spots and 18 fatal and injury accident black spots were identified in city A at 95% confidence level, while 15 black spots were identified in city B at 99% confidence level. The advanced empirical Bayes method is superior to the rate quality control and accident rate methods regarding accuracy, the

ability to eliminate the impact of random fluctuation and the regression-to-the-mean effect of accident frequency. The ranking criterion of the safety benefits of treatment favors the locations that are more cost-effective to treat, while the ranking criterion of the risk of accident involvement favors the locations with higher deviation from the expected values.

摘要: 为了对道路交通事故黑点进行准确有效识别和排序,提出基于事故统计数据及事故预测模型的优化经验贝叶斯黑点识别方法,并对该方法的工程实用性进行了优化。同时,从事故发生危险程度、安全治理可提升空间 2 个方面提出了优化经验贝叶斯黑点排序方法。选取 2 个城市的信号交叉口事故数据,利用基于事故统计数据的黑点识别方法对城市 A 的总事故黑点、伤亡事故黑点分别进行了识别,并按照事故发生危险程度进行了总事故黑点排序;利用基于事故预测模型的黑点识别方法对城市 B 的事故黑点进行识别,并分别按照事故发生危险程度、安全治理可提升空间 2 种排序规则进行了黑点排序。结果表明:在 95%的显著性水平下,城市 A 共识别出 24 个总事故黑点及 18 个伤亡事故黑点;在 99%的显著性水平下,城市 B 共识别出 15 个事故黑点;优化经验贝叶斯法在识别准确性、消除事故数随机波动及趋中心回归现象影响方面优于事故率法和质量控制法;基于安全治理可提升空间的排序指标倾向于筛选出安全治理投资收益比高的地点,基于事故发生危险程度的排序指标则倾向于筛选出与事故期望值偏离较大的地点。

入藏号: CSCD:6600080

地址: Tian Zhun, School of Highway,Chang'an University;;School of Civil Engineering,Xi'an University of Architecture and Technology, ;; Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710055.

Zhang Shengrui, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 田准, 长安大学公路学院;;西安建筑科技大学土木工程学院, ;; 西安;;西安, 陕西;;陕西 710064;;710055, 中国.

张生瑞, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: tianzhun@xauat.edu.cn; zhangsr@chd.edu.cn

电子邮件地址: tianzhun@xauat.edu.cn; zhangsr@chd.edu.cn

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作者: Zhang Chi; Hou Yudi; Qin Jihan; Zhang Hong

作者: 张驰; 侯宇迪; 秦际涵; 张宏

标题: Safety Design Method of Long Slope Downhill Slope Based on Temperature Increase of Brake Drum

标题: 基于制动毂温升的连续下坡安全设计方法

来源出版物: 华南理工大学学报. 自然科学版 卷: 47 期: 10 页: 139-150 出版年: 2019

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文献类型: Article

作者关键词: road engineering; vertical combination design method; brake heating; long and steep downhill; combination of steep slopes and transitional slopes

作者关键词: 道路工程; 纵坡组合设计方法; 制动毂温升; 长大下坡; 陡缓组合

摘要: A safety combined design method of longitudinal slope based on the temperature rise of truck brake drum was studied in order to improve the driving safety level of continuous downhill driving on expressway and to alleviate the contradiction between road and vehicle in China. Six-axis semi-trailer were taken as the leading truck, and the brake heating model was constructed by theoretical analysis method. The accuracy of the model was verified by the real vehicle test. The downhill distance when the brake drum temperature reaches 200°C, the temperature of the slope bottom and the temperature rise rate were selected as the analysis indexes to analyze the combined design method of the longitudinal slope, based on the analysis of the correlation between the accident rate of truck and the temperature rise of the brake drum. The results show that, considering the temperature rise of brake heating, the continuous downhill should be designed and optimized safely from three aspects: transition slope setting, difference control of adjacent slope segments and slope length combination, supplemented by protective measures and traffic management measures. Reasonable transition slope setting is beneficial to relieve the temperature rise of brake heating, but the cooling effect of transition slope is limited. The infinite reduction of slope not only can't help to reduce the temperature of brake heating, but also increases the length of the route. It is advisable to control the slope value reasonably according to the critical slope index. The slope difference of adjacent slope section should not be too large, designing longitudinal alignment as far as possible with the small slope difference of the longitudinal slope combination. It is advisable to control the slope difference according to the average longitudinal slope and the maximum slope difference regression equation. And the slope length combination form of long gentle slope and short steep slope should be adopted. Thus can to the greatest degree minimize the continuous downhill of the lorry brake hub over 200°C, improving the safety of the lorry downhill.

摘要: 为提升高速公路连续下坡行车安全水平,缓解中国长下坡路段车路协同矛盾,研究了基于货车制动毂温升的纵坡组合安全设计方法.选取六轴铰接列车为主导车型,采用理论分析法构建了制动毂温升模型,通过实车试验验证了模型准确性.收集了试验路段多年事故数据,基于对货车事故率与制动毂温升的相关性分析,选取温度达到 200°C 时下坡距离、坡底温度和温升速率作为纵坡组合安全性分析指标,对连续下坡纵坡组合设计方法进行了分析.结果表明:从制动毂温升层面考虑,连续下坡应从缓坡设置、坡度差控制和坡长组合三方面进行安全设计与优化,并辅以主、被动防护和交通管控措施;合理设置缓坡有利于缓解制动毂温升,但缓坡降温效果有限,坡度无限趋缓既无益于降低制动毂温度,也增加了路线长度,宜根据临界坡度指标合理控制缓坡取值;相邻坡段坡度差不宜过大,尽量以坡差较小的纵坡组合进行展线,宜根据平均纵坡以及最大坡度差回归方程控制坡差;同时应采用长缓坡和短陡坡的坡长组合形式.由此可最大限度避免连续下坡的货车制动毂超过 200°C,提升货车下坡安全.

入藏号: CSCD:6596139

地址 : Zhang Chi, Highway Institute, Chang'an University;; Transportation Infrastructure Construction and Management of Digital Engineering Research Center of Shaanxi Province, ;; Transportation Infrastructure Construction and Management of Digital Engineering Research Center of Shaanxi Province, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710064;; 710064.

Hou Yudi, Highway Institute, Chang'an University, Xi'an, Shaanxi 710064, China.

Qin Jihan, Highway Institute, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Hong, Highway Institute, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 张驰, 长安大学公路学院;; 陕西省交通基础设施建设与管理数字化工程研究中心, ;; 陕西省交通基础设施建设与管理数字化工程研究中心, 西安;; 西安, 陕西;; 陕西 710064;; 710064, 中国.

侯宇迪, 长安大学公路学院, 西安, 陕西 710064, 中国.

秦际涵, 长安大学公路学院, 西安, 陕西 710064, 中国.

张宏, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: zhangchi@chd.edu.cn

电子邮件地址: zhangchi@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Wang Xing; Qin Wei; Ma Jia; Wang Lei

作者: 王星; 覃维; 马佳; 王蕾

标题: Study on Local Structural Resistance of Ventilation System in Highway Tunnels

标题: 公路隧道通风系统局部结构阻力研究

来源出版物: 现代隧道技术 卷: 56 期: 5 页: 104-113 出版年: 2019

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作者关键词: Highway tunnel; Ventilation; Three-way structure; Variable-diameter structure; Bending structure; Local resistance; Fluent software; Simulation calculation

作者关键词: 公路隧道; 通风; 三通结构; 变径结构; 弯道结构; 局部阻力 Fluent 软件; 模拟计算

摘要: In the ventilation system of highway tunnels, there are a large number of structures of local

three-way, variable diameter and bending. In order to study the movement pattern of air flow and loss coefficient of local resistance in this context, the software named Fluent was adopted to analyze the cases of three-way structure (oblique confluence, straight and oblique confluence, oblique shunting, straight and oblique shunting), variable diameter structure (sudden enlargement, sudden downsizing, gradual enlargement and gradual downsizing) and curved air duct and so on. The results show that: for the oblique confluence structure, the area ratio of branch and trunk duct A_3 / A_1 and angle θ between the branch and trunk duct have significant influence on loss coefficient ζ of local resistance, but the section form and flow ratio Q_1 / Q_3 of branch and trunk duct have little influence on ζ ; for the oblique shunting structure, the angle θ between branch and trunk duct, the area ratio A_3 / A_1 and flow ratio Q_1 / Q_3 have significant influence on loss coefficient ζ of local resistance while the section form has little influence on loss coefficient ζ of local resistance; for the sudden enlargement and downsizing of ventilation duct, the ratio of two different sections has obvious influence on loss coefficient ζ of local resistance, and all the section should be designed as round form; for the curved duct, the loss coefficient ζ of local resistance will decrease with an increase of bending radius r which should not be smaller than the bending diameter D , and the loss coefficient ζ of local resistance will increase with an increase of bending angle γ and the section should be designed as round form.

摘要: 公路隧道通风系统中存在着大量的局部三通、变径及弯道结构。为了研究公路隧道通风管段在三通、变径及弯道结构处的通风风流的运动形式及局部阻力损失系数,文章采用 Fluent 计算软件,考虑不同影响因素,对公路隧道通风系统的三通结构(斜向合流、直向及斜向合流、斜向分流、直向及斜向分流)、变径结构(突扩、突缩、渐扩、渐缩)、弯曲风道等工况进行了研究。结果表明:(1)在斜向合流时,支、主流面积比 A_3 / A_1 和夹角 θ 对局部阻力损失系数 ζ 的影响较大,断面形状和支、主流流量比 Q_1 / Q_3 对 ζ 的影响较小;(2)对于斜向分流,支、主流夹角 θ 、面积比 A_3 / A_1 和流量比 Q_1 / Q_3 对局部阻力损失系数 ζ 的影响较大,断面形状对 ζ 的影响较小;(3)对于突扩、突缩风道,两段截面的比值对局部阻力损失的影响系数均非常明显,断面均宜设计为圆形;(4)对于弯曲风道,局部阻力损失系数 ζ 将随着弯曲半径 r 的增大而减小,同时弯曲半径 r 不宜小于弯道直径 D 。另外局部阻力损失系数 ζ 将随着弯曲角度 γ 的增大而增大,且宜为圆形。

入藏号: CSCD:6594853

地址: Wang Xing, Highway College, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Lei, Highway College, Chang'an University, Xi'an, Shaanxi 710064, China.

Qin Wei, CCCC Railway Consultants Group Co., Ltd., Beijing 100088, China.

Ma Jia, China Railway Siyuan Survey and Design Group Co., Ltd., Wuhan, Hubei 430063, China.

地址: 王星, 长安大学公路学院, 西安, 陕西 710064, 中国.

王蕾, 长安大学公路学院, 西安, 陕西 710064, 中国.

覃维, 中交铁道设计研究总院有限公司, 北京 100088, 中国.

马佳, 中铁第四勘察设计院集团有限公司, 武汉, 湖北 430063, 中国.

电子邮件地址: 1548622258@qq.com

电子邮件地址: 1548622258@qq.com

使用次数 (最近 180 天): 1

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作者: Xie Yongli; Feng Zhongju; Li Shaojie; Dong Yunxiu; Hao Yumeng; Zhang Mengran; Hu Haibo

作者: 谢永利; 冯忠居; 李少杰; 董芸秀; 郝宇萌; 张梦冉; 胡海波

标题: Longitudinal load adjustment technology for high embankment culverts based on settlement control

标题: 基于沉降控制的高路堤涵洞纵向调荷技术

来源出版物: 岩土工程学报 卷: 41 期: 10 页: 1790-1799 出版年: 2019

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文献类型: Article

作者关键词: road engineering; high embankment culvert; load adjustment technology; numerical simulation; centrifugal model test

作者关键词: 道路工程; 高路堤涵洞; 调荷技术; 数值模拟; 离心模型试验

摘要: In order to solve the disease problem caused by longitudinal uneven settlement of high embankment culverts, based on their vertical settlement control mechanism, the influences of the characteristics of culvert fill and foundation soil and different EPS plate parameters on the vertical soil pressures at culvert top and the soil settlements at culvert bottom are studied by means of the finite element software. The influences of longitudinal EPS plates on settlements of high embankment and culvert are studied through the centrifugal model tests. Through numerical simulation, the influences of different moduli, laying ranges, thicknesses of EPS planes and ranges of ground treatment on the reduction rate of longitudinal settlement difference of high embankment culverts are analyzed. The results show that: (1) The influences of modulus and Poisson's ratio of the fill on vertical soil pressures at culvert top and soil settlements at culvert bottom are not significant. (2) With the increase of modulus and Poisson's ratio of foundation soil, the longitudinal settlements of soil at culvert bottom tend to uniform distribution. (3) The results of numerical simulations and centrifugal model tests indicate that the longitudinal laying of EPS plates along the culvert leads to the best effectiveness of longitudinal load adjustment of culverts. (4) Through numerical simulation, the design method for high embankment culvert loads based on longitudinal settlement control is obtained.

摘要: 为解决高路堤涵洞纵向不均匀沉降所带来的病害问题,基于纵向沉降控制的高路堤涵洞调荷机理,利用有限元软件研究涵洞填土与地基土特性以及不同 EPS 板参数对涵顶垂直土压力和涵底土体沉降的影响,通过离心模型试验探讨涵洞纵向铺设 EPS 板对高路堤及涵洞的沉降的影响。通过数值模拟计算,分析不同 EPS 板模量、铺设范围、厚度以及地基处理范围

对高路堤涵洞纵向沉降差减少率的影响。研究表明:①填土模量与泊松比对涵顶垂直土压力及涵底土体沉降的影响不显著;②随着地基土模量与泊松比的增加,涵底土体纵向沉降趋于均匀分布;③数值仿真与离心模型试验成果得出,沿涵洞纵向分层铺设 EPS 板时,涵洞纵向调荷效果最佳;④通过数值模拟计算得到了基于纵向沉降控制的高路堤涵洞调荷设计计算方法。

入藏号: CSCD:6591272

地址: Xie Yongli, School of Highway, Changan University, Xi'an, Shaanxi 710064, China.

Feng Zhongju, School of Highway, Changan University, Xi'an, Shaanxi 710064, China.

Dong Yunxiu, School of Highway, Changan University, Xi'an, Shaanxi 710064, China.

Zhang Mengran, School of Highway, Changan University, Xi'an, Shaanxi 710064, China.

Hu Haibo, School of Highway, Changan University, Xi'an, Shaanxi 710064, China.

Li Shaojie, School of Highway, Changan University;;China Railway Construction Group Co., Ltd., ;; Xi'an;; ;;Beijing 710064;;100040.

Hao Yumeng, School of Highway, Changan University;;China Second Highway Survey and Design Institute, Ltd., ;; Xi'an;;Wuhan, ;; 710064;;710065.

地址: 谢永利, 长安大学公路学院, 西安, 陕西 710064, 中国.

冯忠居, 长安大学公路学院, 西安, 陕西 710064, 中国.

董芸秀, 长安大学公路学院, 西安, 陕西 710064, 中国.

张梦冉, 长安大学公路学院, 西安, 陕西 710064, 中国.

胡海波, 长安大学公路学院, 西安, 陕西 710064, 中国.

李少杰, 长安大学公路学院;;中铁建设集团有限公司, ;; 西安;; 陕西;;北京 710064;;100040, 中国.

郝宇萌, 长安大学公路学院;;中交第二公路勘察设计研究院有限公司, ;; 西安;;武汉, 陕西;;湖北 710064;;710065, 中国.

电子邮件地址: xieyl@263.net; 1181470168@qq.com

电子邮件地址: xieyl@263.net; 1181470168@qq.com

使用次数 (最近 180 天): 0

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作者: Qi Qun; Bao Han; Lan Hengxing; Yan Changgen; Zhang Keke

作者: 齐群; 包含; 兰恒星; 晏长根; 张科科

标题: BEHAVIOR OF SHEARING MECHANICS AND CHARACTERISTICS OF STRAIN SOFTENING OF FAULT GOUGE

标题: 断层泥剪切力学行为与应变软化特征研究

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作者关键词: Fault gouge; Microscopic test; Ring shear test; Water content; Strain softening; Shear strength parameters

作者关键词: 断层泥; 微观测试; 环剪试验; 含水率; 应变软化; 抗剪强度参数

摘要: Exploring the mechanical behavior of fault gouge is the basis of studying the engineering geology effects of fault zone. Taking the gouges of Shendaogou Fault in Yan'an as an object, the fabric characteristics of three color fault gouges are studied with particle analysis and X-ray diffraction (XRD). In addition, the mechanical behavior of remolded fault gouges under different water contents are analyzed with ring shear test. The results show that the gradation curve with single peak of fault gouge particle is significantly better than that with double-peaks. Quartz, mica and feldspar are the main non-clay minerals, while illite and kaolinite are the main clay minerals. The color difference of fault gouge is brought by the relative content of hematite and chlorite. The strain softening characteristics of fault gouge are mainly affected by water content and coarse particle content. The strain softening is first strengthened and then weakened with the increase of water content. When the water content is less than the plastic limit, the strain softening characteristics weaken with the increase of coarse particle content. Internal friction angle (ϕ) is the main mechanical parameter affecting strain softening characteristics. Peak internal friction angle and residual internal friction angle are negatively correlated with water content. The variation of ϕ is influenced by the mineral composition, which indicates that ϕ increases with the increase of non-clay mineral under 5% and 10% water content.

摘要: 探究断层泥力学行为是研究断裂带工程地质效应的基础,以延安神道沟断裂带断层泥为对象,借助颗粒分析、X射线衍射等微观测试手段研究了3种颜色断层泥的组构特征,并通过环剪试验分析了不同含水率条件下重塑断层泥的力学行为。研究表明:单峰型粒径曲线的断层泥级配明显优于双峰型,石英、云母和长石为主要的非黏土矿物,黏土矿物则以伊利石和高岭石为主,赤铁矿与绿泥石的相对含量是造成断层泥颜色差异的主要原因;受含水率和粗颗粒含量的影响,断层泥应变软化特征显著,应变软化随着含水率增大呈现先增强后减弱的变化规律,当含水率小于塑限含水率时,应变软化特征则随着粗颗粒含量升高而趋弱;内摩擦角是影响应变软化特征的主要力学指标,峰值内摩擦角和残余内摩擦角均与含水率呈负相关;矿物含量影响内摩擦角的变化,在5%和10%含水率条件下,内摩擦角随非黏土矿物含量的升高而增大。

入藏号: CSCD:6587904

地址: Qi Qun, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Bao Han, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Yan Changgen, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Keke, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Lan Hengxing, Institute of Geographic Sciences and Natural Resources Research, CAS, Beijing 100101, China.

地址: 齐群, 长安大学公路学院, 西安, 陕西 710064, 中国.

包含, 长安大学公路学院, 西安, 陕西 710064, 中国.

晏长根, 长安大学公路学院, 西安, 陕西 710064, 中国.

张科科, 长安大学公路学院, 西安, 陕西 710064, 中国.

兰恒星, 中国科学院地理科学与资源研究所, 北京 100101, 中国.

电子邮件地址: qiqim1995@163.com; baohangeo@163.com

电子邮件地址: qiqim1995@163.com; baohangeo@163.com

使用次数 (最近 180 天): 0

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作者: Wang Xing; Zhou Tianyue; Shi Jiangtao; Xia Yongxu

作者: 王星; 周天跃; 师江涛; 夏永旭

标题: Theoretical and LS-DYNA simulation study of based on the theory of free-fall rockfall's impact on soil layer

标题: 基于自由落体的落石冲击土层的理论及 LS-DYNA 模拟研究

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作者关键词: protective structure; rockfall impact; theoretical research; numerical simulation

作者关键词: 防护结构; 落石冲击; 理论研究; 数值模拟

摘要: By means of theoretical derivation, the impulse algorithm and elastic-plastic algorithm for the maximum impact force of rockfall are obtained. The change rules of impact force and penetration depth along with impact time in the process of rockfall impact are studied by using LSDYNA software. The results of Hertz algorithm, Japanese algorithm, Swiss algorithm, Guan Baoshu algorithm, tunnel manual algorithm, impulse algorithm, elastic-plastic algorithm and numerical simulation results of the rockfall impact force are compared and analyzed with specific examples. The conclusions drawn show that LS-DYNA numerical simulation results, Japanese algorithm, Swiss algorithm, elastic-plastic algorithm and impulse algorithm have better consistency, but the results of impulse algorithm are slightly smaller. Based on the numerical simulation results and the results of tunnel manual algorithm, the relation curve of impact velocity and magnification factor of rockfall is established, with the effects of the recovery factor, the impact angle and the

gravity of the rockfall on the impact force taken into account. Therefore, the LS-DYNA algorithm for calculating the final impact force of rockfall is obtained and its applicability is verified.

摘要: 通过理论推导,分别获得了滚石最大冲击力的脉冲算法、弹塑性算法,采用 LS-DYNA 软件研究了滚石冲击过程中的冲击力及侵入深度随冲击时间的变化规律,并结合具体算例对滚石冲击力的 Hertz 算法、日本算法、瑞士算法、关宝树算法、隧道手册算法、脉冲算法、弹塑性算法及数值模拟结果进行了对比分析,研究得出:LS-DYNA 数值模拟结果、日本算法、瑞士算法、弹塑性算法及脉冲算法一致性较好,但脉冲算法所得出的计算结果略微偏小.然后以数值模拟结果及隧道手册算法结果为基础,建立了滚石的冲击力的冲击速度与放大系数的关系曲线,并同时考虑了滚石冲击过程中的恢复系数、冲击角度及滚石重力所带来的影响,从而得出了最终滚石冲击力的 LS-DYNA 算法,并验证了其适用性.

入藏号: CSCD:6584586

地址: Wang Xing, Highway College, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhou Tianyue, Highway College, Chang'an University, Xi'an, Shaanxi 710064, China.

Xia Yongxu, Highway College, Chang'an University, Xi'an, Shaanxi 710064, China.

Shi Jiangtao, Highway College, Chang'an University;; Shaanxi Provincial Communication Construction Group, ;; Xi'an;; Xi'an, ;; 710064;; 710086.

地址: 王星, 长安大学公路学院, 西安, 陕西 710064, 中国.

周天跃, 长安大学公路学院, 西安, 陕西 710064, 中国.

夏永旭, 长安大学公路学院, 西安, 陕西 710064, 中国.

师江涛, 长安大学公路学院;; 陕西交通建设集团, ;; 西安;; 西安, ;; 710064;; 710086.

电子邮件地址: 2016021017@chd.edu.cn

电子邮件地址: 2016021017@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Zhang Shasha; Wang Yongwei; Zhang Lin; Yang Xiaohua; Chen Weizhi

作者: 张莎莎; 王永威; 张林; 杨晓华; 陈伟志

标题: Influence Factors of the Effect of the Load on the Salt Expansion for Coarse-grained Saline Soil Under the Interaction of Multiple Factors

标题: 交互作用下上覆荷载对粗粒盐渍土盐胀量抑制效果的影响因素研究

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作者关键词: subgrade engineering; coarse-grained saline soil; overburden load; salt expansion; interaction

作者关键词: 路基工程; 粗粒盐渍土; 上覆荷载; 盐胀; 交互作用

摘要: Based on quadratic regression-orthogonal design, salt expansion experiments with six different kinds of coarse-grained saline soil considering multi-factors interaction influence were carried out. And the stepwise regression analysis was performed on the experiment data by SPSS software to get salt expansion ratio significance model for different factors of different coarse-grained saline soil. And, the interaction of overburden load and the other factors by BP neural network was studied. It shows that the content of fine-grained soil, soil particle size and the type of saline soil can affect the overburden load inhibition effect which is imposed on salt expansion of coarse-grained saline soil. When the size of coarse-grained soil particle is at a similar level, the weight of overburden load inhibition effect will increase if the content of fine-grained soil become less, and the biggest weight will be bigger than 60%. When the content of fine-grained soil of different kinds of saline soil is the same, the weight of overburden load inhibition effect will be bigger, if the particle size of coarse-grained soil become bigger. When the other salt expansion influence factors of different saline soils is at the same level, the overburden load inhibition effect of coarse-grained sulfite saline soil surpasses coarse-grained sulphate saline soil's. The salt expansion ratio of sand soil containing fine-grained soil will become smaller, if the overburden load become bigger, and the law of change have exponential relationship. The salt expansion ration of fine-grained sand soil and fine-grained gravelly soil will also become smaller, if the overburden load become bigger. Some basic reference data will be provided for optimization design of reasonable subgrade structure in coarse-grained saline soil areas.

摘要: 基于二次回归正交设计方法, 针对细粒土质砾硫酸盐渍土、细粒土质砾亚硫酸盐渍土等 6 种不同类型的粗粒盐渍土开展多因素交互作用影响下的盐胀试验, 采用 SPSS 软件对试验数据进行逐步回归分析, 得到不同盐渍土盐胀率的影响因素显著性模型, 同时采用 BP 神经网络对上覆荷载与其他因素的交互作用进行分析. 研究表明: 细粒土含量、颗粒粒径大小及盐渍土类型均会影响上覆荷载对粗粒盐渍土的抑制效果; 当粗粒料粒径大小处于相似水平时, 上覆荷载对粗粒盐渍土的盐胀抑制影响权重随着细粒土含量的减少而增大, 其影响权重最大可超过 60%; 当细粒土含量相同时, 上覆荷载对粗粒盐渍土的盐胀抑制影响权重随着粗粒料粒径的增大而增大; 其他因素水平相同时, 上覆荷载对粗粒亚硫酸盐渍土的盐胀抑制效果优于粗粒硫酸盐渍土; 含细粒土砂盐渍土的盐胀率随上覆荷载增大而减小的变化规律具有指数关系; 细粒土质砂和细粒土质砾盐渍土盐胀率会随上覆荷载的增大而减小; 研究结果可为粗粒盐渍土地区的合理路基结构型式优化提供基础参考数据.

入藏号: CSCD:6583092

地址: Zhang Shasha, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Lin, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Yang Xiaohua, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Yongwei, School of Highway, Chang'an University;;CCCC Second Harbour Engineering Co.,Ltd National Enterprise Technology Center, ;; Xi'an;; Wuhan, ;; 710064;; 430040.

Chen Weizhi, China Railway Eryuan Engineering Group Co.,Ltd., Chengdu, Sichuan 610031, China.

地址: 张莎莎, 长安大学公路学院, 西安, 陕西 710064, 中国.
张林, 长安大学公路学院, 西安, 陕西 710064, 中国.
杨晓华, 长安大学公路学院, 西安, 陕西 710064, 中国.
王永威, 长安大学公路学院;;中交第二航务工程局有限公司技术中心, ;, 西安;;武汉, 陕西;;
湖北 710064;;430040, 中国.
陈伟志, 中国中铁二院工程集团有限责任公司, 成都, 四川 610031, 中国.
电子邮件地址: zss_lx@126.com
电子邮件地址: zss_lx@126.com
使用次数 (最近 180 天): 0
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作者: He Min; Liang Peng; Li Linguo; Ye Chunsheng

作者: 贺敏; 梁鹏; 李琳国; 叶春生

标题: Automatic modal parameter identification based on improved two-stage FCM algorithm

标题: 基于两阶段改进的 FCM 法的模态参数自动识别

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作者关键词: modal identification; improved fuzzy c-means algorithm; stabilization diagram;
uncertainty of modal parameters; automatic identification

作者关键词: 模态识别; 改进模糊 C 均值聚类法; 稳定图; 模态参数不确定度; 自动识别

摘要: An improved two-stage clustering method was proposed for automatic stabilization diagram identification. Firstly, the uncertainty of modal parameters was introduced to eliminate the false modal results. This process eliminated most of the false results to provide a clearer stabilization diagram for automatic identification. Secondly, an improved fuzzy c-means (FCM) algorithm was introduced to interpret the stabilization diagram. The algorithm identified the optimal cluster number by an iteration process. Firstly, many clustering results were obtained. Then, these different results were integrated as a judgement matrix. And an iterative graph-partitioning process was implemented to identify the desired cluster number and the final identification result. Finally, the algorithm was validated through Z24 Benchmark and a suspension bridge. The results show

that the uncertainty of modal parameters discriminate the false modal parameters better than the traditional index. The proposed algorithm can successfully interpret the stabilization diagram without any user-specified parameter, thus showing strong robustness. The algorithm can be applied in automatic modal identification for bridge health monitoring.

摘要: 为解决基于稳定图的模态参数自动识别中存在人工干预、参数设定不统一的问题,提出两阶段改进的稳定图自动识别方法.首先,将模态参数不确定度指标引入第一阶段虚假模态参数剔除过程,实现最大程度虚假模态参数剔除;然后,基于改进的FCM算法,采用迭代策略计算不同聚类数目的隶属度矩阵,构造累积邻接矩阵,并结合图切割算法解析累积邻接矩阵,自动确定最佳聚类数目,实现稳定图自动识别;最后,将提出的改进方法运用在Z24桥Benchmark模型和悬索桥实测数据上,验证了所提方法的可行性.研究表明:模态参数不确定度相较于传统指标对虚假模态具有更强的辨别能力;基于改进的FCM算法不需要任何人工调整的参数就能自动识别稳定轴,且具有较强的鲁棒性.改进算法在默认参数下准确识别得到Z24桥和悬索桥的模态参数,表明提出的改进算法可以用于桥梁健康监测的模态参数自动识别过程.

入藏号: CSCD:6581785

地址: He Min, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Linguo, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Ye Chunsheng, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liang Peng, School of Highway, Chang'an University;;Chang'an University, ;;Engeerirng Reacher Center for Large Highway Structure Safety of Ministry of Education, Xi'an;;Xi'an, ;;710064;;710064.

地址: 贺敏, 长安大学公路学院, 西安, 陕西 710064, 中国.

李琳国, 长安大学公路学院, 西安, 陕西 710064, 中国.

叶春生, 长安大学公路学院, 西安, 陕西 710064, 中国.

梁鹏, 长安大学公路学院;;长安大学, ;;公路大型结构安全教育部工程研究中心, 西安;;西安, ;;710064;;710064.

电子邮件地址: bridgedoctor@qq.com

电子邮件地址: bridgedoctor@qq.com

使用次数 (最近 180 天): 0

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作者: Wu Hao; Yao Shunyi; Xue Xunqiang; Yang Tao

作者: 吴昊; 姚顺意; 薛勋强; 杨桃

标题: Analysis on Influence of Foundation Pit Dewatering and Excavation on Adjacent Bridge

Piles Based on Seepage Stress Coupling

标题: 基于渗流应力耦合的基坑降水及开挖对邻近桥桩的影响分析

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作者关键词: tunnel engineering; seepage stress coupling; foundation pit excavation and dewatering; finite element; ground settlement; pile deformation

作者关键词: 隧道工程; 渗流应力耦合; 基坑开挖降水; 有限元; 地表沉降; 桥桩变形

摘要: During the construction of urban culverts under viaduct area, the construction of culvert deep foundation pit will have an impact on the surrounding soil and the substructure of adjacent bridge. On the background of the deep foundation pit of a viaduct culvert in Fuzhou, based on the seepage stress coupling theory and modified Mohr-Coulomb 3D model, the deep foundation pit excavation under the condition of dewatering is simulated by FE software, and the analysis is conducted combining with on-site monitoring information feedback. The distribution rules of ground settlement, and the horizontal displacement and vertical settlement of the adjacent viaduct pile during the process of dewatering and excavation of foundation pit are analyzed. To explore the best mode of dewatering in foundation pit construction and reduce the impact of dewatering, the final ground settlements and the deformations of viaduct piles under the condition of once dewatering and multi-stage dewatering are compared in the simulation process. The result shows that (1) The ground settlement during the process of dewatering and excavation shows a spoon-shaped distribution along vertical direction of pit excavation, showing a trend of small at both ends and big in the middle. (2) The horizontal displacement of pier piles near the foundation pit decreases with the increase of depth, while the horizontal displacement of pier piles far from the foundation pit increases at first and then decreases with the increase of depth, and the horizontal displacement of the piles close to the foundation pit is larger. After each excavation, both the ground settlement and the horizontal displacement of pile body increase, and the increase range decreases with the excavation depth. (2) The on-site monitoring data are slightly larger than the finite element result, but the trends of change are basically the same, showing the good adaptability of numerical simulation. (3) Dewatering of foundation pit has a significant influence on the ground settlement outside the foundation pit and the deformations of viaduct piles, and the multi-stage dewatering scheme can reduce the ground settlement and pile horizontal displacement caused by foundation pit dewatering. The influence of settlement can be controlled by multi-stage dewatering scheme in similar foundation pit dewatering construction.

摘要: 城市涵洞建设下穿高架桥区域时,涵洞深基坑施工会对周边土体和临近桥梁下部结构产生影响。以福州某下穿高架桥涵洞深基坑工程为背景,基于渗流应力耦合理论和修正摩尔库伦三维模型,借助有限元软件对降水条件下的深基坑开挖过程进行模拟,结合现场监测信息反馈进行分析。分析了基坑降水及开挖过程地表沉降及邻近高架桥桩水平位移和竖直沉降分布规律。为探索基坑施工降水最佳模式,减少降水带来的影响,模拟过程对比了一次降水和分次降水条件下的最终地表沉降和高架桥桩的变形。结果表明:基坑降水开挖过程地表沉降沿基坑开挖垂直方向呈勺形分布,呈现出两头小中间大的趋势;邻近基坑的桥墩桩身水平位移随

深度的增加而减小,远离基坑的桥墩桩身水平位移随深度的增加先增大后减小,且距离基坑较近的桩体水平位移较大。且每一次开挖后地表沉降和桩身水平位移都增加,增加的幅度随着开挖深度变小;现场监测数据略大于有限元结果,但变化趋势基本一致,表明数值模拟具有良好的适应性;基坑降水对抗外地表沉降及桥桩变形影响显著,分次降水方案可一定程度上减少基坑降水引起的地表沉降和桩身水平位移,类似基坑降水施工可通过分次降水方案控制沉降影响。

入藏号: CSCD:6582445

地址: Wu Hao, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Yao Shunyi, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Xue Xunqiang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Yang Tao, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 吴昊, 长安大学公路学院, 西安, 陕西 710064, 中国.

姚顺意, 长安大学公路学院, 西安, 陕西 710064, 中国.

薛勋强, 长安大学公路学院, 西安, 陕西 710064, 中国.

杨桃, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: 13926621@qq.com

电子邮件地址: 13926621@qq.com

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作者: Shi Xiaoli; Li Yuhuan; Zhang Ming; Zhang Ping

作者: 史小丽; 李玉环; 张明; 张平

标题: Quantitative Analysis of Influencing Factors on Pavement Routine Maintenance Cost of Expressway

标题: 高速公路路面小修保养费用影响因素量化分析

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作者关键词: road engineering; pavement assets; routine maintenance costs; hierarchical regression analysis; influencing factors

作者关键词: 道路工程; 路面资产; 小修保养费用; 阶层回归分析; 影响因素

摘要: In order to improve the decision level of pavement routine maintenance expenditure of expressway, hierarchical regression analysis method was used to quantify the influencing factors of routine maintenance cost. The influencing factors were defined as regional factors, ages, extra-large bridges ratio, long and extra-long tunnel ratio, and traffic factors which were divided into five cases. The quantitative research was carried out based on the historic data of 16 highway pavement assets after the variables were pretreated. The results show that the overall explanatory power of each group to the model is remarkable under the condition of controlling regional variables; the incremental explanatory power and the statistical significance in each group of the age are the most remarkable; the normalized regression coefficient (beta coefficient) of the extra bridge ratio is larger than the long and extra-long tunnel ratio under the same conditions; and the beta coefficient of the AADT (annual average daily traffic) and heavy traffic flow are greater than other traffic groups. Thus, the calculation of pavement assets routine maintenance cost is affected by regional factors, the age, the extra bridges ratio, AADT and heavy traffic flow.

摘要: 为提高高速公路路面小修保养费用决策水平, 采用阶层回归分析方法, 进行小修保养费用影响因素量化研究. 通过定性分析将影响因素界定为地区因素、通车年限、特大桥梁比例、长与特长隧道比例和交通因素, 其中交通因素分为 5 种情况; 通过对变量进行预处理, 基于 16 条高速公路的历史数据进行量化研究. 结果表明, 在控制地区变量的条件下, 各区组对模型的整体解释力均较显著, 其中通车年限的增量解释力和在各区组的统计意义最为显著; 同等条件下特大桥梁比例的标准化回归系数 (β 系数) 远大于长与特长隧道比例的 β 系数, AADT (annual average daily traffic) 和重车流量区组的 β 系数较其他交通因素区组的数值大. 因此, 路面资产小修保养费用受到地区因素、通车年限、大于 1 000m 的桥梁比例、AADT 和重车流量的影响.

入藏号: CSCD:6580097

地址: Shi Xiaoli, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Yuhuan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Ming, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Ping, Shaanxi Provincial Communication Construction, Xi'an, Shaanxi 710075, China.

地址: 史小丽, 长安大学公路学院, 西安, 陕西 710064, 中国.

李玉环, 长安大学公路学院, 西安, 陕西 710064, 中国.

张明, 长安大学公路学院, 西安, 陕西 710064, 中国.

张平, 陕西省交通建设集团公司, 西安, 陕西 710075, 中国.

电子邮件地址: glxl@gl.chd.edu.cn

电子邮件地址: glxl@gl.chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Lyu Zhenghua; Shen Aiqin; Li Yue; Guo Yinchuan; Yu Muyang

作者: 吕政桦; 申爱琴; 李悦; 郭寅川; 喻沐阳

标题: Study on Fatigue Performance and Mechanism of Emulsified Asphalt Cold Recycled Mixture Based on Genetic Optimization

标题: 基于遗传优化的乳化沥青冷再生混合料的疲劳性能及机理研究

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作者关键词: 乳化沥青冷再生混合料; 疲劳性能; 遗传优化; 材料掺量; 抗裂机理

摘要: In order to improve the accuracy of fatigue performance evaluation and optimal design of emulsified asphalt cold recycled mixture, the effect of cement content, emulsified asphalt content and RAP content on fatigue performance of cold recycled mixture under various stress ratio were studied by orthogonal test design. Based on BP neural network model and genetic algorithm, materials parameter were optimized and the correlation between materials content and stress level was illustrated. Then the anti-cracking mechanism of cold recycled mixture was revealed according to SEM test and elemental analysis. The results showed that the significance of materials content influencing fatigue performance under various stress ratio was ranked differently, and the fatigue performance all existed a peak as materials content increased under high stress level. The proportion of 1.53% cement, 3.56% emulsified asphalt and 78.31% RAP was recommended by genetic optimization results. Abundant hydration products like C₃S and C₂S were found positioning in the interfacial crack between asphalt and aggregate, where the content of Ca/Si was as high as 78.84% that enhanced the interfacial strength.

摘要: 为了提高乳化沥青冷再生混合料疲劳性能评价及优化设计的精准性, 通过正交试验设计, 分析了不同应力比下水泥掺量、乳化沥青掺量及 RAP 掺量对混合料疲劳性能的影响规律。采用 BP 神经网络模型结合遗传算法对材料组成参数进行了优化, 并建立了材料掺量与应力水平的相关关系。基于微观形貌测试及元素分析, 揭示了冷再生混合料的耐疲劳抗裂机理。研究表明: 不同应力比下各材料掺量对疲劳性能影响的显著性存在差异, 高应力比下随各材料掺量的增大, 混合料的疲劳性能均存在峰值; 根据遗传优化结果推荐 1.53% 水泥掺量、3.56% 乳化沥青掺量及 78.31% RAP 掺量作为最佳配比; 在矿料-沥青界面开裂处, Ca/Si 比高达 78.84%, 存在大量 C₃S、C₂S 等水化产物, 界面强度显著提高。

入藏号: CSCD:6574936

地址: Lyu Zhenghua, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Shen Aiqin, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Yue, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Guo Yinchuan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Yu Muyang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 吕政桦, 长安大学公路学院, 西安, 陕西 710064, 中国.

申爱琴, 长安大学公路学院, 西安, 陕西 710064, 中国.

李悦, 长安大学公路学院, 西安, 陕西 710064, 中国.

郭寅川, 长安大学公路学院, 西安, 陕西 710064, 中国.

喻沐阳, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: 362154502@qq.com

电子邮件地址: 362154502@qq.com

使用次数 (最近 180 天): 0

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作者: Ma Shuhong; Zhou Yechao; Zhang Yan

作者: 马书红; 周焯超; 张艳

标题: Travel Mode Choice Forecasting Based on Nested Logit-cumulative Prospect Theory Model

标题: 基于 NL-累计前景理论的出行方式选择预测模型研究

来源出版物: 交通运输系统工程与信息 卷: 19 期: 4 页: 135-142 出版年: 2019

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作者关键词: urban traffic; travel mode choice; cumulative prospect theory; Nested Logit model; perceived value

作者关键词: 城市交通; 出行方式选择; 累计前景理论; Nested Logit 模型; 感知价值

摘要: In order to optimize the structure of travel mode choice forecasting model, and deal with the limitations of utility theory in terms of individual risk appetite, incomplete rational decision making, and overall utility of travel mode, a two-factor travel plan is constructed by combining travel mode with departure time, and a joint model based on Nested Logit-cumulative Prospect Theory is established. The objective utility and selection probability of the NL model are subjected by cumulative prospect theory, and two functions (cumulative weight function and value function) are constructed to describe the actual perceived value of travel mode to travelers in the form of prospect value. Finally, the forecasting model is calibrated and tested by the survey data. Results show that the prediction accuracy of the Nested Logit-cumulative Prospect Theory model is higher than NL model, and comprehensive hit ratio rises from 74.8% to 85.2%. The prediction hit ratio of each mode is more balanced.

摘要: 为改进效用理论在个体风险偏好、非完全理性决策、方式整体效用等方面的表述局限, 联立出行方式与出发时段构建双因素出行方案, 并建立基于巢式 Logit(NL)-累计前景理论的

出行方式选择预测优化模型.通过累计前景理论将 NL 模型所获方案客观效用及选择概率主观化,构建累计权重函数、价值函数并以前景值的形式描述出行方式对出行者的实际感知价值,最后通过调查数据进行建模与验证.结果表明,与仅基于 NL 模型进行的方式预测相比,所建模型综合命中率从 74.8%上升至 85.2%,各方式预测命中率更为均衡.

入藏号: CSCD:6569148

地址: Ma Shuhong, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhou Yechao, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Yan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 马书红, 长安大学公路学院, 西安, 陕西 710064, 中国.

周焯超, 长安大学公路学院, 西安, 陕西 710064, 中国.

张艳, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: msh@chd.edu.cn

电子邮件地址: msh@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Lei Ping; Zhou Tianyue; Wang Xing; Zheng Zhuoqi; Kou Youzhen

作者: 雷平; 周天跃; 王星; 郑卓琦; 寇有振

标题: Research on Punching Failure of Shed Under Impact Load

标题: 冲击荷载下棚洞抗冲切性能研究

来源出版物: 地下空间与工程学报 卷: 15 期: 4 页: 1091-1097 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: punching failure; diameter of reinforcement; reinforcement ratio; concrete strength; cushion

作者关键词: 冲切破坏; 配筋直径; 配筋间距; 混凝土强度; 缓冲垫层

摘要: The failure modes of reinforced concrete roof of a shed tunnel under impact of rock-fall are studied and the reinforcement is equivalent to a thin steel plate according to the principle that the whole resistance is equal. The punching failure happened on the reinforced concrete roof of shed under the impact of rock-fall was studied. In the process of research the function of the buffer layer, the influence of concrete strength, thickness and configuration of shed tunnel roof are all

being discussed to analysis their effects on the improvement of reinforced concrete. The results show that even the impact velocity is low,high quality destructive rock-falls can still lead to the formation of roof perforation block; The resistance of the reinforcement decreases with the increase of the reinforcement spacing and the relation between them is inverse; The diameters of transverse and longitudinal reinforcement have remarkable influences on the resistance of block,and the resistance of the reinforcement is proportional to the sum of the square of the transverse and longitudinal reinforcement diameter; The dispersion effect of cushion causes the loading area of roof being larger and this can improve the punching shear capacity and the resistance of plate reinforcement; The shear damage of shed tunnel roof is controlled by many factors,so the design has to be carried out on the comprehensive analysis of the geological conditions of the hole area.

摘要: 本文对落石冲击下棚洞钢筋混凝土顶板的破坏形式进行了研究,并按整体抗力相等的原则将板内配筋等效为薄钢板,在考虑垫层缓冲作用的基础上讨论了混凝土强度、棚洞顶板厚度以及顶板内所配钢筋的配筋间距、横纵向钢筋直径等因素对提高顶板抗冲切破坏性能的影响。结果表明:即使冲击速度不大,大质量的破坏性落石仍然会导致顶板贯穿块形成;板内配筋对贯穿块的阻力随着配筋间距的增大而减小,两者成反比例关系;横、纵向钢筋直径对配筋对贯穿块的阻力有显著影响,配筋阻力与横、纵向钢筋直径的平方之和成正比;垫层对落石冲击力的分散作用使得顶板上部的加载面积变大,这可以在一定程度上提高棚洞顶板的抗冲切承载力以及板内配筋对贯穿块的阻力;棚洞顶板的剪切破坏受多种因素控制,因此,在实际工程中应对棚洞所在区域的地质情况进行综合分析以对其进行设计。

入藏号: CSCD:6569463

地址: Lei Ping, School of Highway,Changan University, Xi'an, Shaanxi 710064, China.

Zhou Tianyue, School of Highway,Changan University, Xi'an, Shaanxi 710064, China.

Wang Xing, School of Highway,Changan University, Xi'an, Shaanxi 710064, China.

Zheng Zhuoqi, School of Highway,Changan University, Xi'an, Shaanxi 710064, China.

Kou Youzhen, School of Highway,Changan University, Xi'an, Shaanxi 710064, China.

地址: 雷平, 长安大学公路学院, 西安, 陕西 710064, 中国.

周天跃, 长安大学公路学院, 西安, 陕西 710064, 中国.

王星, 长安大学公路学院, 西安, 陕西 710064, 中国.

郑卓琦, 长安大学公路学院, 西安, 陕西 710064, 中国.

寇有振, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: 75523506@qq.com

电子邮件地址: 75523506@qq.com

使用次数 (最近 180 天): 0

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作者: Wu Xiaoguang; Li Yuanjun; Shi Yuanxu; Deng Qiyuan

作者: 邬晓光; 李院军; 时元绪; 邓淇元

标题: Damage Assessment Method for Hinged Joint of Fabricated Hollow Slab Girder Bridge

标题: 装配式空心板梁桥铰缝损伤评估方法

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作者关键词: bridge engineering; assembled beam bridge; quantitative evaluation; shear stiffness of hinged joint; transverse load distribution coefficient

作者关键词: 桥梁工程; 装配式梁桥; 量化评估; 铰缝抗剪刚度; 荷载横向分布系数

摘要: A method for calculating the transverse distribution coefficient of load on the mid-span section of an assembled hollow slab bridge with hinged joints damaged is deduced to solve the problem of quantitative evaluation of hinged joints damaged in an assembled hollow slab bridge. Based on the traditional theory of articulated slab-beam method, the damage degree of articulated joints is represented by the shear stiffness of articulated joints. A hollow slab articulated joint cooperative working coefficient is introduced, and its model relationship with the shear stiffness of articulated joints and its functional relationship with the shear resistance value and shear effect value of articulated joints are established. Considering the influence of hinged joint damage on load transverse distribution coefficient, the evaluation model of hinged joint damage of assembled hollow slab girder bridge is obtained, and the load transverse distribution coefficient of mid-span section is calculated. The results are compared with those of real bridge data, finite element method (ANSYS) and traditional hinged slab-girder method. Compared with the actual bridge data, the relative error of the calculated results of articulated plate-girder method is 5.9% ~ 20.5%. The error of the calculated results of ANSYS finite element method is 2.7% ~ 4.4%. The maximum relative error of the modified articulated plate-girder method is only 2.7%. Quantitative evaluation method can be well applied to the calculation of transverse load distribution coefficients of assembled hollow slab girder bridges. The calculated results are close to the actual bridge data, which can provide a reference for the evaluation of stress conditions of assembled hollow slab girder bridges in practical projects.

摘要: 目的推导一种装配式空心板桥铰缝损伤后跨中截面荷载横向分布系数的计算方法,解决装配式空心板梁桥铰缝损伤程度量化评估问题.方法基于传统铰接板梁法理论,以铰缝抗剪刚度的大小来表征铰缝的损伤程度,引入了一个空心板铰缝协同工作系数 ϕ ,并建立了其与铰缝抗剪刚度的模型关系以及与铰缝剪力抗力值、剪力效应值的功能函数关系,从而在正则方程中考虑铰缝损伤对荷载横向分布系数的影响,得到装配式空心板梁桥铰缝损伤的评估模型,计算其跨中截面荷载横向分布系数,并与实桥数据、有限元法(ANSYS)及传统铰接板梁法的计算结果进行对比.结果铰接板梁法计算结果与实桥数据相比其相对误差在 5.9% ~ 20.5%; ANSYS 有限元法计算结果误差在 2.7% ~ 4.4%;修正铰接板梁法计算结果最大相对误差仅为 2.7%.结论量化评估方法能够较好地适用于装配式空心板梁桥荷载横向分布系数的计算,计算结果与实桥数据较为接近,为实际工程中装配式空心板梁桥受力状况的评估可提供参考.

入藏号: CSCD:6569832

地址: Wu Xiaoguang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Yuanjun, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Shi Yuanxu, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Deng Qiyuan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 邬晓光, 长安大学公路学院, 西安, 陕西 710064, 中国.

李院军, 长安大学公路学院, 西安, 陕西 710064, 中国.

时元绪, 长安大学公路学院, 西安, 陕西 710064, 中国.

邓淇元, 长安大学公路学院, 西安, 陕西 710064, 中国.

使用次数 (最近 180 天): 1

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作者: Tang Ke; Mao Xuesong; Xu Wang; Tang Xinlei

作者: 唐可; 毛雪松; 徐旺; 汤鑫磊

标题: PERFORMANCE ANALYSIS OF CEMENT CONCRETE WITH IRON TAILINGS SAND AS FINE AGGREGATE

标题: 掺铁尾矿砂细集料的水泥混凝土性能分析

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作者关键词: iron tailings sand; design of mix proportion; slump; mechanical properties; freeze-thaw cycle; salt resistance; forst resistance

作者关键词: 铁尾矿砂; 配合比设计; 坍落度; 力学性能; 冻融循环; 抗盐侵蚀; 抗冻性

摘要: In order to analyze the influence of iron tailings sand as fine aggregate on workability, mechanical properties and durability of cement concrete, the workability, compressive strength and flexural strength of concrete were analyzed under different concrete mix ratio conditions, and the frost resistance and salt resistance of the group with better mechanical properties were analyzed. The results indicated that when the content of iron tailings sand was 25%~ 50%, it was beneficial to the workability and mechanical properties of concrete; the freeze-thaw cycle and Na₂SO₄ erosion cycle tests showed that the mass change of concrete specimens with iron tailings sand was significantly less than that without iron tailings sand; the

mass change of concrete with iron tailings sand content of 75% was the smallest. It indicated that the existence of iron tailings sand improved the compactness of concrete, the invasion of moisture and sulfate was reduced, and the destruction of concrete structure was restrained.

摘要: 为分析铁尾矿砂作为细集料对水泥混凝土的和易性、力学性能及耐久性的影响,在不同混凝土配合比条件下,进行混凝土的和易性、抗压及抗弯拉强度分析,并针对力学性能较优组进行抗冻性、抗盐侵蚀性分析。结果表明:当铁尾矿砂含量为 25%~ 50%时,对混凝土和易性、力学性能产生有利影响。冻融循环及 Na₂SO₄ 侵蚀循环试验表明:掺有铁尾矿砂的混凝土试件的质量变化明显小于未掺铁尾矿砂的试件;铁尾矿砂含量为 75%的混凝土质量变化幅度最小,说明铁尾矿砂可提高混凝土密实性,减少水分及硫酸盐的侵入,抑制混凝土结构的破坏。

入藏号: CSCD:6567321

地址: Tang Ke, School of Highway, Changan University, Xi'an, Shaanxi 710064, China.

Mao Xuesong, School of Highway, Changan University, Xi'an, Shaanxi 710064, China.

Xu Wang, School of Highway, Changan University, Xi'an, Shaanxi 710064, China.

Tang Xinlei, School of Highway, Changan University, Xi'an, Shaanxi 710064, China.

地址: 唐可, 长安大学公路学院, 西安, 陕西 710064, 中国.

毛雪松, 长安大学公路学院, 西安, 陕西 710064, 中国.

徐旺, 长安大学公路学院, 西安, 陕西 710064, 中国.

汤鑫磊, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: Xuesongxian@aliyun.com

电子邮件地址: Xuesongxian@aliyun.com

使用次数 (最近 180 天): 2

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作者: Ma Feng; Zhang Yao; Fu Zhen; Feng Qiao

作者: 马峰; 张耀; 傅珍; 冯乔

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标题: 新型橡胶粉和抗车辙剂复合改性沥青混合料级配优化

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作者关键词: asphalt mixture; composite modification; uniform design; orthogonal design; graded optimization

作者关键词: 沥青混合料; 复合改性; 均匀设计; 正交设计; 级配优化

摘要: New type of rubber powder and anti-rutting agent modified asphalt mixture pavement high and low temperature performance is stable;for optimizing the gradation design and raising the road performance, using the uniform design method and the orthogonal design method,respectively,to determine the thickness of aggregate key size screen hole pass rate,and regression analysis of experimental data,through the comprehensive weight aggregate gradation optimization results the overall optimal mixture aggregate gradation is determined;and through the analysis of optimized distribution of high and low temperature performance indicators,the applicability of the grading is verified.The test results show that the embedded squeeze to form the optimal mixture skeleton structure,content of coarse aggregate maximum is 65%; significantly influence factors of the high and low temperature performance of mixture is coarse aggregate screen hole pass rate of 4.75mm,2.36mm pass rate and the ratio of fine aggregate sieve hole;key recommendations mixture size from 16mm to 13.2mm and 13.2mm to 9.5mm to 4.75mm,4.75 mm to 2.36mm,2.36mm to 0.3mm and 0.3mm to 0.075mm mesh passing rate are 95%,67%,32%, 67%,13.5%,5%;and the suggesting oil-stone ratio is 4.7%.Finally,the optimal gradation scope is also given.

摘要: 新型橡胶粉和抗车辙剂改性沥青混合料路面高低温性能稳定,为优化其级配设计并提高路用性能,采用均匀设计法和正交设计法分别确定粗细集料关键粒径的筛孔通过率,对试验数据进行回归分析,通过综合粗细集料级配优化结果确定混合料集料总体最优级配,并通过分析优化级配下的高低温性能指标验证级配的适用性.试验结果表明,混合料嵌挤形成最优骨架结构时,粗集料最大含量占 65%;能显著影响混合料高低温性能的因素是粗集料 4.75mm 筛孔通过率、2.36mm 细集料筛孔通过率及油石比;建议混合料关键粒径 16~13.2、13.2~9.5、9.5~4.75、4.75~2.36、2.36~0.3、0.3~0.075mm 的筛孔通过率分别为 95%、67%、32%、20%、13.5%、5%,并给出建议的油石比为 4.7%,最后给出了优化级配范围.

入藏号: CSCD:6564567

地址: Ma Feng, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Yao, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Feng Qiao, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Fu Zhen, School of Materials Science and Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 马峰, 长安大学公路学院, 西安, 陕西 710064, 中国.

张耀, 长安大学公路学院, 西安, 陕西 710064, 中国.

冯乔, 长安大学公路学院, 西安, 陕西 710064, 中国.

傅珍, 长安大学材料学院, 西安, 陕西 710064, 中国.

电子邮件地址: mafeng@chd.edu.cn

电子邮件地址: mafeng@chd.edu.cn

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作者: Liu Yongjian; Wang Kangning; Liu Bin; Jiang Lei; Ma Yinping; Wang Wenshuai

作者: 刘永健; 王康宁; 刘彬; 姜磊; 马印平; 王文帅

标题: Experimental research on mechanical behavior of RCFST composite truss beam under negative bending

标题: 矩形钢管混凝土组合桁梁负弯矩区受力性能试验研究

来源出版物: 建筑结构学报 卷: 40 期: 9 页: 74-83 出版年: 2019

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作者关键词: composite truss beam; rectangular concrete-filled steel tube; negative bending area; static test; mechanical behavior

作者关键词: 组合桁梁; 矩形钢管混凝土; 负弯矩区; 静力试验; 受力性能

摘要: The rectangular concrete-filled steel tube (RCFST) composite truss beam consists of concrete slab and RCFST truss. Subjected to the action of vertical loads, the composite effect of concrete slab and truss can be fully achieved in positive bending area, but its mechanical properties are weak in negative bending area as well as the concrete slab in tension tends to craze more easily. In response to this problem, a new type of composite truss beam with prestressed concrete slab and shear studs to release the shear action in local was presented. Two RCFST composite truss beams subjected to negative bending moments were tested by applying reverse concentrated loads at mid-span to simulate support reaction forces of continuous beams. The load versus displacement relationships, characteristics of development of cracks, strain distribution of concrete slab, load versus strain relationships of steel truss beam, the interface slip between steel truss and concrete slab and the bearing capacity of the RCFST composite truss were all analyzed. The structural characteristic loads at different loading stages were discussed according to the simplified mechanical model of composite truss beam. The results show that the new type composite truss beam with prestressed concrete slab and shear studs to release the shear studs to release shear action in local can improve the crack resistance capacity of structure, but it has limited influence on flexural capacity. The structural plastic deformation increases because of the cracking of concrete slab and yielding of truss members at first, then the composite truss reaches ultimate state after the failure of welds at the joint. The structural characteristic loads calculated from the simplified mechanical model agree well with the measured values, which can provide references for the design and calculation of RCFST composite truss beam under negative bending.

摘要: 矩形钢管混凝土组合桁梁由混凝土板和矩形钢管混凝土桁架组成,在竖向荷载作用下,其正弯矩区可充分发挥混凝土板和桁架的组合作用,但负弯矩区的力学性能较为薄弱且受拉混凝土板容易开裂。针对这一问题,提出了在负弯矩区混凝土板施加预应力以及布置局部释放剪切作用的剪力钉相结合的组合桁梁结构形式。采用跨中施加反向集中荷载模拟连续梁支

点反力的方法,对 2 榀承受负弯矩的矩形钢管混凝土组合桁梁进行了静力加载试验,对其荷载-位移关系、裂缝发展规律、混凝土板应变分布、桁梁荷载-应变关系、钢与混凝土界面滑移及承载力进行了分析。还根据组合桁梁的简化力学模型对不同加载阶段的结构特征荷载进行了讨论。结果表明:采用局部释放剪切作用的剪力钉和混凝土板施加预应力的组合桁梁结构形式可有效提高其抗裂性能,但对受弯承载力影响较小;在加载过程中混凝土板的开裂和杆件的屈服导致结构塑性变形增大,最终节点处焊缝撕裂,组合桁梁丧失承载力;由简化力学模型计算得到的结构特征内力与实测值吻合较好,可为矩形钢管混凝土组合桁梁负弯矩区的设计和计算提供参考。

入藏号: CSCD:6562199

地址: Liu Yongjian, School of Highway, Chang' an University, Xi'an, Shaanxi 710064, China.

Wang Kangning, School of Highway, Chang' an University, Xi'an, Shaanxi 710064, China.

Ma Yinping, School of Highway, Chang' an University, Xi'an, Shaanxi 710064, China.

Wang Wenshuai, School of Highway, Chang' an University, Xi'an, Shaanxi 710064, China.

Liu Bin, School of Highway, Chang' an University;;CSCEC AECOM Consultants Co., Ltd, ;; Xi'an;;Lanzhou, ;; 710064;;730000.

Jiang Lei, School of Highway, Chang' an University;;Department of Civil Engineering, Queen's University, ;; Xi'an;;Kingston, ;;Canada 710064;;K7L3N6.

地址: 刘永健, 长安大学公路学院, 西安, 陕西 710064, 中国.

王康宁, 长安大学公路学院, 西安, 陕西 710064, 中国.

马印平, 长安大学公路学院, 西安, 陕西 710064, 中国.

王文帅, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘彬, 长安大学公路学院;;中国市政工程西北设计研究院有限公司, ;; 西安;;兰州, 陕西;;甘肃 710064;;730000, 中国.

姜磊, 长安大学公路学院;;女王大学土木工程系, ;; 西安;;安大略金斯顿, 陕西;;710064;;K7L3N6, 中国.

电子邮件地址: lyj.chd@gmail.com

电子邮件地址: lyj.chd@gmail.com

使用次数 (最近 180 天): 0

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作者: Fang Naren; Wang Xuancang; Ye Hongyu; Zhang Chunan

作者: 房娜仁; 王选仓; 叶宏宇; 张春安

标题: Plastic deformation analysis of double-layer continuous paving for large thickness water stabilized base course

标题: 大厚度水稳基层双层连续摊铺塑性变形分析

来源出版物: 重庆大学学报. 自然科学版 卷: 42 期: 7 页: 70-78 出版年: 2019

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作者关键词: Duncan-Chang model; large thickness base; double-layer continuous paving; plastic deformation; control standards

作者关键词: 邓肯-张模型; 大厚度基层; 双层连续摊铺; 塑性变形; 控制标准

摘要: In order to obtain the plastic deformation law of the base under large thickness continuous paving, and find solution to the problem of lack of relevant control standards for the construction smoothness of large thickness continuous paving technology, the incremental elastic Duncan-Chang model is studied and improved by using D-P yield criterion. The yield limit of uncured water-stable mixture is 220 kPa by triaxial shear test and field test, and the initial tangent modulus is determined to be 500 kPa, from which a prediction formula for deformation value of uncured cement stabilized macadam base during construction period is obtained. Then the number of repeated loads in the most unfavorable position of the pavement is calculated, and the Wolff and Visser permanent deformation prediction model is introduced to establish the construction displacement prediction model of the lower bearing stratum. Finally, by studying the smoothness transfer law and the disturbance effect of the construction vehicles on the base stratum under the double-layer continuous paving, the smoothness control principle of the continuous paving is proposed. The smoothness of middle and lower layers of continuous paving layer should be controlled according to the construction standard of the lower layer, and that of the other layers should be controlled according to the traditional paving construction standard.

摘要: 为了得到大厚度连续摊铺下基层的塑性变形规律,解决大厚度基层连续摊铺技术缺乏施工平整度控制标准的问题。采用 D-P 屈服准则,研究改进了增量弹性 Duncan-Chang 模型;利用三轴剪切试验及现场试验段检测得到未养生水稳混合料的屈服极限为 220 kPa,确定初始切线模量为 500 kPa,得到了未养生水泥稳定碎石基层施工期内的变形值预估公式;其次计算了路面最不利位置下重复荷载作用次数,并引入 Wolff 和 Visser 永久变形预估模型得到下层施工位移预估模型;最后通过研究平整度传递规律及施工车辆对双层连续摊铺下基层扰动的影响,提出了连续摊铺平整度控制原则:连续摊铺层中、下层应按下一级层位施工标准进行平整度控制,其它层位按照传统摊铺施工标准进行控制。

入藏号: CSCD:6560689

地址: Fang Naren, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Xuancang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Ye Hongyu, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Chunan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 房娜仁, 长安大学公路学院, 西安, 陕西 710064, 中国.

王选仓, 长安大学公路学院, 西安, 陕西 710064, 中国.

叶宏宇, 长安大学公路学院, 西安, 陕西 710064, 中国.

张春安, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: 834905475@qq.com; wxc2005@163.com

电子邮件地址: 834905475@qq.com; wxc2005@163.com

使用次数 (最近 180 天): 0

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作者: Li Hao; Xu Xinquan; Liu Feng; Gong Yaobin

作者: 李浩; 许新权; 刘锋; 龚晓斌

标题: Comparative Analysis of Pavement Mechanical Response of Four Kinds of Contact Forms of Uniformly-Distributed Load

标题: 四种均布荷载接触形式的路面力学响应对比分析

来源出版物: 重庆交通大学学报. 自然科学版 卷: 38 期: 8 页: 53-58 出版年: 2019

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作者关键词: road engineering; asphalt pavement; uniform load; contact form; mechanical response

作者关键词: 道路工程; 沥青路面; 均布荷载; 接触形式; 力学响应

摘要: Based on the structure type of Yunluo expressway test road, ANSYS was used to establish a three-dimensional finite element model. The response of asphalt pavement mechanical index under four kinds of contact forms of uniformly distributed load such as rectangle, square, circle and ellipse under static loading was compared and analyzed. And the influence of load form on pavement structure design was also analyzed. The research results show that compared with the double circular uniformly-distributed load in the current code, the fatigue life calculated by the rectangular load is greatly different. The simplified form of rectangular load is not recommended in the structural design of asphalt pavement. Under square and elliptical loads, the response of each index is similar to that of circular loads. The design of asphalt pavement with square load is more secure than the specification, and the design of asphalt pavement with oval load is not as safe as the specification. Considering the convenience of mesh division in finite element calculation, the simplified form of square load can be adopted.

摘要: 以云罗高速公路试验路结构型式为基础, 利用 ANSYS 建立三维有限元模型, 对比分析静态作用下矩形、正方形、圆形、椭圆形四种均布荷载接触形式下沥青路面力学指标响应, 并分析了荷载形式对路面结构设计的影响。研究表明: 与现行规范中的双圆均布荷载相比, 矩形荷载计算的疲劳寿命与规范相差较大, 在进行沥青路面结构设计时, 不建议采用矩形

荷载简化形式;方形、椭圆形荷载作用下,各指标的响应同圆形荷载相差不大,采用方形荷载设计沥青路面较规范更安全,采用椭圆形荷载设计沥青路面不如规范安全性高;考虑到有限元计算中网格划分的便利性,可采用方形荷载简化形式进行路面设计。

入藏号: CSCD:6555630

地址: Li Hao, School of Highway,Chang'an University;;Guangdong Hualu Communications Technology Co. Ltd., ;, Xi'an;;Guangzhou, Shanxi;;Guangdong 710064;;510420.

Xu Xinquan, Guangdong Hualu Communications Technology Co. Ltd., Guangzhou, Guangdong 510420, China.

Liu Feng, Guangdong Hualu Communications Technology Co. Ltd., Guangzhou, Guangdong 510420, China.

Gong Yaobin, School of Civil Engineering,Guangzhou University, Guangzhou, Guangdong 510006, China.

地址: 李浩, 长安大学公路学院;;广东华路交通科技有限公司, ;, 西安;;广州, 陕西;;广东 710064;;510420, 中国.

许新权, 广东华路交通科技有限公司, 广州, 广东 510420, 中国.

刘锋, 广东华路交通科技有限公司, 广州, 广东 510420, 中国.

龚尧斌, 广州大学土木工程学院, 广州, 广东 510006, 中国.

电子邮件地址: hao_li_20007@163.com

电子邮件地址: hao_li_20007@163.com

使用次数 (最近 180 天): 0

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作者: Luo Gang; Pan Shaokang; Zhang Yulong; Chen Liang

作者: 罗刚; 潘少康; 张玉龙; 陈亮

标题: Settlement and deformation law of a double-track shield tunnel underpass airport expressway

标题: 双线盾构隧道下穿机场高速沉降及变形规律

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作者关键词: tunnel engineering; shield tunnel; underpass airport expressway; numerical

simulation; Peck formula; low of deformation and settlement

作者关键词: 隧道工程; 盾构隧道; 下穿机场高速; 数值模拟; Peck 公式; 沉降变形规律

摘要: To analyze the impact of expressway pavement and the stability of a cutting slope when constructing a shield tunnel under an expressway and determining the feasibility of the shield construction method, the construction of the shield tunnel under the airport expressway of the Xi'anbei Railway Station as part of the Xi'an Xianyang International Airport Intercity Railway Project was taken as the research object and explored deformation rules of the expressway cutting slope, pavement, and tunnel structure was studied. The superimposed Peck formula was used to calculate the subsidence law of the ground caused by the underpass of a double line shield tunnel. In the Code for Design of Metro (GB 50157-2013) (shorter for code), a concept was termed diameter deformational rate in the radial direction of the subway tunnel lining structure. This concept was used to calculate the horizontal and vertical diameter deformational rates of the tunnel. Furthermore, the finite difference software FLAC3D was used to simulate the excavation process of the double-track shield tunnel and the deformation rules of the expressway cutting slope pavement and tunnel structure were explored, respectively. The results show that the maximum settlement of the pavement appears at the foot of the south slope when the right-line tunnel excavation is directly below the airport expressway, the value is 6.2 mm. The maximum settlement of the slope is 7 mm and it appears immediately above the middle of the double-track shield tunnel. After the double-track shield tunnel penetrates through, the maximum vertical displacement and the maximum horizontal displacement of the structure are 14.86 and 12.25 mm, respectively. The horizontal and vertical diameter deformational rates of the tunnel lining structure are 0.20 and 0.24%, respectively, which are near each other and meet the code requirements. Depending on the displacement control limit of the airport expressway pavement, the shield construction method meets the deformational requirements of the pavement. The results of this study provide a reference for the construction of a shield section. Meanwhile, it can be a mirror of the same type of approaching construction. 2 tabs, 16 figs, 23 refs.

摘要: 为了研究双线盾构隧道近距离下穿既有高速公路时,对高速公路路面和路堑边坡稳定性的影响,论证盾构下穿工法的可行性,以西安北客站-西安咸阳国际机场城际轨道项目盾构隧道下穿机场高速公路施工为研究对象,对高速公路路堑边坡、路面及隧道结构的变形规律进行研究。采用叠加的 Peck 公式计算了双线盾构隧道下穿引起地表沉降的规律,引入《地铁设计规范》(GB 50157-2013)(下文简称规范)中地铁隧道衬砌结构径向直径变形率的概念,对隧道水平和竖向的直径变形率进行计算,进一步通过有限差分软件 FLAC3D 对双线盾构隧道下穿施工过程进行三维数值模拟,分别研究高速公路路堑边坡、路面及隧道结构的变形规律。研究表明:路面最大沉降出现在右线掘进至机场高速公路正下方时的南侧坡脚,其值为 6.2 mm;边坡的最大沉降为 7 mm,出现在双线盾构隧道中间的正上方;双线盾构隧道贯通后,结构的最大竖向位移和最大水平位移分别为 14.86、12.25 mm,隧道衬砌结构的水平和竖向直径变形率分别为 0.20%、0.24%,两者较接近且满足规范要求。根据机场高速公路路面的位移控制限值,此次盾构施工法满足路面的变形要求,所得的计算结果为该区间的盾构隧道施工提供了参考,亦可对类似的近接工程施工起到借鉴作用。

入藏号: CSCD:6555496

地址: Luo Gang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Pan Shaokang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Yulong, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Liang, School of Civil Engineering, Changsha University of Science & Technology;;Guangxi

Communications Investment Group Co.,Ltd., ;, Changsha;;Nanning, Hunan;;Guangxi 410114;;530022.

地址: 罗刚, 长安大学公路学院, 西安, 陕西 710064, 中国.

潘少康, 长安大学公路学院, 西安, 陕西 710064, 中国.

张玉龙, 长安大学公路学院, 西安, 陕西 710064, 中国.

陈亮, 长沙理工大学土木与建筑学院;;广西交通投资集团有限公司, ;, 长沙;;南宁, 湖南;;广西 410114;;530022, 中国.

电子邮件地址: luogang@chd.edu.cn

电子邮件地址: luogang@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Wang Lu; Li Longfei; Liu Yuwen; Li Huaen

作者: 王露; 李龙飞; 刘玉雯; 李华恩

标题: Driving stability along a bridge and tunnel connection segment under rain and snow conditions

标题: 雨雪气象条件下桥隧连接段行车稳定性

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作者关键词: traffic engineering; driving stability; Carsim simulation; bridge and tunnel connecting segment; rain and snow condition

作者关键词: 交通工程; 行车稳定性; Carsim 仿真; 桥隧连接段; 雨雪气象条件

摘要: To ease traffic safety operational problems of a bridge and tunnel connection segment under rain and snow conditions, Carsim simulation analysis software was used to establish a three-dimensional vehicle-road model. Using the two evaluation indexes of lateral offset and yaw rate, the driving stability of a class C standard vehicle along the bridge and tunnel connection segment under rain and snow conditions was systematically analyzed. Then, the influence of vehicle speed, road friction coefficient, and road circular curve radius on the operational and lateral stability was quantitatively analyzed. The results show that the evaluation of vehicle

stability by lateral offset and yaw rate is consistent. The smaller and more stable the value of lateral offset and yaw rate, the safer the vehicle driving. The vehicle speed is negatively correlated and the road friction coefficient, and the circular curve radius are positively correlated with the driving stability. In other words, decreasing the vehicular speed and increasing the road friction coefficient and road circular curve radius can effectively reduce the vehicle lateral offset. Under the special driving environment of a bridge and tunnel connection segment under rain and snow conditions, the design speed of the vehicle is reduced by 6.25% (from 80 to 75 km/h.), the road friction coefficient increases to 0.21, or if the minimum circular curve limit radius increases by 6% (from 250 to 265 m), the vehicle is not subject to sharp side slip, and the stability and safety of vehicles is improved. This study provides a reference for mountain highway design and traffic operational management. 1 tab, 21 figs, 22 refs.

摘要: 为了缓解雨雪气象条件下桥隧连接段的交通安全运行问题,采用 Carsim 仿真分析软件,建立车辆-道路三维模型,通过侧向偏移量和横摆角速度 2 个评价指标,系统地模拟分析雨雪气象条件下 C 级标准车在桥隧连接段行驶的稳定性和定量分析行车速度、路面摩擦因数、圆曲线半径对桥隧连接段行车稳定性和车辆横向稳定性能的影响。研究表明:侧向偏移量与横摆角速度对行车稳定性的评价具有一致性,当侧向偏移量和横摆角速度指标的值越小、越稳定,车辆行驶越安全;车辆速度与行车稳定性呈负相关,路面摩擦因数和圆曲线半径与行车稳定性呈正相关,即降低车速、增大路面摩擦因数和圆曲线半径均可有效地减小车辆的侧向偏移量。在雨雪气象条件下桥隧连接段的特殊行车环境下,车辆设计速度由 80 降低至 75 km/h,降低了 6.25%;路面摩擦因数增大至 0.21、圆曲线极限最小半径由 250 增至 265 m,增大了 6%;二者均可保证车辆不发生大幅度侧滑,并能提升车辆行驶的稳定性和安全性,可为山区高速公路设计规划和交通运营管理提供参考。

入藏号: CSCD:6555497

地址: Wang Lu, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Yuwen, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Huaen, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Longfei, Transportation Planning Survey and Design Institute of Shanxi Co., Ltd., Taiyuan, Shanxi 030012, China.

地址: 王露, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘玉雯, 长安大学公路学院, 西安, 陕西 710064, 中国.

李华恩, 长安大学公路学院, 西安, 陕西 710064, 中国.

李龙飞, 山西省交通规划勘察设计院有限公司, 太原, 山西 030012, 中国.

电子邮件地址: 1251058940@qq.com

电子邮件地址: 1251058940@qq.com

使用次数 (最近 180 天): 0

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作者: Feng Zhongju; He Jingbin; Dong Yunxiu; Feng Kai; Zhu Yanming

作者: 冯忠居; 何静斌; 董芸秀; 冯凯; 朱彦名

标题: Analysis on Influence of Rigid Long-short-pile Soft Foundation Pretreatment on Deformation of Adjacent Surcharged Pile Foundation and Treatment Effect Evaluation

标题: 刚性长短桩软基预处理对堆载邻近桩基的变位影响分析及处理效果评价

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作者关键词: bridge engineering; foundation treatment; numerical simulation; soft soil layer; surcharge load; rigid long-short-pile

作者关键词: 桥梁工程; 地基处理; 数值模拟; 软弱土层; 堆载; 刚性长短桩

摘要: When building bridge pile foundation in valley area, it often meets the engineering accident caused by high subgrade filling behind the abutment, which results in the deviation of pile foundation on one side of subgrade, especially when there is the soft soil layer in the underlying soil, the possibility of accident is greatly increased. In order to explore the application effect of rigid long-short-pile in treating the soft soil layer under the side subgrade filling, and analyze the influence of different factors on the treatment performance of rigid long-short-pile and the influence of using rigid long-short-piles on the lateral pile foundation in high subgrade filling, relying on the practical project of Mali River bridge II, the influence of rigid long-short-piles on the stress distribution characteristics of pile foundation at filling side under different layouts and different treatment distances are analyzed by using numerical simulation software Marc. The treatment effects under different conditions are evaluated and the related engineering proposals are proposed accordingly. The result shows that (1) Under surcharge load, the lateral compression deformation of the soft soil layer has a significant influence on the pile displacement, the soil resistance on the pile side and the pile bending moment. There is a significant inflection point of the pile displacement in the depth of 16 m (the interface between soft soil layer and strong weathered rock layer), and the resistance of the pile side soil and the bending moment of the pile body reach a maximum in the depth of 16 m. (2) The change rule of displacements of pile foundation and pile body in different positions is basically the same but the degree of influence is different. The pile closest to the outside of the surcharge load is in the most disadvantageous position, and the bearing capacity of the side pile foundation should be increased properly in the design. (3) Compared with the square and staggered layouts, the quincuncial stakes arranged rigid long-and-short piles have the most significant effect on reducing the influence of lateral compression deformation of the soft soil layer on the bridge pile foundation. (4) The treatment effects of the quincuncial stakes arranged reinforcement area differs significantly under different treatment distances. The treatment distance range of the reinforcement area should not be too close to or too far away from the pile foundation, and the treatment effect of 8 m distance is

optimal.

摘要: 在河谷地区修建桥梁桩基础时,常会遇到因桥台后高路基填土而导致路基一侧桩基础发生偏位的工程事故,尤其是当地基土中存在软弱土层时,发生事故的可能性大大增加。为探明刚性长短桩在处理侧方路基填土下软弱土层时的应用效果,研究不同因素对刚性长短桩处理效果的影响以及采用刚性长短桩处理对高路基填土侧桩基础的影响,依托马里河 II 桥实体工程,采用数值模拟软件 Marc 分析了不同布置形式和不同处理距离下的刚性长短桩对填土侧桩基础受力分布特性的影响,对不同工况的处治效果进行了工程评价并依此提出了相关的工程建议。结果表明:堆载作用下,软弱土层的侧向挤压变形对桩身位移、桩侧土抗力和桩身弯矩等均有明显影响,桩身位移在 16 m (即软土层与强风化岩层的分界面)处出现明显拐点,桩侧土抗力和桩身弯矩在 16 m 处达到最大值;不同距离下的桩基桩身位移等各项数值变化规律基本一致但影响程度大小不同,最靠近堆载外侧的桩处于最不利位置,设计时可适当提高边侧桩基的承载性能;梅花桩布置形式的刚性长短桩相较于正方形布置和交错布置对减少软弱土层侧向挤压变形对桥梁桩基础影响的效果最显著;梅花形布置形式的加固区在不同处理距离下的处治效果差异显著,加固区处理距离范围不宜距离桩基础过近,也不宜过远,8 m 左右距离的处理效果最优。

入藏号: CSCD:6550095

地址: Feng Zhongju, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

He Jingbin, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Dong Yunxiu, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Feng Kai, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhu Yanming, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 冯忠居, 长安大学公路学院, 西安, 陕西 710064, 中国.

何静斌, 长安大学公路学院, 西安, 陕西 710064, 中国.

董芸秀, 长安大学公路学院, 西安, 陕西 710064, 中国.

冯凯, 长安大学公路学院, 西安, 陕西 710064, 中国.

朱彦名, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: ysf@gl.chd.edu.cn

电子邮件地址: ysf@gl.chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 1

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作者: Li Yuanjun; Wu Xiaoguang; Huang Cheng; Xiao Kailong; Ying Yue

作者: 李院军; 邬晓光; 黄成; 肖凯龙; 殷悦

标题: Calculation of transverse load distribution coefficient of assembled girder bridge considering main girder damage

标题: 考虑主梁损伤的装配式梁桥荷载横向分布系数计算

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作者关键词: 桥梁工程; 装配式梁桥; 荷载横向分布系数; 非线性回归分析

摘要: In order to calculate the transverse load distribution coefficients of assembled girder bridges under the condition of main girder damage, based on the load test data of 12 assembled T-girder and small box girder bridges, the measured values of the transverse load distribution coefficients were obtained. Considering the three key factors of vertical fundamental frequency, linear stiffness and width-span ratio, one was introduced. The damage reduction coefficient of main girder was fitted by the multivariate nonlinear regression analysis method of matlab software, and a calculation method of load transverse distribution coefficient considering the mechanical performance of the bridge is obtained. The calculation results were compared with the actual bridge data, finite element method (ANSYS) and traditional calculation methods. The results show that the calculation results of load transverse distribution coefficients of assembled girder bridges considering main girder damage are close to the actual bridge data.

摘要: 为了计算在役装配式梁桥发生主梁损伤情况下的荷载横向分布系数,以 12 座装配式 T 梁和小箱梁桥为背景,通过实桥荷载试验数据,得出荷载横向分布系数实测换算值;同时考虑竖向基频、线刚度和宽跨比 3 个关键因素,引入一个主梁损伤折减系数 β_{tak} ,通过 matlab 软件多元非线性回归分析法拟合,得到一种考虑桥梁受力性能的荷载横向分布系数的计算方法,并与实桥数据、有限元法(ANSYS)及传统计算方法的计算结果进行对比。研究结果表明:考虑主梁损伤的装配式梁桥荷载横向分布系数的计算方法的计算结果与实桥数据较为接近。

入藏号: CSCD:6547041

地址: Li Yuanjun, School of Highway, Changan University, Xian, 710064.

Wu Xiaoguang, School of Highway, Changan University, Xian, 710064.

Huang Cheng, School of Highway, Changan University, Xian, 710064.

Xiao Kailong, School of Highway, Changan University, Xian, 710064.

Ying Yue, School of Highway, Changan University, Xian, 710064.

地址: 李院军, 长安大学公路学院, 西安, 陕西 710064, 中国.

邬晓光, 长安大学公路学院, 西安, 陕西 710064, 中国.

黄成, 长安大学公路学院, 西安, 陕西 710064, 中国.

肖凯龙, 长安大学公路学院, 西安, 陕西 710064, 中国.

殷悦, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: wxgwst.cn@126.com

电子邮件地址: wxgwst.cn@126.com

使用次数 (最近 180 天): 0

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作者: Yang Xiaohua; Wan Qi; Liu Dapeng; Bao Han

作者: 杨晓华; 万琪; 刘大鹏; 包含

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作者关键词: road engineering; low embankment; model test; dynamic characteristic; stress; strain

作者关键词: 道路工程; 低路堤; 模型试验; 动力特性; 应力; 应变

摘要: Based on the Sanchakou-Shache Expressway in Xinjiang, the subgrade model test with 1 : 1 ratio was carried out within the influence range of one wheel for the standard axle load, and the dynamic characteristics of low embankment were studied under vehicle load. The different moisture content states of the subsoil in service in the oasis area were considered, the low embankment road structure was divided into four parts, including pavement, base, subgrade, and subsoil according to the general road design standards, the dynamic characteristics of low embankment under different loads were simulated, and the effects of peak values, frequencies and repetition times of dynamic loads on the dynamic characteristics were studied. Research result indicates that the vertical stresses under different loading cases decrease rapidly with the increase of subgrade depth, and attenuate by 69.2% at the depth of 0.8m. The stresses at different depths vary linearly with the static and short-term dynamic load, while the strains show a nonlinear trend. Due to the modulus difference of different soil layers, the strains appear obvious stratification in the subgrade and subsoil. The change of water content of the subsoil has obvious influence on the dynamic characteristics of low embankment, and the strain at the top of the subsoil increases by 1.8 times when the water content increases from 18% to 28%. The increase of short-term dynamic load frequency has little effect on the stress and strain, and they decrease by 7% and 9%, respectively when the frequency increases from 1Hz to 5Hz at the tops of the subgrade and subsoil. When the peak values of static load, short-term dynamic load and long-term dynamic load are 50kN at the tops of the subgrade and subsoil, the stress and strain under the short-term dynamic load are 79%-95% and 75%-95% of the values under the static load, respectively, while the stress and strain caused by the long-term dynamic load are 1.02-1.11 and 1.9-3.3 times of the values

under the static load, respectively. 2 tabs, 12 figs, 29 refs.

摘要: 以新疆三岔口-莎车高速公路为依托,基于标准轴载作用下单轮影响范围内的 1:1 路基模型试验,分析了车辆荷载下低路堤的动力特性;考虑了绿洲区地基在服役期间不同的含水率状态,根据一般道路设计标准,将低路堤道路结构分为面层、基层、路基与地基四部分,模拟了低路堤在不同荷载作用下的动力特性,研究了动载峰值、频率与重复作用次数对低路堤动力特性的影响。研究表明:不同加载方式下的竖向应力均随路基深度增大而迅速减小,应力在距路基顶面 0.8m 深度处均衰减了 69.2%;静载和短时动载作用下各深度处的应力随荷载呈线性变化趋势,应变则呈非线性变化趋势;由于不同土层模量的差异,使得应变在路基与地基中出现了明显的分层现象;地基含水率的变化对低路堤动力特性的影响非常明显,当地基含水率从 18%增大到 28%时,地基顶面处的应变增大了 1.8 倍;短时动载频率的增大对应力和应变的影响都很小,当动载频率由 1Hz 增大到 5Hz 时,路基与地基顶面处的应力分别减小了 7%和 9%;当静载、短时动载和长时动载的峰值为 50kN 时,短时动载峰值作用下路基与地基顶面处的应力和应变分别是静载作用的 79%~95%和 75%~95%,而长时动载引起的路基与地基顶面处的应力和应变分别是静载作用的 1.0~1.1 倍和 1.9~3.3 倍。

入藏号: CSCD:6532719

地址: Yang Xiaohua, School of Highway, Changan University, Xian, Shaanxi 710064, China.

Wan Qi, School of Highway, Changan University, Xian, Shaanxi 710064, China.

Bao Han, School of Highway, Changan University, Xian, Shaanxi 710064, China.

Liu Dapeng, School of Highway, Changan University;; School of Construction Management, Jiangsu Vocational Institute of Architectural Technology, ;; Xian;; Xuzhou, Shaanxi;; Jiangsu 710064;; 221116.

地址: 杨晓华, 长安大学公路学院, 西安, 陕西 710064, 中国.

万琪, 长安大学公路学院, 西安, 陕西 710064, 中国.

包含, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘大鹏, 长安大学公路学院;; 江苏建筑职业技术学院建筑管理学院, ;; 西安;; 徐州, 陕西;; 江苏 710064;; 221116, 中国.

电子邮件地址: xiaohuay@126.com; wanqi77@163.com

电子邮件地址: xiaohuay@126.com; wanqi77@163.com

使用次数 (最近 180 天): 0

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作者: Feng Zhongju; Hu Haibo; Wang Fuchun; Xu Zhanhui; Yao Xianhua; Liu Ning

作者: 冯忠居; 胡海波; 王富春; 徐占慧; 姚贤华; 刘宁

标题: Field simulation test of bridge pile foundation damage in high altitude and strong salt marsh area

标题: 高海拔强盐沼泽区桥梁桩基损伤现场模拟试验

来源出版物: 交通运输工程学报 卷: 19 期: 3 页: 46-57 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: bridge engineering; strong salt marsh area; bridge pile foundation; simulation test; influencing factors of corrosion; erosion resistance coefficient; damage microscopic mechanism

作者关键词: 桥梁工程; 强盐沼泽区; 桥梁桩基; 模拟试验; 腐蚀影响因素; 抗侵蚀系数; 损伤微观机理

摘要: In order to explore the damage status of highway bridge pile foundation subjected to dry-wet cycle and freeze-thaw cycle in high altitude and strong salt marsh area, the effects of pile body positions, concrete mix proportions, concrete admixtures and external protective measures on the mechanical properties of bridge pile foundation were studied by the field simulation test. The microscopic mechanism of pile foundation damage was analyzed by the SEM analysis, EDS analysis and chemical composition analysis. Research result shows that the anti-erosion ability and inner steel bar corrosion of pile foundation concrete are affected by the position of pile body. For the benchmark concrete specimens, when the curing age is 360d, the erosion resistance coefficients of pile foundation concrete in the water, on the ground, and at the depths of 0.25 and 1.25 m are 0.80, 0.63, 0.75, and 0.76, respectively, and the corrosion rates of steel bar area at the corresponding positions are 76%, 91%, 66%, and 65%, respectively. The anti-erosion ability of pile foundation concrete is affected by the concrete mix proportion and concrete admixture, and the anti-erosion ability of the concrete with slag is the strongest on the whole. When the contents of sand, water, gravel, reducer, cement, rust inhibitor, and expansion agent are consistent, the average erosion resistance coefficients of concrete specimens with 87.25 kg·m⁻³ fly ash, 21.8 kg·m⁻³ silica ash, and 87.25 kg·m⁻³ slag are 0.79, 0.89, and 0.91 at the curing age of 360d, respectively. The steel casing has a protective effect on the concrete erosion in a short time, but the protection period under long-term erosion is generally 2-3 years. When the curing age changes from 90d to 360d, the mass fraction of element C in pile foundation concrete increases from 0 to 9.61%, so that more and more CaCO₃ molecules are produced, together with the expansion of ettringite and other crystals, resulting in the swelling and cracking of pile foundation concrete. 7 tabs, 23 figs, 30 refs.

摘要: 为了探明高海拔强盐沼泽区公路桥梁桩基受干湿循环和冻融循环的损伤状况, 采用现场模拟试验, 研究了桩身位置、混凝土配合比、混凝土掺合料与外防护措施等对桥梁桩基力学性能的影响, 采用 SEM 分析、EDS 分析和化学成分分析等手段探究了桩基损伤的微观机理。研究结果表明: 桩基混凝土抗侵蚀能力及其内部钢筋锈蚀受桩身位置影响, 对于基准混凝土试件, 龄期为 360d 时, 水中、地表、地下 0.25 与 1.25m 的桩基混凝土抗侵蚀系数依次为 0.80、0.63、0.75 和 0.76, 对应位置钢筋面积锈蚀率依次为 76%、91%、66% 和 65%; 桩基混凝土抗侵蚀能力受混凝土配合比与掺合料的影响, 整体上掺入矿渣的混凝土抗侵蚀能力最强, 龄期为 360d 时, 当砂子、水、碎石、减水剂、水泥、阻锈剂和膨胀剂的含量一致时, 掺入 87.25 kg·m⁻³ 粉煤灰、21.8 kg·m⁻³ 硅灰、87.25 kg·m⁻³ 矿渣的混凝土试件的抗侵蚀系数分别为 0.79、0.89、0.91; 钢护筒在短期内能保护桩基混凝土不受到外界侵蚀, 在长期侵蚀下保护期限

一般为 2~3 年;从 90d 龄期到 360d 龄期,桩基混凝土中 C 元素的质量分数从 0 增长到 9.61%,生成了越来越多的 CaCO₃ 分子,再加上钙矾石等晶体的膨胀,使得桩基混凝土膨胀开裂。

入藏号: CSCD:6532724

地址: Feng Zhongju, School of Highway,Changan University, Xian, Shaanxi 710064, China.

Hu Haibo, School of Highway,Changan University, Xian, Shaanxi 710064, China.

Wang Fuchun, School of Highway,Changan University, Xian, Shaanxi 710064, China.

Xu Zhanhui, Highway Survey and Design Institute of Qinghai Province, Xining, Qinghai 810008, China.

Liu Ning, Highway Survey and Design Institute of Qinghai Province, Xining, Qinghai 810008, China.

Yao Xianhua, School of Highway,Changan University;;School of Civil Engineering and Communication, North China University of Water Resources and Electric Power, ;;, Xian;;Zhengzhou, Shaanxi;;Henan 710064;;450011.

地址: 冯忠居, 长安大学公路学院, 西安, 陕西 710064, 中国.

胡海波, 长安大学公路学院, 西安, 陕西 710064, 中国.

王富春, 长安大学公路学院, 西安, 陕西 710064, 中国.

徐占慧, 青海省公路科研勘测设计院, 西宁, 青海 810008, 中国.

刘宁, 青海省公路科研勘测设计院, 西宁, 青海 810008, 中国.

姚贤华, 长安大学公路学院;;华北水利水电大学土木与交通学院, ;;, 西安;;郑州, 陕西;;河南 710064;;450011, 中国.

电子邮件地址: ysf@gl.chd.edu.cn

电子邮件地址: ysf@gl.chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Wu Jun; Liu Huanju; Huang Pingming; Han Wanshui; Liu Xiaodong

作者: 武隽; 刘焕举; 黄平明; 韩万水; 刘晓东

标题: Numerical simulation on the whole dynamic process of a typhoon field passing through a long span bridge

标题: 大跨桥梁台风风场全过程动态数值模拟

来源出版物: 振动与冲击 卷: 38 期: 14 页: 260-266 出版年: 2019

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作者关键词: typhoon; numerical simulation; whole dynamic process simulation; time-varying wind direction

作者关键词: 台风; 数值模拟; 动态全过程模拟; 时变风向

摘要: The whole dynamic process of a typhoon field passing through a bridge was simulated in the aspects of speed and direction. Based on the Batts model, typhoon attenuation model and regularity of wind profile, the time-varying mean speed of the typhoon was simulated. The harmonic synthesis method was improved in terms of evolutionary spectrum to simulate the fluctuating speed, and a dynamic simulation method for typhoon speed was constructed. According to the geometric relationship between bridge nodes and the attenuated typhoon field, the time-varying wind directions at bridge nodes were determined, and a dynamic simulation method for wind direction was built. Taking a typical cable-stayed bridge as an example, the applicability of the whole process simulation method for the typhoon field around the long-span bridge was studied. The results show that the established simulation method can take into account the non-stationary property, intensity attenuation and direction variation of the typhoon, and can be applied to the simulation of typhoon field around the long span bridge; during the period when the typhoon passes through the bridge, the wind direction at each node experiences remarkable change which can even reach 180 degree. The wind direction at each node is different and time-varying; and the wind direction experienced by the bridge undergoes a continuous change from the one side of the main beam to a circulation that makes the main beam rotate and finally to the other side.

摘要: 从风速和风向两个角度对台风经过桥梁区域全过程的三维风场进行动态模拟。基于 Batts 模型、台风衰减模型及风剖面规律对时变平均风速进行模拟,采用进化谱理念改进谐波合成法对脉动风速进行模拟,构建台风风速动态模拟方法。依据桥梁节点与衰减风场的位置关系,动态确定桥梁各节点任意时刻时变风向,构建大跨桥梁台风风向全过程动态模拟方法。以一座典型斜拉桥为例,研究了大跨桥梁台风风场全过程模拟方法的适用性。结果表明:建立的模拟方法可考虑台风非平稳、强度衰减和风向时变,适用于大跨桥梁台风风场模拟;台风经过桥梁时段,各节点上的风力方向经历了可达 180° 的显著的变化,各节点风向不同,且均具有时变性;桥梁整体所受风向经历了由集中于主梁一侧到使桥梁转动的环流风向再到集中于主梁另一侧的连续变化。

入藏号: CSCD:6536294

地址: Wu Jun, Highway School, Changan University, Xian, 710064.

Huang Pingming, Highway School, Changan University, Xian, 710064.

Han Wanshui, Highway School, Changan University, Xian, 710064.

Liu Xiaodong, Highway School, Changan University, Xian, 710064.

Liu Huanju, School of Civil Engineering, Hebei University of Engineering, Handan, Hebei 056038, China.

地址: 武隽, 长安大学公路学院, 西安, 陕西 710064, 中国.

黄平明, 长安大学公路学院, 西安, 陕西 710064, 中国.

韩万水, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘晓东, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘焕举, 河北工程大学土木工程学院, 邯郸, 河北 056038, 中国.

使用次数 (最近 180 天): 0

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作者: Dai Xuezheng; Yuan Renteng; Pei Wenjie; Peng Zhipeng

作者: 戴学臻; 苑仁腾; 裴文杰; 彭志鹏

标题: Discrimination of Urban Road Traffic Based on Set Pair Analysis

标题: 基于集对分析的城市道路交通运行状况判别

来源出版物: 重庆交通大学学报. 自然科学版 卷: 38 期: 7 页: 96-101,118 出版年: 2019

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作者关键词: traffic engineering; urban road; traffic flow; running state; set pair analysis

作者关键词: 交通工程; 城市道路; 交通流; 运行状态; 集对分析

摘要: In order to improve the traditional way of judging the operation status of urban road traffic, a method of judging the operation state of urban road traffic based on set pair analysis and triangular fuzzy number α -cut set was proposed, according to the analysis of the evaluation method of traffic operation state at home and abroad. In the proposed method, the average travel speed, the ratio of road congestion mileage, the ratio of travel time and the ratio of road network delay time were taken as the discriminant indexes. Set pair $H(A_n, B_k)$ was composed of set A_n (measured data) and set B_k (criteria for discriminating indicators), furthermore, the hierarchical relationship between similarities, differences and inverses of set pair theory was analyzed. Based on the coupling of set pair analysis and triangular fuzzy number α -cut set, the expression of connection degree was constructed, and the comprehensive evaluation model of weight and construction connection number was determined. Taking the measured data of the eastern section of the South Second Ring Road in Xi'an as an example, the proposed method was proved to be more accurate to reflect the road operation, through comparison and analysis with the traditional evaluation results.

摘要: 为改进传统的城市道路交通运行状态判别方法, 首先在分析国内外交通运行状态评价方法的基础上, 提出了基于集对分析与三角模糊数 α -截集耦合的城市道路交通运行状态判别方法。该方法以车辆平均行程车速、道路拥堵里程比例、行程时间比、道路网延误时间比作为判别指标。将集合 A_n (实测数据) 与集合 B_k (判别指标标准构成) 构成集对 $H(A_n, B_k)$, 从而对集对理论同异反层次结构关系进行分析。构建了基于集对分析与三角模

糊数 α -截集耦合的联系度表达式,确定了权重与构建联系数综合评价模型。以西安市南二环东段实测数据为例,通过与传统评价结果对比分析证明了该方法可更加准确地反映道路运行状态。

入藏号: CSCD:6533471

地址: Dai Xuezheng, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Yuan Renteng, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Peng Zhipeng, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Pei Wenjie, Nuclear Industry Southwest Survey & Design Institute Co.,Ltd., Chengdu, Sichuan 640000, China.

地址: 戴学臻, 长安大学公路学院, 西安, 陕西 710064, 中国.

苑仁腾, 长安大学公路学院, 西安, 陕西 710064, 中国.

彭志鹏, 长安大学公路学院, 西安, 陕西 710064, 中国.

裴文杰, 核工业西南勘察设计研究院有限公司, 成都, 四川 640000, 中国.

电子邮件地址: 699855166@qq.com; 643215506@qq.com

电子邮件地址: 699855166@qq.com; 643215506@qq.com

使用次数 (最近 180 天): 0

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作者: Song Liang; Wang Xuancang

作者: 宋亮; 王选仓

标题: Salt Heaving Deformation Rule and Mechanism of Cement Stabilized Base of Saline Areas in Xinjiang

标题: 新疆盐渍土地区水泥稳定基层盐胀变形规律及机理

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作者关键词: road engineering; salt heaving deformation; indoor simulation; cement stabilized base; sulfate

作者关键词: 道路工程; 盐胀变形; 室内模拟; 水泥稳定基层; 硫酸盐

摘要: In order to further clarify the influence rule of sulfate on expansion deformation of cement stabilized base, based on the theory of sulfate crystallization expansion, the salt heaving test of cement stabilized gravel mixture is designed. The salt heaving rules of cement stabilized base

material under different sulfate content and environmental humidity conditions are studied systematically. The salt heaving mechanism of cement stabilized base material is revealed. The reasonable control range of sulfate content in cement stabilized base mixture is put forward. The result shows that (1) with the increase of sulfate content in the mixture, the deformation of cement stabilized base material changed from negative value without sulfate to positive value. (2) When the sulfate content is less than 1.0%, the salt heaving ratio of the mixture increased by 0.012 1% with the increase of 0.25% sulfate content. (3) In the temperature range of 5 ~ 20 °C, the salt heaving deformation of cement stabilized base material increased rapidly with the decreasing of temperature, and the salt heaving deformation reached the maximum at about 10 °C. (4) With the increase of environmental humidity, the increase of salt heaving deformation of cement stabilized base material is mainly determined by the sulfate content of the mixture, the expansion deformation is significantly affected by humidity when the sulfate content is 1.0%. (5) Sulfate aggregation and crystallization occurred in the cement stabilized base material with sodium sulfate. After crystallization, the crystal morphology changed greatly, most of them suspended between solid particles, and the volume expanded remarkably. When the expansion force is greater than the bonding force between micro-solid particles, the distance between particles will increase, thus showing the macro-expansion deformation. (6) There is a good exponential relationship between sulfate content and expansion of cement stabilized base material, and the correlation coefficient is above 0.97. (7) Sulfate content in cement stabilized base should be controlled less than 0.136%.

摘要: 为进一步明确硫酸盐对水泥稳定基层膨胀变形的影响规律,基于硫酸盐结晶膨胀理论,设计了水泥稳定砂砾混合料盐胀试验,系统研究了不同硫酸盐含量和环境湿度条件下水泥稳定基层材料的盐胀规律,揭示了水泥稳定基层材料的盐膨胀机理,提出了水泥稳定基层混合料中硫酸盐含量的合理控制范围。结果表明:随混合料含盐量的增加,水泥稳定基层材料变形量从不含盐时的负值变为正值;当含盐量小于 1.0%时,混合料每增加 0.25%的含盐量,其盐胀率将增大 0.012 1%左右;在 5 ~ 20 °C温度范围内,水泥稳定基层材料的盐胀变形随温度的不断降低而快速增长,且在 10 °C左右,其盐胀变形量达到最大;随环境湿度的增加,水泥稳定基层材料盐膨胀变形量的增大幅度主要由混合料含盐量决定。当含盐量为 1.0%时,膨胀变形量受湿度的影响较为显著;含硫酸钠水泥稳定基层材料发生了盐分聚集和结晶作用,结晶后晶体形态变化较大,多数悬浮于固体颗粒之间,且体积显著膨胀,当膨胀力大于微观固体颗粒间的联结力时,便会造成颗粒距离增大,从而在宏观上表现出膨胀变形;水泥稳定基层材料含盐量与其膨胀量存在良好的指数关系,相关系数 0.97 以上;水泥稳定砂砾混合料中硫酸含盐量宜控制在 0.136%以内。

入藏号: CSCD:6530636

地址: Song Liang, School of Highway, Chang'an University;; Xinjiang Transportation Planning Surveying and Design Institute, ;; Xi'an;; Urumqi, Shaanxi;; Xinjiang 710064;; 830006.

Wang Xuancang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 宋亮, 长安大学公路学院;; 新疆维吾尔自治区交通规划勘察设计研究院, ;; 西安;; 乌鲁木齐, 陕西;; 新疆 710064;; 830006, 中国.

王选仓, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: 3359559@qq.com

电子邮件地址: 3359559@qq.com

使用次数 (最近 180 天): 0

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作者: Xia Quanping; Gao Jiangping; Chen Luchuan; Wang Aitao

作者: 夏全平; 高江平; 陈鲁川; 王爱涛

标题: Distribution of Soil Pressure on Back of Suspension Anchor Retaining Wall

标题: 路基悬锚式挡土墙墙背土压力分布

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作者关键词: road engineering; suspended anchor retaining wall; comparative analysis; soil pressure; measured data

作者关键词: 道路工程; 悬锚式挡土墙; 对比分析; 土压力; 实测数据

摘要: Suspension anchor retaining wall is a new type of retaining wall. Due to the distribution of soil pressure on the back of the wall is different from that on the conventional retaining wall, the existing formula cannot be used to calculate it. According to its force characteristics, combining with the needs of the project research and the actual situation of the support project, determining the working conditions of the wall height as 8,9,10 m, the field test and the tracking test on the stress and the distribution of soil pressure on the back of suspended anchor retaining wall of subgrade are carried out. The soil pressure on the back of the suspended anchor retaining wall is analyzed by the measured data and the structural characteristics of practical project, which is compared with the design value and the value calculated by the improved formula. The result shows that (1) the soil pressure of the measuring points on the back of suspended anchor retaining wall of subgrade gradually increases with time and tends to stability, it shows 3-stage nonlinear distribution along the wall height; (2) the approximate distribution figure of the soil pressure on the wall back can be obtained referring to the calculation method of existing anchor plate retaining wall, but it must be modified, and the soil pressure coefficient should be 1.2 - 1.4; (3) to improve the force uniformity of the back of the retaining wall and the overall stability of the retaining wall, the distance between the height of the first layer anchor and the bottom slab should be 1/3 height of the retaining wall and should not be more than 2.5 m in the distance from the bottom slab, and the height difference between each anchor rod layer is 2.5 - 3 m; (4) because the soil pressure on the anchor rod at the top of wall back is small, so the height of the top anchor rod should be set as the 1/3H to the wall top, and the suitable height should be 2 - 3 m; (5) the heights

of double-layer anchor rod and anchored plate type building of the retaining wall should be 6 - 10 m, and the height of 3-layer anchor rod and anchored plate type building should be 10 - 12 m.

摘要: 路基悬锚式挡土墙是一种新型的挡土墙,其墙背土压力分布与常规挡土墙墙背土压力分布规律不同,不能套用现有的公式进行计算。根据其受力特点,结合项目研究的需要和依托工程的实际情况,确定了以墙高 8,9,10 m 这 3 种工况对路基悬锚式挡土墙的墙背受力情况及土压力分布情况进行现场试验和跟踪检测。通过实体工程的实测数据及其结构特点对悬锚式挡土墙的墙背土压力进行了分析,并与墙后土压力设计值及修正后的公式计算值进行了对比。结果表明:路基悬锚式挡土墙各测试点的墙背土压力随时间逐渐增大并趋于稳定,沿墙高呈 3 段式非线性分布;墙背土压力近似分布图形可以参照现有锚定板挡土墙的计算方法得出,但需进行修正,土压力系数宜取 1.2 ~ 1.4;为提高挡土墙墙背的受力均匀性及挡墙的整体稳定性,第 1 层锚杆高度与底板的距离宜为挡墙建筑高度的 1/3 且距离底板不宜大于 2.5 m,各锚杆层间高差宜为 2.5 ~ 3 m;墙背最上层锚杆位置由于受土压力较小,因此最上层锚杆布设高度宜为距墙顶 1/3 高处,且适宜高度为 2 ~ 3 m;悬锚式挡土墙的双层锚杆与锚定板型式建筑高度宜为 6 ~ 10 m,3 层锚杆与锚定板型式建筑高度宜为 10 ~ 12 m。

入藏号: CSCD:6530639

地址: Xia Quanping, School of Highway, Chang'an University;; Highway Bureau of Shandong Transport Department, ;; Xi'an;; Ji'nan, Shaanxi;; Shandong 710064;; 250002.

Gao Jiangping, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Luchuan, Qilu Transportation Development Group Co., Ltd., Ji'nan, Shandong 250000, China.

Wang Aitao, Qilu Transportation Development Group Co., Ltd., Ji'nan, Shandong 250000, China.

地址: 夏全平, 长安大学公路学院;; 山东省交通运输厅公路局, ;; 西安;; 济南, 陕西;; 山东 710064;; 250002, 中国.

高江平, 长安大学公路学院, 西安, 陕西 710064, 中国.

陈鲁川, 齐鲁交通发展集团有限公司, 济南, 山东 250000, 中国.

王爱涛, 齐鲁交通发展集团有限公司, 济南, 山东 250000, 中国.

电子邮件地址: 489522471@qq.com

电子邮件地址: 489522471@qq.com

使用次数 (最近 180 天): 0

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作者: Fang Ying; Xie Weijun; Yang Jianhua

作者: 方滢; 谢玮珺; 杨建华

标题: Preparation and rheological behavior of polyurethane pre-polymer modified asphalt

标题: 聚氨酯预聚物改性沥青的制备及其流变行为

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文献类型: Article

作者关键词: polyurethane pre-polymer modified asphalt; preparation process parameters; optimum dosage; rheological behavior

作者关键词: 聚氨酯预聚物改性沥青; 制备工艺参数; 最佳掺量; 流变行为

摘要: In order to endow good physic-chemical properties to the matrix asphalt and enhance its adaptability under different environmental conditions, the matrix asphalt was modified with polyurethane pre-polymer. The optimal preparation parameters were firstly determined by orthogonal test and visual analysis based on the selected raw materials. On the basis, the optimum dosage of polyurethane pre-polymer modifier was determined by analyzing the influence of polyurethane pre-polymer content on the three major indexes, toughness, storage stability and viscosity index of modified asphalt. Secondly, the rheological behavior of polyurethane pre-polymer modifier asphalt, SBS modified asphalt, SBR modified asphalt and matrix asphalt was compared and analyzed by dynamic shear rheological test (DSR) and bending beam rheological test (BBR). The experimental results show that the optimum preparation parameters of polyurethane pre-polymer modified asphalt are unit preparation amount 400 g, shear rate 4000 r/min, shear temperature 150°C and shear time 40 min. Also, considering the three major indicators of modified asphalt, toughness, storage stability, viscosity index and economy, it is recommended that the optimum dosage of polyurethane pre-polymer modifier was 6%. Moreover, compared with other three kinds of asphalt, polyurethane pre-polymer modified asphalt had the best high temperature performance in the temperature range of 52-82°C, but it was of high temperature sensitivity. At the same time, the elastic property of polyurethane pre-polymer modified asphalt under alternating stress was slightly lower than that of SBS modified asphalt with the best elastic property. In addition, the low temperature rheological properties of polyurethane pre-polymer modified asphalt was slightly lower than that of SBR modified asphalt with the best low temperature performance.

摘要: 为了赋予基质沥青良好的物化性能,增强其在不同环境条件下的适应性,采用聚氨酯预聚物对基质沥青进行改性。基于选择的原材料,首先采用正交试验和直观分析法确定了聚氨酯预聚物改性沥青的最佳制备工艺参数,在此基础上,通过分析聚氨酯预聚物掺量对改性沥青3大指标、韧性、存储稳定性和粘度指标的影响,确定了聚氨酯预聚物改性剂的最佳掺量。其次,借助动态剪切流变试验(DSR)和弯曲梁流变试验(BBR),对比分析了聚氨酯预聚物改性沥青、SBS改性沥青、SBR改性沥青和基质沥青的流变行为。试验结果表明,聚氨酯预聚物改性沥青的最佳制备工艺参数为单位制备量400g、剪切速率4000r/min、剪切温度150°C和剪切时间40min;综合考虑改性沥青3大指标、韧性、存储稳定性、粘度指标和经济性,推荐聚氨酯预聚物改性剂最佳掺量为6%;较其它3种沥青,聚氨酯预聚物改性沥青在52~82°C温度区间内具有最优的高温性能,但其对温度的敏感性最强。同时,聚氨酯预聚物改性沥青在交变应力作用下的弹性性能略低于弹性性能最优的SBS改性沥青。此外,聚氨酯预聚物改性沥青的低温流变性能略低于低温性能最优的SBR改性沥青。

入藏号: CSCD:6530616

地址: Fang Ying, Highway College, Chang'an University, Xi'an, Shaanxi 710064, China.

Yang Jianhua, Highway College, Chang'an University, Xi'an, Shaanxi 710064, China.

Xie Weijun, The 1st Engineer Co.Ltd.of China Railway 12th Bureau Group, Xi'an, Shaanxi 710038, China.

地址: 方滢, 长安大学公路学院, 西安, 陕西 710064, 中国.

杨建华, 长安大学公路学院, 西安, 陕西 710064, 中国.

谢玮珺, 中铁十二局集团第一工程有限公司, 西安, 陕西 710038, 中国.

电子邮件地址: 2934748339@qq.com

电子邮件地址: 2934748339@qq.com

使用次数 (最近 180 天): 0

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作者: Ma Feng; Dong Wenhao; Fu Zhen; Dai Jiasheng; Chang Xiaorong; Wang Boya

作者: 马峰; 董文豪; 傅珍; 代佳胜; 常晓绒; 王博雅

标题: Low temperature performance of compound modified asphalt with SEBS and rubber powder based on rheology

标题: 基于流变学的 SEBS/橡胶粉复合改性沥青低温性能研究

来源出版物: 功能材料 卷: 50 期: 6 出版年: 2019

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作者关键词: SEBS; road engineering; compound modified asphalt; SEBS; rubber powder; low temperature performance

作者关键词: 道路工程; 复合改性沥青; 橡胶粉; 低温性能

摘要: In order to improve the road performance of rubber asphalt in cold regions, SEBS modifier was used to compound the rubber asphalt. The prepared composite modified asphalt with different SEBS content was tested when keeping the rubber powder content unchanged. The low temperature performance of asphalt was tested by bending beam rheometer (BBR), and the creep rate stiffness ratio (m/S) and low temperature continuous grading temperature (T_{LC}) were introduced to evaluate the low temperature performance of composite modified asphalt with different SEBS content. Test results indicate that SEBS modifier could significantly reduce the creep stiffness of asphalt, thus improving the low temperature flexibility of asphalt. And the lower the temperature, the more obvious the improvement was. The flexibility and stress relaxation ability of the composite modified asphalt did not decrease significantly after short-term aging, indicating that the asphalt could maintain good low temperature performance after short-term aging, and SEBS could improve the anti-aging performance of asphalt. After adding

SEBS modifier,the m/S value increased and the TLCvalue decreased significantly.Therefore, SEBS/rubber powder modified asphalt had superior low temperature performance.Through comprehensive comparison,the optimal content of SEBS was 6%.

摘要: 为提高橡胶沥青在寒冷地区的路用性能,选用 SEBS 改性剂对橡胶沥青进行复合改性,在保持橡胶粉掺量一定的情况下制备不同 SEBS 掺量的复合改性沥青,通过弯曲梁流变仪(BBR)对沥青低温性能进行测定,并引入蠕变速率劲度比(m/S)和低温连续分级温度(T_(LC))对不同 SEBS 掺量的复合改性沥青低温性能进行评价。结果表明,SEBS 改性剂可显著降低沥青蠕变劲度,使沥青低温柔性得到改善,且温度越低改善效果越明显;短期老化后复合改性沥青的柔性和应力松弛能力均未出现明显降低,表明短期老化后沥青仍能保持较好的低温性能,SEBS 对沥青抗老化性能具有改善作用;掺加 SEBS 改性剂后,m/S 值有所提高,低温连续分级温度显著降低,表明 SEBS/橡胶粉改性沥青具有优越的低温性能,通过综合比选得出 SEBS 最佳掺量为 6%。

入藏号: CSCD:6530597

地址: Ma Feng, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Dong Wenhao, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Dai Jiasheng, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Fu Zhen, School of Materials Science and Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Chang Xiaorong, School of Materials Science and Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Boya, School of Materials Science and Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 马峰, 长安大学公路学院, 西安, 陕西 710064, 中国.

董文豪, 长安大学公路学院, 西安, 陕西 710064, 中国.

代佳胜, 长安大学公路学院, 西安, 陕西 710064, 中国.

傅珍, 长安大学材料学院, 西安, 陕西 710064, 中国.

常晓绒, 长安大学材料学院, 西安, 陕西 710064, 中国.

王博雅, 长安大学材料学院, 西安, 陕西 710064, 中国.

电子邮件地址: mafeng@chd.edu.cn

电子邮件地址: mafeng@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Niu Yanwei; Cao Hongen; Tang Yingying; Wang Tao

作者: 牛艳伟; 曹宏恩; 汤颖颖; 王涛

标题: Concrete Torsion Shear Creep Experimental Method and Application

标题: 混凝土扭转剪切徐变试验方法及其应用

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作者关键词: 混凝土桥梁; 徐变; 剪切; 扭转; 试验

摘要: To study the effect of shear creep on long-term deformation of large span concrete bridge, aiming at the problem of shear creep coefficient, an experimental device and test method based on torsion was proposed for shear creep test. Three groups of shear creep members were tested to obtain creep coefficient curve lasted in 375 days. And based on the modification of axial compression creep model of current specification, the rules of shear creep progress was analyzed with finite element (FE) analysis verification. The results show that the shear creep test device based on torsion can be used to load the concrete element effectively. And creep coefficient formula deduced from torsion creep can be used for test data analysis. The C30 concrete shear creep ultimate value is 2.26 ~ 2.63 times of specification compression model. The early aged shear creep progressed smaller than compression creep, but accelerated in the later age. Torsion and other significantly shear effected structures should consider shear creep action in creep analysis.

摘要: 为研究大跨径混凝土梁桥在长期变形分析时剪切徐变的影响, 针对剪切徐变系数的取值问题, 提出一种基于扭转的剪切徐变试验装置和测试方法, 并开展三组混凝土试件的剪切徐变试验研究; 获取 375d 的徐变系数曲线, 利用现行规范模型的参数修正, 对剪切徐变的发展规律进行分析, 并通过有限元对结果进行验证. 研究表明: 基于扭转的剪切徐变试验装置可对构件进行有效加载; 通过扭转剪切得到的徐变系数计算公式可用于试验数据分析; C30 混凝土试验剪切徐变终极值为规范轴压徐变终极值的 2.26~2.63 倍, 剪切徐变在受荷早期的发展低于轴压徐变, 但后期逐步加速; 受扭构件等剪切影响显著的结构徐变计算应考虑剪切徐变效应.

入藏号: CSCD:6526707

地址: Niu Yanwei, School of Highway, Changan University, Xian, 710064.

Wang Tao, School of Highway, Changan University, Xian, 710064.

Cao Hongen, China Gezhouba Group, PPP Division, Wuhan, Hubei 430033, China.

Tang Yingying, School of Science, Changan University, Xian, 710064.

地址: 牛艳伟, 长安大学公路学院, 西安, 陕西 710064, 中国.

王涛, 长安大学公路学院, 西安, 陕西 710064, 中国.

曹宏恩, 中国葛洲坝集团 PPP 事业部, 武汉, 湖北 430033, 中国.

汤颖颖, 长安大学理学院, 西安, 陕西 710064, 中国.

电子邮件地址: niuyanwei@163.com

电子邮件地址: niuyanwei@163.com

使用次数 (最近 180 天): 0

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作者: Song Liang; An Chuanfeng; Huang Mei

作者: 宋亮; 安传峰; 黄美

标题: Bonding Property and Evaluation of Basalt Fiber Asphalt Macadam Seal Coat

标题: 玄武岩纤维沥青碎石封层黏结性能及评价

来源出版物: 建筑材料学报 卷: 22 期: 3 页: 440-445 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: road material; asphalt macadam seal coat; basalt fiber; bonding property; grey target decision-making

作者关键词: 道路材料; 沥青碎石封层; 玄武岩纤维; 黏结性能; 灰靶决策

摘要: In order to solve the problems of insufficient interlayer bonding and low temperature cracking of asphalt macadam seal coat, a certain content of basalt fiber was added to the asphalt macadam seal coat and different types of basalt fiber asphalt macadam seal coat were prepared. Through the plate impact test, pull-out test and shear test, the effects of basalt fiber content, length and emulsified asphalt content on the asphalt macadam seal coat bonding property were systematically analyzed. Based on the mixed grey target decision-making method, the comprehensive bonding properties of basalt fiber asphalt macadam seal coat were compared and evaluated. The reasonable amount of each material was further determined, and the bonding properties and service performance of basalt fiber asphalt macadam seal coat were improved. The results show that compared with asphalt macadam seal coat, aggregate loss rate of basalt fiber asphalt macadam seal coat is lower than 11.0%~30.5%, interlaminar pull-out strength and shear strength of it are increased by 11.7%~16.3% and 9.7%~22.4% respectively. Considering the road performance and economic benefits, the optimum content of emulsified asphalt is 1.6kg/m² and the optimum content of basalt fiber is 80g/m².

摘要: 针对现有沥青碎石封层黏结不足、低温开裂等一系列问题, 将一定量玄武岩纤维掺入沥青碎石封层中, 制备了不同类型玄武岩纤维沥青碎石封层。通过板冲击试验、黏结拉拔试验和抗剪切试验, 系统分析了玄武岩纤维掺量、长度和乳化沥青掺量对沥青碎石封层黏结性能的影响, 并引入混合型多指标灰靶决策方法, 对比评价玄武岩纤维沥青碎石封层综合黏结性能, 进一步确定各材料的合理掺量, 以提高玄武岩纤维沥青碎石封层的黏结性能及使用品质。结果表明: 与普通沥青碎石封层相比, 玄武岩纤维沥青碎石封层的脱石率降低 11.0%~30.5%, 层间拉拔强度、层间抗剪强度分别提高 11.7%~16.3% 和 9.7%~22.4%。综合考虑路用性能和经济效益, 玄武岩纤维沥青碎石封层中乳化沥青最佳掺量为 1.6kg/m², 玄武岩纤维最佳掺量为 80g/m²。

入藏号: CSCD:6525393

地址: Song Liang, School of Highway, Chang'an University;; Xinjiang Transportation Planning Surveying and Design Institute, ;; Xi'an;; Urumqi, ;; 710064;; 830006.

An Chuanfeng, Qingdao Traffic Engineering Supervision & Advisory Co., Ltd., Qingdao, Shandong 266071, China.

Huang Mei, Xinjiang Xingya Engineering Construction Co., Ltd., Changji, Xinjiang 831100, China.

地址: 宋亮, 长安大学公路学院;; 新疆维吾尔自治区交通规划勘察设计研究院, ;; 西安;; 乌鲁木齐, 陕西;; 新疆 710064;; 830006, 中国.

安传峰, 青岛交通工程监理咨询有限公司, 青岛, 山东 266071, 中国.

黄美, 新疆兴亚工程建设有限公司, 昌吉, 新疆 831100, 中国.

电子邮件地址: 3359559@qq.com

电子邮件地址: 3359559@qq.com

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作者: An Pinghe; Wu Xiaoguang

作者: 安平和; 邬晓光

标题: Multi position damage identification of beam-bridges based on support vector machine

标题: 基于支持向量机的梁桥多位置损伤识别研究

来源出版物: 铁道科学与工程学报 卷: 16 期: 5 页: 1231-1236 出版年: 2019

文献号: 1672-7029(2019)16:5<1231:JYZCXL>2.0.TX;2-P

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文献类型: Article

作者关键词: bridge engineering; multi position damage identification; change rate of curvature modal difference; support vector machine

作者关键词: 桥梁工程; 多位置损伤识别; 曲率模态差变化率; 支持向量机

摘要: In order to identify multi position damage of beam bridge more accurately, through the theoretical analyzing, it is concluded that the damage of a certain position will have a certain effect on the displacement and curvature of the surrounding position. However, the sudden change of curvature modal difference is the typical feature of damage, and the change rate of curvature

modal difference is used to quantize the sudden change. Then normalize and input them into the support vector machine to identify multi position damage. Taking a multi-span continuous rigid frame bridge as an example, typical cross section appears 10%, 30% and 50% stiffness reduction. The change rate of curvature modal difference of the 1st and 2nd ordered vertical vibration and the damage state of each position are used as eigenvectors to train the support vector machine. After that, the change rate of curvature modal difference with 20% and 40% stiffness reduction in the prediction set is input into the trained support vector machine to identify the damage of each position, and the recognition accuracy is 99.68%. It is proved that this method has good accuracy and generalization in damage identification.

摘要: 为实现更准确的梁桥多位置损伤识别,从理论角度分析得出某位置的损伤会对周边位置的位移和曲率产生一定影响。曲率模态差的突变是损伤的典型特征,以曲率模态差变化率作为量化突变的参数,并将其归一化处理后输入支持向量机中进行桥梁多位置损伤识别。以某多跨连续刚构桥为例,将多处典型截面发生 10%,30%和 50%刚度折减情况下的前 2 阶竖向振动的曲率模态差变化率以及各位置的损伤状态作为特征向量去训练支持向量机。之后将预测集中包含 20%和 40%刚度折减的曲率模态差变化率输入训练好的支持向量机中去识别各位置的损伤情况,其识别准确率达到 99.68%。

入藏号: CSCD:6525792

地址: An Pinghe, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wu Xiaoguang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 安平和, 长安大学公路学院, 西安, 陕西 710064, 中国.

鄂晓光, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: wxgwst.cn@126.com

电子邮件地址: wxgwst.cn@126.com

使用次数 (最近 180 天): 0

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作者: Guo Jukun; Lei Shengyou; Wei Daokai; Kou Hailei; Wang Rui

作者: 郭聚坤; 雷胜友; 魏道凯; 寇海磊; 王瑞

标题: Effects of roughness on shear properties of structure-sands interface

标题: 粗糙度对结构物-细砂界面剪切特性的影响

来源出版物: 水利水运工程学报 期: 3 页: 85-94 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: sand; roughness; particle size; shear surface; interface friction angle

作者关键词: 砂; 粗糙度; 粒组; 剪切面; 界面摩擦角

摘要: The shear properties of the interface between the underlying foundation and soil are very important for the safe construction of the entire structure. Sandy soil layers are common in the upper soil layer of the foundation, and the particle size of sand and surface roughness of the foundation will affect the mechanical properties of the pile foundation. It is very important to study the shaft resistance of the sand strata. In order to investigate the interface shear strength, interface shear strength index with different particle sizes of sands, different roughnesses and different normal stresses, the interface shear tests on sands having particle sizes of 0.075~0.150 mm and 0.150~0.300 mm with rough steel plate and concrete plate are performed by using an improved direct shear apparatus. The testing results indicate that the interface shear stress-displacement relationships can be described by a hyperbolic model. The ratio between the peak shear stress of the test and the peak shear stress of the model ranges from 0.85 to 0.95. The peak value of the measured shear stress increases with normal stress and roughness. The peak shear stress of the particle size I is slightly larger than that of the particle size II. The peak shear stress of the interface between concrete and sands is larger than that of the steel-sands interface. The shear surface for the sand-structure interface without engraved lines is a moving horizontal plane, while the shear surface for the sand-structure interface with engraved lines is composed of discontinuous horizontal shear planes and dynamic curved shear surfaces. The interface friction angle increases with roughness. The shear strength index of the particle size I is slightly larger than that of the particle size II. The friction angle for the sand-steel interface ranges from 23° to 28°, and the friction angle for the concrete-steel interface ranges from 25° to 31°. The research and analysis results can provide an experimental reference for shaft resistance estimation and numerical simulation of the sand strata.

摘要: 下部基础与土体界面的剪切特性对于整个结构的安全施工至关重要,地基上部土层中多见砂土层,砂粒径大小和结构物表面粗糙程度会影响下部基础的受力特性,对于研究砂土层下部基础的侧摩阻力具有重要意义。利用改进后的直剪仪,进行粒组为 0.075~0.150 mm, 0.150~0.300 mm 的砂与人工粗糙混凝土板、钢板的界面剪切试验,研究不同砂粒组、不同粗糙度、不同法向应力下的钢-砂和混凝土-砂界面抗剪强度和界面剪切强度指标。结果表明:界面剪切应力-剪切位移关系可用双曲线模型描述,试验峰值剪切应力与模型峰值剪切应力的比值为 0.85~0.95;峰值剪切应力随法向应力和粗糙度的增大而增加,粒组 I 的较粒组 II 略大,混凝土-砂界面峰值剪切应力较钢-砂界面的大;对于未刻纹路的结构物-砂界面剪切面为一移动的水平面,刻有纹路的结构物-砂界面剪切面由间断的水平剪切面和动态曲形剪切面构成;界面摩擦角随粗糙度增大而增加,粒组 I 的抗剪强度指标较粒组 II 略大,钢-砂界面摩擦角集中在 23°~28°,混凝土-砂界面摩擦角集中在 25°~31°。研究成果可为砂土层桩侧摩阻力估计和数值模拟提供参考。

入藏号: CSCD:6522167

地址: Guo Jukun, School of Highway, Chang'an University; School of Highway and Architecture, Shandong Transport Vocational College, Xi'an; Weifang, 710064; 261206.

Lei Shengyou, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wei Daokai, School of Highway and Architecture, Shandong Transport Vocational College, Weifang, Shandong 261206, China.

Wang Rui, School of Highway and Architecture, Shandong Transport Vocational College, Weifang, Shandong 261206, China.

Kou Hailei, College of Engineering, Ocean University of China, Qingdao, Shandong 266100, China.

地址: 郭聚坤, 长安大学公路学院;; 山东交通职业学院公路与建筑系, ;, 西安;; 潍坊, 陕西;; 山东 710064;; 261206, 中国.

雷胜友, 长安大学公路学院, 西安, 陕西 710064, 中国.

魏道凯, 山东交通职业学院公路与建筑系, 潍坊, 山东 261206, 中国.

王瑞, 山东交通职业学院公路与建筑系, 潍坊, 山东 261206, 中国.

寇海磊, 中国海洋大学工程学院, 青岛, 山东 266100, 中国.

电子邮件地址: gjk_1986@126.com; kou123321@126.com

电子邮件地址: gjk_1986@126.com; kou123321@126.com

使用次数 (最近 180 天): 0

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作者: Peng Yuhua; Fu Xiangxiang; Lu Xin; Li Xuan

作者: 彭余华; 傅向祥; 陆昕; 李璇

标题: Numerical Simulation on Light Environment and Secondary Pollution of Sunshade Awning of Adjacent Tunnel Portals

标题: 毗邻隧道洞口遮阳棚光环境及二次污染数值模拟

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作者关键词: tunnel engineering; adjacent tunnel; light environment simulation; secondary pollution; numerical simulation

作者关键词: 隧道工程; 毗邻隧道; 光环境模拟; 二次污染; 数值模拟

摘要: Lighting of adjacent tunnels in the tunnel group is significantly different from that of the single tunnel. In order to reduce the traffic accidents caused by the difference of the light intensity

at adjacent tunnel entrances during the daytime, sunshade awnings measures were adopted at tunnel entrances to reduce light, and to satisfy the drivers' visual characteristics. However, the structure was often closed, and the pollutants in the upstream tunnel portal could easily flow to the downstream tunnel entrance to form secondary pollution. Based on the adjacent tunnels, a sunshade with hollowed-out on both sides of the bottom and closed on the top was constructed, and the light simulation analysis software Daylight Visualizer was used to analyze the rule of brightness change and the light reduction effect of sunshade of adjacent tunnels. The three-dimensional turbulence model based on the standard k-epsilon two-equation and the multi-group diffusion transfer were used as the physical calculation models. Ansys Fluent fluid analysis software was used to simulate the diffusion of pollutants at adjacent tunnel entrances with or without sunshade awnings. The results show that the constructed sunshade (transmittance 30%) can greatly reduce the gap of road illumination between tunnels, and it can better improve the diffusion of pollutants at tunnel portals, compared with the rather closed sunshade shed.

摘要: 隧道群中毗邻隧道的照明与单体隧道照明有着显著差异。为减少白天毗邻隧道洞口由光照强度差异引起的交通事故,在公路隧道洞口采用遮阳棚的减光措施,可起到良好的减光效果,满足驾驶员的视觉特性,但往往结构形式较封闭,上游隧道洞口污染物易窜流到下游隧道进口形成二次污染。以毗邻隧道为背景,构建了底部两侧镂空、上方封闭的遮阳棚模型,利用光模拟计算软件 Daylight Visualizer 分析了毗邻隧道洞口的亮度变化规律及遮阳棚的减光效果;以标准 k-epsilon 双方程的三维紊流模型及多组分扩散传输为物理计算模型,采用 Ansys Fluent 流体分析软件数值模拟了无遮阳棚和有遮阳棚两种情况下,毗邻隧道洞口污染物的扩散情况。结果表明:所构建的遮阳棚(透光率 30%)能大大减少隧道内与隧道间路面照度的差值,与较封闭遮阳棚相比,能更好地改善隧道洞口污染物的扩散。

入藏号: CSCD:6521590

地址: Peng Yuhua, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Fu Xiangxiang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Lu Xin, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Xuan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 彭余华, 长安大学公路学院, 西安, 陕西 710064, 中国.

傅向祥, 长安大学公路学院, 西安, 陕西 710064, 中国.

陆昕, 长安大学公路学院, 西安, 陕西 710064, 中国.

李璇, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: 332639358@qq.com; 437923661@qq.com

电子邮件地址: 332639358@qq.com; 437923661@qq.com

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作者: Pan Binghong; Ni Xu; Tang Lijiao; Zhao Yaru; Yu Yingjie

作者: 潘兵宏; 倪旭; 唐力焦; 赵亚茹; 余英杰

标题: Reserach on the Operating Speed Transition Section Length at Ring off-ramp of B-type Trumpet Interchange

标题: B 型喇叭式立交环圈出口匝道运行速度过渡段长度研究

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作者关键词: traffic engineering; operating speed transition section; theoretical analysis; B-type trumpet interchange; speed-changing demand

作者关键词: 交通工程; 运行速度过渡段; 理论分析; B 型喇叭式立交; 变速需求

摘要: In order to determine the minimum lengths of the operating speed transition section which meet the safe driving demand of vehicles at ring off-ramp of B-type trumpet interchange,the calculation models of the operating speed transition section length were set up respectively to meet the requirements of ultra-high transition,speed-changing driving and moderate lateral acceleration change rate. Through UMRR Kepler chain radar tachometer,the operating speeds at the diverging gore nose of the ring off-ramp were measured under different main line design speeds,and with SPSS software,the operating speed representative values at the diverging gore nose were obtained.Based on the length calculation models of the operating speed transition section and the analysis of the typical parameters, the minimum lengths of the operating speed transition section were obtained to meet different requirements. The results show that vehicle variable speed driving demand is the main control factor for the length of the transition section at the ring off-ramp of B-type trumpet interchange; and based on the safe driving demand of the vehicles,the minimum recommended values where proposed,as well as the correction coefficients of longitudinal slopes.

摘要: 为确定车辆在 B 型喇叭式立交环圈出口匝道满足安全行驶需求的运行速度过渡段最小长度,分别建立了满足超高过渡需求、车辆变速行驶需求、横向加速度变化率适中等要求下的运行速度过渡段长度计算模型。采用 UMRR 开普勒链式雷达测速仪,实测不同主线设计速度下环圈出口分流鼻运行速度,结合 SPSS 软件分析,得到分流鼻运行速度。基于运行速度过渡段长度计算模型和典型参数的分析论证,得到满足不同需求的运行速度过渡段最小长度。结果表明:车辆变速行驶需求是 B 型喇叭式立交环圈出口匝道运行速度过渡段长度的主要控制因素;并基于满足车辆安全行驶需求,提出了运行速度过渡段长度最小建议值及纵坡修正系数。

入藏号: CSCD:6521634

地址: Pan Binghong, School of Highway,Chang'an University;;Chang'an University, ;;Key Laboratory of Highway Engineering in Special Area of Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

Ni Xu, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Tang Lijiao, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Yaru, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Yu Yingjie, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 潘兵宏, 长安大学公路学院;;长安大学, ;;特殊地区公路工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

倪旭, 长安大学公路学院, 西安, 陕西 710064, 中国.

唐力焦, 长安大学公路学院, 西安, 陕西 710064, 中国.

赵亚茹, 长安大学公路学院, 西安, 陕西 710064, 中国.

余英杰, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: kc20@GL.chd.edu.cn; Nixu93@chd.edu.cn

电子邮件地址: kc20@GL.chd.edu.cn; Nixu93@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Yan Changgen; Wang Ting; Jia Hailiang; Xu Wei; Zi Fan; Tao Yue; Wei Wei; Wang Yachong

作者: 晏长根; 王婷; 贾海梁; 徐伟; 訾凡; 陶悦; 威巍; 王亚冲

标题: Influence of the unfrozen water content on the shear strength of unsaturated silt during freezing and thawing

标题: 冻融过程中未冻水含量对非饱和粉土抗剪强度的影响

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文献类型: Article

作者关键词: soil mechanics; freezing and thawing processes; unfrozen water content; unsaturated silt; shear strength

作者关键词: 土力学; 冻融过程; 未冻水含量; 非饱和粉土; 抗剪强度

摘要: A series of direct shear tests on unsaturated silt with a water content of 18.3% during freezing and thawing were conducted, and the phase composition of pore water was measured by NMR during the shear process. Effects of the unfrozen water content and the ice content on mechanical properties of the tested silt were analyzed. The results indicate that the freezing process of unsaturated silt can be divided into super-cooling stage $>-1.15\text{ }^{\circ}\text{C}$, no phase change), rapid freezing stage ($-1.15\text{ }^{\circ}\text{C}$ -- $-2\text{ }^{\circ}\text{C}$) where 76% of the pore water freezes, and stable

freezing stage($<-2\text{ }^{\circ}\text{C}$) where the unfrozen water content only decreases by 7%. The cohesion changes significantly with the temperature during the process of freezing and thawing while the friction angle varies slightly. The change of the shear strength of silt occurs primarily within the stable freezing stage, where the cohesion increases by 123.5% and the friction angle decreases by 12%. For the rapid freezing stage, the cohesion only ascends by 38.5% and the friction angle has no obvious change. It can be concluded that, within the rapid freezing phase, the freezing of the pore water drives the matrix suction to increase, which results in increasing of the cohesion, while that, within the stable freezing phase, the increase of the cementation strength between ice and soil particles leads to a rise of the cohesion. When the ice content changes slightly, the shear strength of frozen silt is mainly controlled by the cementation strength between ice and soil particles which depends on the thickness of the unfrozen water film. The decrease of the friction angle within the stable freezing phase is mainly caused by the force acting on the particle skeleton generated by volumetric expansion of the pore water upon freezing.

摘要: 对含水率为 18.3% 的非饱和粉土进行了冻融过程中不同温度下的直剪试验, 用核磁共振测定了冻融过程中孔隙水的相变过程, 并分析了未冻水、孔隙冰对其力学性质的影响机制。试验结果表明: (1) 非饱和粉土冻结可分为过冷段($>-1.15\text{ }^{\circ}\text{C}$)、快速冻结阶段($-1.15\text{ }^{\circ}\text{C}\sim-2\text{ }^{\circ}\text{C}$) 和稳定冻结阶段($<-2\text{ }^{\circ}\text{C}$), 快速冻结阶段 76% 的孔隙水冻结, 而稳定冻结阶段未冻水含量只减少 7%; (2) 冻融过程中黏聚力随温度发生显著变化, 内摩擦角变化幅度很小; (3) 冻结过程中抗剪强度的变化主要发生在稳定冻结阶段, 快速冻结阶段黏聚力仅增大 38.5%, 内摩擦角基本无变化, 而稳定冻结阶段黏聚力增大 123.5%, 内摩擦角降低 12%。得到以下结论: (1) 快速冻结阶段黏聚力增大主要是由于孔隙水冻结导致基质吸力增大, 毛细黏聚作用增强; 稳定冻结阶段黏聚力增大主要是由于冰对土颗粒胶结强度增大; (2) 含冰量变化不大时, 冻土抗剪强度主要受冰对土颗粒胶结强度的控制, 而此胶结强度决定于未冻水膜的厚度; (3) 稳定冻结阶段内摩擦角降低主要由孔隙中水冰相变发生体积膨胀时对土颗粒骨架的作用力导致。

入藏号: CSCD:6508873

地址: Yan Changgen, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Ting, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Tao Yue, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wei Wei, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Yachong, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Jia Hailiang, School of Architecture and Civil Engineering, Xi'an University of Science and Technology, Xi'an, Shaanxi 710054, China.

Zi Fan, School of Architecture and Civil Engineering, Xi'an University of Science and Technology, Xi'an, Shaanxi 710054, China.

Xu Wei, Gansu Provincial Public Aviation Brigade, Dinglin Highway Management Co., Ltd., Dingxi, Gansu 743099, China.

地址: 晏长根, 长安大学公路学院, 西安, 陕西 710064, 中国.

王婷, 长安大学公路学院, 西安, 陕西 710064, 中国.

陶悦, 长安大学公路学院, 西安, 陕西 710064, 中国.

威巍, 长安大学公路学院, 西安, 陕西 710064, 中国.

王亚冲, 长安大学公路学院, 西安, 陕西 710064, 中国.

贾海梁, 西安科技大学建筑与土木工程学院, 西安, 陕西 710054, 中国.

瞿凡, 西安科技大学建筑与土木工程学院, 西安, 陕西 710054, 中国.

徐伟, 甘肃省公航旅定临高速公路管理有限公司, 定西, 甘肃 743099, 中国.

电子邮件地址: yanchanggen@163.com; 897340409@qq.com

电子邮件地址: yanchanggen@163.com; 897340409@qq.com

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作者: Xue Xiaojiao; Yang Hongzhi; Ren Nan

作者: 薛晓姣; 杨宏志; 任楠

标题: Travel Time Reliability of Regional Road Network under Emergency Conditions

标题: 应急条件下区域路网行程时间可靠性研究

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作者关键词: traffic engineering; regional road network; Vissim simulation; travel time reliability; emergency conditions

作者关键词: 交通工程; 区域路网; Vissim 仿真; 行程时间可靠性; 应急条件

摘要: To study reliability of regional road network under emergency conditions, a Vissim simulation model of a regional road network in Shaoxing is developed and calibrated. A model to calculate travel time of links under emergency conditions based on simulations and Monte Carlo method is proposed, and modified with actual and simulated data. Topologic analyze of the road network is used to establish reliability models of travel path, OD pair, and road network under emergency conditions. Typical links and typical regions of Shaoxing are simulated and evaluated by quantifying and grading travel time reliability. The results show that the travel time reliability of road network decreases with the decrease of emergency level. When emergency level of Yuecheng District and Zhuji City decreases from normal to first grade, the travel time reliability of road network reduces from 0.519 and 0.534 to 0.201 and 0.173, respectively. The same emergency conditions have different influences at different regional road network. The reduction ratio of travel time reliability of road network at Zhuji City is 4.5%-9.9% higher than Yuecheng District under the same emergency conditions, which is mainly resulted from the weak road network evacuation capability and poor traffic management of Zhuji City. To study reliability of regional road network under emergency conditions, a Vissim simulation model of a regional road network

in Shaoxing is developed and calibrated. A model to calculate travel time of links under emergency conditions based on simulations and Monte Carlo method is proposed, and modified with actual and simulated data. Topologic analyze of the road network is used to establish reliability models of travel path, OD pair, and road network under emergency conditions. Typical links and typical regions of Shaoxing are simulated and evaluated by quantifying and grading travel time reliability. The results show that the travel time reliability of road network decreases with the decrease of emergency level. When emergency level of Yuecheng District and Zhuji City decreases from normal to first grade, the travel time reliability of road network reduces from 0.519 and 0.534 to 0.201 and 0.173, respectively. The same emergency conditions have different influences at different regional road network. The reduction ratio of travel time reliability of road network at Zhuji City is 4.5%-9.9% higher than Yuecheng District under the same emergency conditions, which is mainly resulted from the weak road network evacuation capability and poor traffic management of Zhuji City.

摘要: 为了研究应急条件下的区域路网可靠性, 建立绍兴市区域路网 Vissim 仿真模型并进行校准。提出基于交通仿真和蒙特卡洛方法的应急条件下路段行程时间计算模型并结合实测与仿真数据对模型进行修正, 并分析路网拓扑空间关系依次建立应急条件下路径、OD 对、路网行程时间可靠性模型。量化分级行程时间可靠性, 对绍兴市典型路段和典型区域进行仿真与评价分析。研究结果表明, 路网行程时间可靠性随应急事件的降低而降低, 当越城区和诸暨市应急事件等级由正常降至一级, 路网行程时间可靠性由 0.519 和 0.534 降低至 0.201 和 0.173。同等应急条件对同一地区不同区域路网存在差异性影响, 同等应急条件下诸暨市的路网行程时间可靠性下降比相对于越城区高 4.5%~9.9%, 主要由于其自由式路网交通疏散能力较差且非城区交通管理水平较低。

入藏号: CSCD:6506794

地址: Xue Xiaojiao, School of Highway, Chang'an University;; China Railway Eryuan Engineering Group Co.Ltd, ;; Xi'an;; Chengdu, ;; 710064;; 610031.

Ren Nan, School of Highway, Chang'an University;; China Railway Eryuan Engineering Group Co.Ltd, ;; Xi'an;; Chengdu, ;; 710064;; 610031.

Yang Hongzhi, School of Highway, Chang'an University, Xi'an, 710064.

地址: 薛晓姣, 长安大学公路学院;; 中铁二院工程集团有限责任公司, ;; 西安;; 成都, ;; 710064;; 610031.

任楠, 长安大学公路学院;; 中铁二院工程集团有限责任公司, ;; 西安;; 成都, ;; 710064;; 610031.

杨宏志, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: 1031530734@qq.com; yhz@chd.edu.cn

电子邮件地址: 1031530734@qq.com; yhz@chd.edu.cn

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作者: Wang Lu; Liu Yuwen; Chen Hong

作者: 王露; 刘玉雯; 陈红

标题: Cross-wind environment vehicle driving feature at canyon bridge and tunnel connection segment

标题: 侧风下峡谷桥隧连接段汽车的行驶特性

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作者关键词: 交通运输安全工程; 车辆气动性能; 桥隧连接段; 峡谷风

摘要: In order to solve the problem of highway traffic safety in the mountainous area, vehicle transient aerodynamic feature and its laws in bridge and tunnel connecting segment affected by the wind environment are studied. With the help of Carsim software, the vehicle model and the road model are built to simulate the feature of the vehicle and road in bridge and tunnel connecting segment. The measured varying wind speed of Xihan Expressway is input to simulate the average wind and fluctuating wind of the natural wind load, and the influence of wind angle on the vehicles is researched. Firstly, after simulation, the parameters, such as vehicle longitudinal speed, lateral acceleration, aerodynamic force (drag force, side force and lift force) and aerodynamic slip angle are analyzed. Then, the influences of the vehicle aerodynamic forces of different vehicle speeds, wind speeds and wind directions on the driving stability are analyzed. Finally, the critical vehicle speed and critical wind speed of safe and stable driving in the side wind environment are investigated. Research results show that, when the vehicle speed is increased from 60 km/h to 80 km/h, the drag force, side force and lift force are increased by 160%, 53% and 89% respectively. Under the snow and ice surface with wind speed of 80 km/h, a large offset of more than one meter occurs. When the maximum wind speed of Xihan Expressway was 31.5 m/s (about 113 km/h), the vehicle will obviously overturn and it will be a risk to driving safety.

摘要: 为保障山区高速公路的运营安全,研究了在风环境下峡谷桥隧连接段车辆瞬态气动特性及其规律,借助 Carsim 软件建立车辆模型,并模拟峡谷桥隧连接处的路段特性,以西汉高速桥隧连接段的实测数据输入风速值和侧风角度等参数,来模拟不同风速及角度对车辆行驶的影响。首先,对运行仿真后得到的车辆纵向速度、侧向加速度、车辆气动三分力(气动阻力、侧向力、气动升力)、气动侧偏角等参数进行分析;其次,通过分析不同车速、风速、风向角的车辆气动力,探究其对行车稳定性的影响程度;最后,研究了车辆在侧风环境下安全稳定行驶的临界车速和临界风速。研究表明:车辆行驶在有侧风作用影响下的峡谷桥隧连接段时,车速由 60 km/h 提升至 80 km/h,车辆气动阻力、侧向力及气动升力分别增加 160%、53% 及 89%,并且在风速达 80 km/h 的冰雪路面下,伴随出现超过 1 m 的大偏移量侧滑,当经历西汉高速年最大风速 31.5 m/s(约 113 km/h)时,车辆出现明显倾覆现象,对行车安全构成了一定的

风险。

入藏号: CSCD:6506360

地址: Wang Lu, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Yuwen, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Hong, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 王露, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘玉雯, 长安大学公路学院, 西安, 陕西 710064, 中国.

陈红, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: 1251058940@qq.com

电子邮件地址: 1251058940@qq.com

使用次数 (最近 180 天): 0

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作者: Feng Guoping; Song Jiale; Xue Xuan; Xu Ning; Zhang Dongliang; Li Weiguang

作者: 冯国平; 宋家乐; 薛旋; 徐宁; 张栋梁; 李炜光

标题: Curing kinetics of epoxy asphalt

标题: 环氧沥青固化动力学研究

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作者关键词: epoxy asphalt; non-isothermal DSC; infrared spectroscopy; curing kinetics

作者关键词: 环氧沥青; 非等温 DSC; 红外光谱; 固化动力学

摘要: The epoxy asphalt was prepared with self-made modified amine curing agent, epoxy resin and matrix asphalt. The curing kinetics of this epoxy asphalt was studied by non-isothermal differential scanning calorimetry (DSC). The best curing temperature of the epoxy asphalt was 120 °C obtained by linear fitting extrapolation method. The apparent activation energy E_a , forward factor A and apparent reaction order n of the epoxy asphalt system was 42.57 kJ/mol, 9334.8/min and 0.833, respectively, calculated according to the self-catalytic kinetic model. The relationship between curing degree and curing time was obtained by integral transformation. The relationship was simulated at 120 °C and verified by infrared spectroscopy. The results were in good agreement. The above research results had guiding significance for the on-site construction

of epoxy asphalt mixture.

摘要: 采用自制改性胺类固化剂、复配环氧树脂和基质沥青制备了环氧沥青,通过非等温示差扫描量热法研究了该环氧沥青体系的固化动力学。经线性拟合外推得到该体系最佳的固化温度为 120 °C。按照自催化动力学模型计算得到该体系的表观活化能 E_a 为 42.57 kJ/mol,指前因子 A 为 9 334.8/min,表观反应级数 n 为 0.833。通过积分变换得到固化度与时间的对应关系,对 120 °C 下此关系进行了模拟并采用红外光谱进行了验证,结果较为吻合。上述研究结果对环氧沥青混合料的现场施工具有指导意义。

入藏号: CSCD:6505406

地址: Feng Guoping, Highway College of Chang'an University, Xi'an, 710064.

Xu Ning, Highway College of Chang'an University, Xi'an, 710064.

Zhang Dongliang, Highway College of Chang'an University, Xi'an, 710064.

Li Weiguang, Highway College of Chang'an University, Xi'an, 710064.

Song Jiale, Materials Science and Engineering College of Chang'an University, Xi'an, 710064.

Xue Xuan, Materials Science and Engineering College of Chang'an University, Xi'an, 710064.

地址: 冯国平, 长安大学公路学院, 西安, 陕西 710064, 中国.

徐宁, 长安大学公路学院, 西安, 陕西 710064, 中国.

张栋梁, 长安大学公路学院, 西安, 陕西 710064, 中国.

李炜光, 长安大学公路学院, 西安, 陕西 710064, 中国.

宋家乐, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

薛旋, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

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作者: Ye Fei; Guo Huawei; Duan Zhijun; Liang Xing; Wang Siyu; Wang Bin

作者: 叶飞; 郭华伟; 段智军; 梁兴; 王思宇; 王斌

标题: Disturbance mechanical problems induced by synchronous grouting in deep shield tunnels

标题: 深埋盾构隧道同步注浆施工扰动力学问题研究

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作者关键词: deep shield tunnel; disturbance induced by synchronous grouting; unified strength

theory; cylindrical cavity expansion theory; grout seepage theory

作者关键词: 深埋盾构隧道; 同步注浆施工扰动; 统一强度理论; 柱形扩孔理论; 浆液渗流理论

摘要: In order to study the disturbance influences of the surrounding soils and the existing double-arch tunnels induced by the synchronous grouting during the construction of deep shield tunnels, the effect of grouting on soils during the synchronous grouting is simplified as the problem of cylindrical cavity expansion in the infinite space. Considering the seepage effect of grouting on soils during the synchronous grouting, the construction disturbance mechanical model of synchronous grouting is established on the basis of the cylindrical cavity expansion theory and unified strength theory. The theoretical formulas for stress field, strain field and displacement field in the elastic-plastic zone under the influence of the synchronous grouting disturbance are deduced. The Hang to Hang zone shield tunnel of Xi'an subway No. 4 line is taken as an example. The results show that: (1) The influence of the grouting penetration pressure on the plastic zone is significantly greater than that of the grouting pressure on the plastic zone, which indicates the grouting disturbance zone can be reduced by controlling the grouting penetration pressure. (2) The significantly apparent disturbance influence of the existing tunnel under the action of the synchronous grouting when the adjacent double-arch tunnel is passed by newly-bulit shield tunnel, the grouting pressure and grouting capacity can be adjusted in real time, and the isolation and reinforcement measures are adopted to ensure the passing safety.

摘要: 为研究深埋盾构隧道施工过程中同步注浆对周边土体及既有连拱隧道的扰动影响,将同步注浆浆液对土体的作用简化为无限空间土体中的柱孔扩张问题,基于柱形扩孔理论和统一强度理论,考虑同步注浆时浆液渗流对土体的作用,建立了同步注浆施工扰动力学模型,推导了同步注浆扰动下周围土体弹塑性区内应力场、应变场及位移场的理论计算公式。并以西安地铁四号线航航区间盾构隧道为例进行了算例分析,研究表明:①注浆渗透压力对塑性区范围的影响显著大于注浆压力对塑性区范围的影响,可通过控制注浆渗透压力来减少注浆扰动范围;②新建盾构隧道在近距离侧穿既有连拱隧道时,同步注浆产生的施工扰动影响显著,可实时调整同步注浆的注浆压力、注浆量及采取隔离加固措施,确保安全通过。

入藏号: CSCD:6499971

地址: Ye Fei, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Guo Huawei, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Duan Zhijun, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liang Xing, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Siyu, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Bin, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 叶飞, 长安大学公路学院, 西安, 陕西 710064, 中国.

郭华伟, 长安大学公路学院, 西安, 陕西 710064, 中国.

段智军, 长安大学公路学院, 西安, 陕西 710064, 中国.

梁兴, 长安大学公路学院, 西安, 陕西 710064, 中国.

王思宇, 长安大学公路学院, 西安, 陕西 710064, 中国.

王斌, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: xianyefei@126.com

电子邮件地址: xianyefei@126.com

使用次数 (最近 180 天): 0

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作者: Peng Bo; Deng Hailong; Cao Shijiang; Li Wenying

作者: 彭波; 邓海龙; 曹世江; 李文瑛

标题: Carbon emission quantification and evaluation system of hot mix asphalt mixture

标题: 热拌沥青混合料碳排放量化与评价体系

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文献类型: Article

作者关键词: road engineering; carbon emission; quantitative model; analytic hierarchy process; evaluation system

作者关键词: 道路工程; 碳排放; 量化模型; 层次分析法; 评价体系

摘要: In order to solve the problems that a carbon emission evaluation system for hot mix asphalt mixture was not yet to be established, the carbon emission level of an asphalt mixture could not be correctly identified, and reduction of carbon emission in asphalt pavement needs further studied, the carbon emission sources for 21 high-grade asphalt pavements in China was adopted. The emission source survey, combined with the calculation parameters provided by the UN Intergovernmental Panel on Climate Change (IPCC) and the National Bureau of Statistics of China, a quantitative model for energy consumption carbon emissions of a hot mix asphalt mixture and a quantitative model for high temperature volatile carbon emissions were established. The weight of the carbon emissions for different asphalt mixture types was obtained by using an analytic hierarchy process (AHP). According to the weight coefficients and carbon emission of the same kind of asphalt mixture in each carbon emission link, the same kind of asphalt mixtures were identified using Hamming closeness theory. In the weighted average of the total carbon emissions in each construction link, combined with the emission reduction requirements proposed in the China "13th Five-Year Plan", the evaluation standard for the total carbon emission for different asphalt mixture types and the carbon emissions of various construction links were proposed. The results show that the energy consumption carbon emissions for aggregate heating, asphalt heating, and mixture mixing account for 65.62%, 15.30%, and 12.22% of the total carbon emissions of the asphalt mixture, respectively. The high temperature of rolling and paving the volatile carbon emissions accounted for 91.56% and 7.02% of the high-temperature volatile carbon emissions of the asphalt mixture, respectively, and the China emission reduction target values and the measured

carbon emission mean values are used as the carbon emission classification evaluation limits. The hot mixed asphalt mixture carbon emission level are divided into three types: A (mild emissions), B (medium emissions), and C (severe emissions). The research results provide evaluation indexes for carbon emissions of different types of asphalt mixtures, and these indexes are significant for ensuring low carbon concentrations in asphalt pavements.

摘要: 为解决目前尚未建立热拌沥青混合料碳排放评价体系,无法正确反映沥青混合料碳排放水平和进一步开展沥青路面低碳减排工作等问题,通过对中国 21 条高等级公路沥青路面的碳排放来源调查,结合联合国政府间气候变化专门委员会和中国国家统计局提供的计算参数,建立了热拌沥青混合料能耗碳排放量化模型和高温挥发碳排放量化模型。运用层次分析法(AHP)得出不同种类沥青混合料碳排放的权重,依据同种沥青混合料在各个碳排放环节中的权重系数和碳排放量,采用海明贴近度理论,明确了同类沥青混合料在各施工环节碳排放总量的加权均值,并结合中国"十三五"规划提出的温室气体减排要求,提出了不同类型沥青混合料的碳排放总量评价标准及各施工环节的碳排放评价标准。研究表明:集料加热、沥青加热和混合料拌合环节的能耗碳排放分别占热拌沥青混合料能耗碳排放总量的 65.62%、15.30%和 12.22%;碾压、摊铺环节的高温挥发碳排放分别占沥青混合料高温挥发碳排放总量的 91.56%和 7.02%;以中国减排目标值、实测碳排放均值为碳排放分级评价界限,将热拌沥青混合料碳排放水平分为 A 级(轻度排放)、B 级(中度排放)、C 级(重度排放)。该研究成果提供了不同类型沥青混合料的碳排放评价指标,对指导沥青路面低碳施工具有积极意义。

入藏号: CSCD:6501809

地址: Peng Bo, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Deng Hailong, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Cao Shijiang, Guiyang Engineering Corporation Limited of Power China, Guiyang, Guizhou 550081, China.

Li Wenying, Xi'an Highway Institute, Xi'an, Shaanxi 710003, China.

地址: 彭波, 长安大学公路学院, 西安, 陕西 710064, 中国.

邓海龙, 长安大学公路学院, 西安, 陕西 710064, 中国.

曹世江, 中国电建集团贵阳勘测设计研究院有限公司, 贵阳, 贵州 550081, 中国.

李文瑛, 西安公路研究院, 西安, 陕西 710003, 中国.

电子邮件地址: pengb8888@126.com

电子邮件地址: pengb8888@126.com

使用次数 (最近 180 天): 0

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作者: Feng Zhongju; Dong Yunxiu; Pan Fang; Hao Yumeng; Li Shaojie; Jian Xinlong

作者: 冯忠居; 董芸秀; 潘放; 郝宇萌; 李少杰; 建鑫龙

标题: Influence of gully topography on stress of high fill slab culverts and settlement characteristics of fill

标题: 沟谷地形对高填方盖板涵受力及填土沉降特性的影响

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作者关键词: bridge engineering; geotechnical engineering; gully topography; centrifugal model test; slab culvert; earth pressure; settlement deformation

作者关键词: 桥梁工程; 岩土工程; 沟谷地形; 离心模型试验; 盖板涵; 土压力; 沉降变形

摘要: To study the influence of the gully topography on the stress of high fill slab culverts and settlement characteristics of the fill, a centrifugal model test was carried out, using a self-developed model test platform which can reflecting the interactions among the topography, culvert, and fill. The variation characteristics of the earth pressure of the culvert-soil interface, fill settlement, internal force of the culvert structure, and the vertical soil pressure concentration coefficient K_s under different valley widths B and different valley slopes α were analyzed. Furthermore, relevant engineering technical recommendations were presented. The results show that the earth pressure of the culvert-soil interface and the vertical soil pressure concentration coefficient K_s are positively correlated with the valley widths, and are negatively correlated with the valley slopes. The settlement of the fill at the culvert top shows a W shaped distribution. With an increase in the valley widths, the difference between the internal and external settlements of the soil increases gradually. Further, with an increase in the valley widths, the settlement delta of the fill gradually increases. With an increase in the slopes of the valley, the settlement difference between the inside and outside of the fill is $\Delta_0 - \Delta$. When the gully width is $1.5D$ to $5D$, where D is the culvert span, the range of change in the equal settlement section height is 12.2 to 13.7 m. When the gully slope is 0° to 60° , the range of change in the equal settlement section height is 12.5 to 13.7 m. Moreover, the equal settlement section height is used to determine whether the culvert is a high fill culvert, and 14 m is taken as the defined height. The lower edge of the cover plate and the middle of the upper edge of the culvert floor are subjected to a tensile stress, and the lower edge of the cover plate is the most unfavorable position of the slab culvert structure. The construction of high fill slab culverts can make full use of the original topography. Under the premise of slope stability, to retain the gully as far as possible, or to apply anti-excavation construction methods, artificially increase the gully gradient and reduce the gully width. A gully width of $B \leq 3D$ and a gully slope of $\alpha \geq 45^\circ$ are advisable.

摘要: 为探明山区沟谷地形对高填方盖板涵受力特性和填土沉降变形特性的影响,通过离心模型试验,选用自主研发的能够反映地形-涵洞-填土相互作用的模型试验平台,分析了不同沟谷宽度 B 和不同沟谷坡度 α 下盖板涵的涵-土界面土压力、涵顶填土沉降变形、涵洞结构内力以及涵顶垂直土压力集中系数 K_s 的变化特征,并提出了相关的工程技术建议。研究结果表明:涵-土界面土压力、涵顶垂直土压力集中系数 K_s 与沟谷宽度呈正相关,与沟谷坡度呈负相关;盖板涵涵顶土体沉降变形呈 W 形分布,随沟谷宽度的增大,涵顶土体内外沉降差

δ 逐渐增大;随沟谷坡度的增大,涵顶土体内外沉降差变化为 $\delta_0-\delta$;沟谷宽度为 $1.5D\sim 5D$ 时(D 为涵洞计算跨径),对应等沉面高度变化范围为 $12.2\sim 13.7$ m;沟谷坡度为 $0^\circ\sim 60^\circ$ 时,对应等沉面高度变化范围为 $12.5\sim 13.7$ m,提出可用等沉面高度界定高填方涵洞,可取 14 m 作为其界定高度;盖板涵盖板下缘、涵底上缘中部受拉应力,盖板下缘为盖板涵结构受力最不利位置;高填方盖板涵施工时应充分利用原有地形,在确保边坡稳定的前提下,尽量保留边坡,或人为反开挖施工,增加沟坡、减小沟宽,坡体以沟谷宽度 $B\leq 3D$ 、沟谷坡度 $\alpha\geq 45^\circ$ 为宜。

入藏号: CSCD:6501815

地址: Feng Zhongju, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Shaojie, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Dong Yunxiu, School of Highway, Chang'an University;;School of Civil Engineering, Longdong University, ;;, Xi'an;;Qingyang, Shaanxi;;Gansu 710064;;745000.

Pan Fang, Guangdong Province Expressway Co., Ltd, Guangzhou, Guangdong 510000, China.

Hao Yumeng, CCCC Second Highway Consultant Co., Ltd, Wuhan, Hubei 430056, China.

Jian Xinlong, Guangdong Dachao Expressway Co., Ltd, Guangzhou, Guangdong 510000, China.

地址: 冯忠居, 长安大学公路学院, 西安, 陕西 710064, 中国.

李少杰, 长安大学公路学院, 西安, 陕西 710064, 中国.

董芸秀, 长安大学公路学院;;陇东学院土木工程学院, ;;, 西安;;庆阳, 陕西;;甘肃 710064;;745000, 中国.

潘放, 广东省高速公路有限公司, 广州, 广东 510000, 中国.

郝宇萌, 中交第二公路勘察设计研究院有限公司, 武汉, 湖北 430056, 中国.

建鑫龙, 广东大潮高速公路有限公司, 广州, 广东 510000, 中国.

电子邮件地址: ysf@gl.chd.edu.cn

电子邮件地址: ysf@gl.chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Zhang Chi; Hou Yudi; Yang Kun; Qin Jihan; Zhang Hong

作者: 张驰; 侯宇迪; 杨坤; 秦际涵; 张宏

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作者关键词: traffic engineering; brake drum of truck; review; temperature rise model; long and steep downgrade

作者关键词: 交通工程; 货车制动鼓; 综述; 温升模型; 长大下坡

摘要: To clarify the applicability and application status of a brake drum temperature rise model for heavy vehicles and to provide the basis for the safety of vehicle on long and steep downgrades of highway, related literatures had been summarized. The temperature rise mechanism of the brake drum of large vehicles were reviewed. According to the modeling method, the brake drum temperature rise models were divided into the theoretical analysis models, software simulation models, and measured regression models, and the research status of the model was analyzed. The characteristics of each modeling method, the dominant modeling model and the auxiliary braking measures were commented respectively. Three long longitudinal slopes of mountainous highway in Ya'an to Xichang section of Jingkun Highway (Beijing to Kunming) were selected as test sections, and the measured data were obtained of a downhill truck test. The temperature rise curves of typical mode and measured data were plotted, and the correlation and error were compared by SPSS, thus the applicability of each model was analyzed. The results show that the theoretical analysis model can better reflect the temperature rise in heavy vehicle under actual driving conditions, and the brake drum temperature rise model still can be further studied and developed. In the future, we should take the semi-hanging truck as the leading vehicle, with consider the influence of road curve, horizontal and longitudinal alignment combination, characteristics of driver braking behavior and climate environment on the temperature rise of brake drum. The braking characteristics of driver on downhill and temperature rise mechanism in combination with various auxiliary braking methods should also be studied, and then building the brake drum temperature rise model under the coupling effect of human-vehicle-road-environment. Finally, the brake drum temperature rise model can be deeply applied to the control and optimization of longitudinal slope design, the traffic management and the safety risk rating on downhill. These can alleviate the coordination contradiction between the road and vehicle in China, and improve the traffic safety levels.

摘要: 为明确重载大货车制动鼓温升模型的适用性及应用现状,对国内外货车制动鼓温升模型研究进行了梳理。概述大货车制动鼓温升机理,依据建模方法将现有制动鼓温升模型分为理论分析模型、软件仿真模型和实测回归模型,重点论述3种模型的研究进展,分别从建模方法、建模主导车型和辅助制动措施等3个方面对模型研究现状进行分析评述。选取京昆(北京-昆明)高速公路雅安至西昌段3处长大纵坡作为试验路段,进行载重货车下坡试验,获取货车相关实测数据,绘制典型模型温升曲线和实测温升曲线,采用SPSS软件对其相关性及其误差进行对比,分析各模型适用性。研究表明:理论分析模型能更好反映实际行车条件下货车制动鼓的温升态势,同时目前温升模型仍具有较大的研究与改善空间;今后应以半挂铰接货车为主导车型,进一步考虑平曲线、平纵组合、驾驶人制动行为特性及气候环境对制动鼓温升的影响,并结合多种辅助制动方式深入研究其下坡制动特性和温升机理,进而构建人-车-路-环境耦合作用下的温升模型。未来可将温升模型深入应用于长大纵坡组合设计控制与优化、下坡通行管理和下坡安全风险评级等方面,以缓解中国高速公路长大下坡车路协同矛盾,全面提升长大下坡路段的交通安全水平。

入藏号: CSCD:6501819

地址: Zhang Chi, School of Highway, Chang'an University;;Transportation Infrastructure Construction and Management Digital Engineering Research Center, ;;Transportation Infrastructure Construction and Management Digital Engineering Research Center, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

Hou Yudi, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Qin Jihan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Hong, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Yang Kun, Shenzhen Transportation Design and Research Institute Co., Ltd, Shenzhen, Guangdong 518000, China.

地址: 张驰, 长安大学公路学院;;陕西省交通基础设施建设与管理数字化工程研究中心, ;;陕西省交通基础设施建设与管理数字化工程研究中心, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

侯宇迪, 长安大学公路学院, 西安, 陕西 710064, 中国.

秦际涵, 长安大学公路学院, 西安, 陕西 710064, 中国.

张宏, 长安大学公路学院, 西安, 陕西 710064, 中国.

杨坤, 深圳市综合交通设计研究院有限公司, 深圳, 广东 518000, 中国.

电子邮件地址: zhangchi@chd.edu.cn

电子邮件地址: zhangchi@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Han Wanshui; Liu Xiuping; Deng Lu; Du Qunle; Li Guangling

作者: 韩万水; 刘修平; 邓露; 杜群乐; 李光玲

标题: Updating method of bridge finite element model based on real coded genetic algorithm

标题: 基于实数编码遗传算法的桥梁有限元模型修正方法

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作者关键词: bridge engineering; finite element model; updating method; RCGA; static and dynamic characteristic; baseline model

作者关键词: 桥梁工程; 有限元模型; 修正方法; 实数编码遗传算法; 静动力特性; 目标函数; 基准模型

摘要: To overcome the local convergence and improve the corrective accuracy in the modified iterative optimization process of traditional finite element model, an updating method was proposed by combining the real coded genetic algorithm (RCGA) and measured data of static and dynamic characteristics. The quadrilateral isoparametric element theory and Newton iteration method were used to compile the macro command to realize the fast automatic loading of vehicle loads in the FEM. The objective function was constructed by the static and dynamic characteristics of the finite element model of the structure, the RCGA was taken as the optimization strategy, and the modification frame of the model was established by the MATLAB platform. Through the numerical simulation of a frame structure, the convergence efficiencies and updating results of the proposed optimization method and other methods were compared to verify the effectiveness of the proposed method. To determine the modified parameters, the Latin hypercube sampling method was used to analyze the parametric influence of finite element model on the dynamic responses of the bridge, and the proposed method was applied to modify the solid finite element model of a reconstructed hollow slab bridge. Analysis result shows that the zero order algorithm and the first order algorithm are depended on the sensitivities and correction ranges of the parameters. When the parameters have less sensitivities or the correction ranges are greater than 50%, the correction result of the model is erroneous. The RCGA is insensitive to the initial inputs, so the local convergence can be avoided. The main parameters to be corrected by the sensitivity analysis are the elastic modulus of hollow slab, the elastic modulus of cast-in-situ layer and the longitudinal and transversal restraint stiffnesses of the supports. After correction, the elastic modulus of hollow slab increases by about 19.13%, the elastic modulus of cast-in-situ layer increases by about 16.00%, the lateral restraint stiffness increases by about 46.21%, and the longitudinal restraint stiffness increases by about 72.72%. The static and dynamic characteristics of the modified finite element model are in good agreement with the measured responses, the errors of static responses are less than 4%, and the errors of dynamic responses are less than 3%.

摘要: 为克服传统桥梁有限元模型修正迭代优化过程中存在的局部收敛和提高模型修正精度,提出了联合实数编码遗传算法与静动力实测数据的有限元模型修正方法;引入四边形等参元理论和牛顿迭代法编制宏命令,实现有限元模型中车辆荷载的快速自动加载;基于结构有限元模型静动力特性构造目标函数,以实数编码遗传算法为优化策略,采用 MATLAB 平台建立了有限元模型修正框架;通过对一个简支框架结构的数值模拟,对比了所提出优化方法与其他方法的收敛效率和修正结果,以验证所提出方法的有效性;采用拉丁超立方体抽样分析了有限元模型参数变化对桥梁动力响应的影响,以确定待修正参数,并采用所提方法修正了一座改建的空心板桥梁的实体有限元模型。分析结果表明:零阶算法和一阶算法对参数的敏感性和修正范围依赖大,选用敏感性较小的参数或者参数修正范围大于 50%将会导致错误的修正结果;实数编码遗传算法对初始输入不敏感,可避免局部收敛的情况;采用灵敏度分析得到的主要待修正参数有空心板弹性模量、现浇层弹性模量以及支座横桥向和顺桥向的约束刚度;修正后的空心板弹性模量增幅约为 19.13%,现浇层弹性模量增幅约为 16.00%,横向约束刚度增幅约为 46.21%,纵向约束刚度增幅约为 72.72%,修正后的有限元模型的静动力特性与实测响应吻合良好,各测点静力响应误差均小于 4%,动力响应误差小于 3%。

入藏号: CSCD:6492536

地址: Han Wanshui, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Xiuping, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Guangling, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Deng Lu, College of Civil Engineering, Hunan University, Changsha, Hu'nan 410082.

Du Qunle, Shijiazhuang Transport Bureau, Shijiazhuang, Hebei 050051, China.

地址: 韩万水, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘修平, 长安大学公路学院, 西安, 陕西 710064, 中国.

李光玲, 长安大学公路学院, 西安, 陕西 710064, 中国.

邓露, 湖南大学土木工程学院, 长沙, 湖南 410082, 中国.

杜群乐, 石家庄市交通运输局, 石家庄, 河北 050051, 中国.

电子邮件地址: hws_freedom@163.com

电子邮件地址: hws_freedom@163.com

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作者: Xu Bo; Liu Yongjian; Zhu Weiqing; Jiang Lei

作者: 许波; 刘永健; 朱伟庆; 姜磊

标题: Simplified method of calculating flexural capacity of steel-concrete composite beam after stud corrosion

标题: 焊钉锈蚀后钢-混组合梁抗弯承载力简化计算方法

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作者关键词: steel-concrete composite beam; flexural capacity; stud corrosion; shear connection degree; shear capacity coefficient; simplified calculating method

作者关键词: 钢-混组合梁; 抗弯承载力; 焊钉锈蚀; 抗剪连接度; 抗剪承载力系数; 简化计算方法

摘要: In order to forecast the flexural capacity of steel-concrete composite beam after the interface stud corrosion, the deterioration effects of the reductions of stud shear strength, bonding strength with concrete and stud effective area on the stud shear capacity after corrosion were mainly considered, and the concept and calculation formula of shear connection degree of composite beam and the stud shear capacity coefficient after stud corrosion were proposed. Based on the plasticity simplified calculation assumption, the calculation models of flexural capacity of positive and

negative moment regions for the composite beam after stud corrosion were established by adopting the shear connection degree of composite beam after stud corrosion to reduce the composite beam flexural capacity. The test results of 23 composite beams were analyzed, and the validity of the model was verified. Test result shows that when the corrosion rate of stud is less than 10%, the test values of flexural capacity of positive and negative moment regions of the test beam are very close to the theoretical value calculated by the proposed formula. The mean ratio between the test value and the calculated value in the positive moment region is 1.00, and the variation coefficient is 0.04. Their mean ratio in the negative moment region is 1.01, and the variation coefficient is 0. It can be seen that the formula calculation results are in good agreement with the test results, and the simplified calculation method can be used for the quantitative and qualitative analysis on the flexural capacity of steel-concrete composite beams when the corrosion rate of interface stud is small.

摘要: 为预测界面焊钉锈蚀后钢-混组合梁抗弯承载力,考虑了焊钉锈蚀后其抗剪强度与混凝土黏结强度和有效面积降低对焊钉抗剪承载力的劣化影响,提出焊钉锈蚀后组合梁抗剪连接度和锈蚀焊钉抗剪承载力系数的概念及其计算公式;基于塑性简化计算假定,采用焊钉锈蚀后组合梁抗剪连接度对其抗弯承载力进行折减,建立了焊钉锈蚀后组合梁正负弯矩区抗弯承载力计算模型,分析了 23 根组合梁抗弯承载力试验结果,验证了计算模型的有效性。试验结果表明:在焊钉锈蚀率低于 10%时,试验梁正负弯矩区抗弯承载力的试验值与提出公式的理论计算值非常接近,其中正弯矩区试验值与计算值的平均比值为 1.00,变异系数为 0.04,负弯矩区二者平均比值为 1.01,变异系数为 0,由此可见,计算结果与试验结果吻合较好。简化计算方法可用作界面焊钉锈蚀率较小情况下钢-混组合梁抗弯承载力定量和定性分析。

入藏号: CSCD:6492537

地址: Xu Bo, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China; Department of Civil Engineering, Ordos Institute of Technology, Ordos, Shaanxi, Inner Mongolia 710064, China.

Liu Yongjian, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhu Weiqing, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Jiang Lei, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 许波, 长安大学公路学院; 鄂尔多斯应用技术学院土木工程系, 西安; 鄂尔多斯, 陕西; 内蒙古 710064; 017000, 中国.

刘永健, 长安大学公路学院, 西安, 陕西 710064, 中国.

朱伟庆, 长安大学公路学院, 西安, 陕西 710064, 中国.

姜磊, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: xubo152723@126.com; lyj.chd@gmail.com

电子邮件地址: xubo152723@126.com; lyj.chd@gmail.com

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作者: Feng Zhongju; Chen Huiyun; Yuan Fengbin; Yin Honghua; Li Xiaoxiong; Liu Chuang; Zhang Fuqiang; Wang Mengmeng; Li Shaojie

作者: 冯忠居; 陈慧芸; 袁枫斌; 尹洪桦; 李孝雄; 刘闯; 张福强; 王蒙蒙; 李少杰

标题: Vertical bearing characteristics of bridge pile foundation under pile-soil-fault coupling action

标题: 桩-土-断层耦合作用下桥梁桩基竖向承载特性

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作者关键词: 桥梁工程; 桩基; 断层; 室内模型试验; 数值仿真; 竖向承载力; 轴力; 侧阻力; 影响度

摘要: Based on the Hainan Puqian Bridge, the distance effect and bearing characteristics of bridge pile foundation under the fault-pile-rock interaction were analyzed by the indoor model test and numerical simulation. Research result shows that, in the model test, for a pile foundation with a diameter of 6.3 cm and a length of 60 cm, when the horizontal distance between the fault and the pile foundation increases from 9.45 cm to 22.05 cm, the bearing capacity of pile foundation increases by 26.7%. When the horizontal distance increases from 22.05 cm to 31.50 cm, the bearing capacity increases by only 3.8%, and the influence degree of the horizontal distance on the vertical bearing capacity reduces to 6.5% and may be neglected. When the length of pile foundation is constant and the load is the same, the smaller the horizontal distance, the smaller the change of axial force of pile foundation. The horizontal distance increases from 9.45 cm to 22.05 cm, the side resistance of pile foundation increases by 0.059 kN at the 30 cm of pile foundation length, and the influence degree decreases by 44.5%. When the horizontal distance increases from 22.05 cm to 31.50 cm, the side resistance increases by 0.029 kN, and the influence degree decreases by 8.3%. In the numerical simulation, under the condition that the diameter, length and overburden thickness of pile foundation are 1.5, 30, and 10 m, respectively, when the horizontal distance increases from 1.5 m to 6.0 m, the increment of the bearing capacity reduces from 11.0% to 6.5%. When the horizontal distance increases from 6.0 m to 7.5 m, the increment reduces to 4.9%. When the horizontal distance reduces from 7.5 m to 1.5 m, the axial force of pile foundation decreases gradually along the length direction of pile foundation. When the length of pile foundation is constant and the load is the same, the smaller the horizontal distance, the smaller the change of axial force of pile foundation. When the horizontal distance increases from 1.5 m to 6.0 m, the side resistance of pile foundation at the 16 m of pile foundation length increases by 1.90 MN, and the influence degree of the horizontal distance on the side resistance reduces by 28.0%. When the horizontal distance increases from 6.0 m to 7.5 m, the pile side resistance increases by 0.33 MN, and the influence

degree decreases by 5.0%.The results of model test and numerical simulation show that the vertical bearing characteristics of bridge pile foundation are greatly affected by the horizontal distance between the fault and the pile foundation when the horizontal distance is less than five times the pile foundation diameter.When the horizontal distance is more than five times the pile foundation diameter,its influence is smaller or even negligible.The side resistance ratio and influence degrees of the horizontal distance on the bearing capacity and side resistance of pile foundation decrease rapider in the numerical simulation than in the indoor model test.When the horizontal distance is five times the pile foundation diameter,the numerical simulation values reduce by 0.174,2.2%,and 6.0% compared with the indoor model test values,respectively.Therefore,the numerical simulation result is ideal and can be used as engineering reference.

摘要: 基于海南铺前大桥,采用室内模型试验与数值仿真,分析了断层-桩-岩土相互作用时桥梁桩基的距离效应与承载特性。研究表明:在模型试验中,对于直径为 6.3 cm,长度为 60 cm 的桩基,当断层与桩基水平距离由 9.45 cm 增加到 22.05 cm 时,承载力增幅为 26.7%,当水平距离由 22.05 cm 增加到 31.50 cm 时,承载力增幅仅为 3.8%,断层与桩基水平距离对桩基承载力影响度降至 6.5%,可以忽略;当桩长一定,荷载相同时,断层与桩基水平距离越小,桩身轴力变化越小;当断层与桩基水平距离由 9.45 cm 增加到 22.05 cm 时,桩身 30 cm 处桩侧阻力增大了 0.059 kN,水平距离对桩侧阻力影响度降低了 44.5%,当水平距离由 22.05 cm 增加到 31.50 cm 时,桩侧阻力增大了 0.029 kN,水平距离对桩侧阻力影响度降低了 8.3%。在数值仿真中,在桩基直径为 1.5 m,长度为 30 m,覆盖层厚度为 10 m 的工况下,当断层与桩基水平距离由 1.5 m 增加到 6.0 m 时,承载力增幅由 11.0%减小到 6.5%,当水平距离由 6.0 m 增加到 7.5 m 时,承载力增幅减小到 4.9%;当断层与桩基水平距离由 7.5 m 减小到 1.5 m 时,桩身轴力沿桩长方向减小趋势逐渐变缓,当桩长一定,荷载相同时,断层与桩基水平距离越小,桩身轴力变化越小;当断层与桩基水平距离由 1.5 m 增加到 6.0 m 时,桩身 16 m 处桩侧阻力增大了 1.90 MN,水平距离对桩侧阻力影响度降低了 28.0%,当水平距离由 6.0 m 增加到 7.5 m 时,桩侧阻力增大了 0.33MN,水平距离对桩侧阻力影响度降低了 5.0%。模型试验与数值仿真结果均表明,在 5 倍桩径范围内,桩基竖向承载特性受断层与桩基水平距离的影响较大;超出 5 倍桩径后,水平距离的影响较小,甚至可以忽略;断层与桩基水平距离对承载力、桩侧阻力的影响度与桩侧阻力占比的仿真值均减小较快,在水平距离为 5 倍桩径时,较模型试验值分别降低了 2.2%、6.0%、0.174,结果较理想化,可用作工程参考。

入藏号: CSCD:6492538

地址: Feng Zhongju, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Huiyun, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Mengmeng, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Li Shaojie, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Yuan Fengbin, China Highway Engineering Consultants Corporation, Beijing 100089, China.

Yin Honghua, Jinan Highway Administration Bureau, Ji'nan, Shandong 250014, China.

Li Xiaoxiong, School of Geographic Information and Tourism,Chuzhou University, Chuzhou, Anhui 239000, China.

Liu Chuang, Department of Transport of Hainan Province, Haikou, Hainan 570204, China.

Zhang Fuqiang, Department of Transport of Hainan Province, Haikou, Hainan 570204, China.

地址: 冯忠居, 长安大学公路学院, 西安, 陕西 710064, 中国.

陈慧芸, 长安大学公路学院, 西安, 陕西 710064, 中国.

王蒙蒙, 长安大学公路学院, 西安, 陕西 710064, 中国.

李少杰, 长安大学公路学院, 西安, 陕西 710064, 中国.
袁枫斌, 中国公路工程咨询集团有限公司, 北京 100089, 中国.
尹洪桦, 济南市公路管理局, 济南, 山东 250014, 中国.
李孝雄, 滁州学院地理信息与旅游学院, 滁州, 安徽 239000, 中国.
刘闯, 海南省交通运输厅, 海口, 海南 570204, 中国.
张福强, 海南省交通运输厅, 海口, 海南 570204, 中国.
电子邮件地址: ysf@gl.chd.edu.cn; 992387012@qq.com
电子邮件地址: ysf@gl.chd.edu.cn; 992387012@qq.com
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作者: Wang Yongdan; Liu Ziming; Hao Peiwen

作者: 王泳丹; 刘子铭; 郝培文

标题: Self-healing Behavior of Fatigue Damage in Asphalt Binders:Theoretical Studies, Evaluation Approaches, Influencing Factors, Numerical Simulation

标题: 综论沥青的疲劳损伤自愈合行为:理论研究,评价方法,影响因素,数值模拟

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作者关键词: asphalt self-healing; fatigue damage; behavior theory; evaluation method; affecting factors; numerical simulation

作者关键词: 沥青自愈合; 疲劳损伤; 行为理论; 评价方法; 影响因素; 数值模拟

摘要: Asphalt concrete is one of the most common road construction materials. Asphalt pavement is widely used in high-grade highways in China due to its advantages of driving comfort, low noise and wear resistance. Under the repeated action of vehicle load and ambient temperature, asphalt pavement is prone to fatigue damage. If it is not detected in time, accumulated fatigue damage will result in cracks, which reduces pavement service life and endangers driving safety. Meanwhile, it has been found that asphalt concrete is capable of self-healing in terms of strength and cracks under certain conditions. This self-healing ability is likely to be derived from asphalt binder. Aiming at prolonging the service life of asphalt pavement and reducing the maintenance cost during operation, great efforts have been put in the study on self-healing characteristics of asphalt materials in recent years. Taking the combined indoor laboratory test and physical phase technology as

research methods, the self-healing evaluation index of asphalt fatigue damage based on mechanics and energy is proposed, the impacts of chemical composition, modifier, external environment and loading method of asphalt are studied, and attempts have been made to explain the process of fatigue damage healing of asphalt by means of macroscopic and microscopic theoretical perspectives. Presently, the applicability of the evaluation method and evaluation index of fatigue damage healing of asphalt has not yet been demonstrated and needs to be further explored. Based on the above problems, further researches on the self-healing behavior of fatigue damage in asphalt have been carried out. Results show that macro-micro mechanics, molecular diffusion and other theories can explain the fatigue damage recovery behavior and micro-interface healing behavior of asphalt to some extent. Taking shearing, fracture test, phase technology of asphalt as research methods, the self-healing behavior of asphalt can be evaluated from different angles by employing the mechanical and energy indicators. Meanwhile, fatigue damage behavior equation and molecular dynamics simulation have been applied to simulate the healing process of asphalt. Combining the theoretical equations with molecular-scale simulation, the macroscopic and microscopic self-healing behavior of asphalt can be numerically characterized. These research results would contribute to the study of its evolution mechanism and characteristic description. Referring to the domestic and foreign research results, we review the progress in the self-healing behavior of fatigue-damage of asphalt binders, including asphalt self-healing theory, evaluation methods and indexes, influencing factors, numerical simulation, as well as point out its future research direction.

摘要: 沥青混凝土是常见的筑路材料之一, 沥青路面以其行车舒适、低噪声、耐磨耗等优势被广泛应用于我国高等级公路。在车辆荷载及环境温度的反复作用下, 沥青路面易产生疲劳损伤, 若未及时察觉, 疲劳损伤会不断累积汇集产生裂缝, 降低路面的使用寿命, 危及行车安全。与此同时, 研究者通过试验发现, 在一定条件下, 沥青混凝土具有强度恢复及裂缝自修复能力, 这种自愈合能力与胶结料沥青有较大关系。因此, 为延长沥青路面使用寿命, 降低运营过程中的养护成本, 沥青的自愈合特性成为近年来国内外研究的热点问题。研究者结合室内试验与现代物相技术, 提出基于力学、能量角度的沥青疲劳损伤自愈合评价指标, 研究了沥青化学组成、改性剂、外界环境及加载方式等因素的影响, 并试图借助宏观、微观理论解释沥青疲劳损伤愈合的过程。目前, 关于沥青疲劳损伤愈合的评价方法、评价指标的有效性及理论模型的适用性尚未有定论, 仍需进一步探索。基于上述问题, 研究者对沥青疲劳损伤自愈合行为及相关理论开展进一步研究。研究结果表明, 宏微观力学、分子扩散等理论可从一定程度上解释沥青疲劳损伤强度恢复行为和微观界面愈合行为。将沥青剪切、断裂试验和现代物相技术等作为研究方法, 采用力学、能量等指标可从不同角度对沥青的自愈特性进行评价。同时采用疲劳损伤愈合行为方程及分子动力学模拟作为愈合过程数值模拟, 将基本理论方程与分子尺度模拟结合, 对沥青宏观及微观愈合行为进行数值表征, 研究结果为其演化机制及特性描述提供参考。本文参考国内外研究成果, 综述了沥青疲劳损伤自愈合特性的研究现状, 其中包括沥青自愈合行为理论、沥青疲劳损伤自愈合能力评价方法及指标、沥青疲劳损伤自愈合特性影响因素、沥青疲劳损伤自愈合行为数值表征, 最后展望了其未来的研究方向。

入藏号: CSCD:6494134

地址: Wang Yongdan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Hao Peiwen, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Ziming, School of Transportation, Southeast University, Nanjing, Jiangsu 210096, China.

地址: 王泳丹, 长安大学公路学院, 西安, 陕西 710064, 中国.

郝培文, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘子铭, 东南大学交通学院, 南京, 江苏 210096, 中国.

电子邮件地址: pwhao@chd.edu.cn

电子邮件地址: pwhao@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Chen Qian; Wang Chaohui; Fan Zhentong; Hou Rongguo; Chen Jiao

作者: 陈谦; 王朝辉; 樊振通; 侯荣国; 陈姣

标题: The Estimation Model of Heat Conduction Effect for Combination Structure with Conductive Gussasphalt Concrete

标题: 浇注式导电沥青混凝土组合结构热传导效应预估模型

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作者关键词: road material; conductive gussasphalt concrete; bridge deck pavement; estimation model; heat conduction effect; snow melting time

作者关键词: 道路材料; 浇注式导电沥青混凝土; 桥面铺装; 预估模型; 热传导效应; 融雪化冰工作时间

摘要: To determine the heat conduction effect and the snow melting time of combination structure with conductive gussasphalt concrete, the heat conduction principle of combination structure with conductive gussasphalt concrete was studied systematically. The estimation model of heat conduction effect for the upper layer on the combination structure with conductive gussasphalt concrete was established. The surface temperatures on the upper layer of the combination structure were measured and estimated at different ambient temperature, thickness of structure layer and electrified time. The snow melting time of conductive gussasphalt concrete was determined. The accuracy of the estimation model for combination structure with conductive gussasphalt concrete was analyzed and verified with pearson correlation method. It lays a foundation for the popularization and application of conductive gussasphalt concrete in the field of bridge deck pavement. The results show that the heat conduction process of the combination structure with conductive gussasphalt concrete is a heat conduction process with transient and unsteady. At different environment conditions, the surface temperatures on the upper layer of the combination structure can be divided into three stages, such as the initial rise, the mid-term turn, and the later

decline. Their estimation errors are maintained at 0.2-0.8 °C ,0.3-1.2 °C and 0.7-5.5 °C, respectively. The estimation error of snow melting time is maintained at about 16 min. At different ambient temperature, thickness of structure layer and electrified time, the coefficients (R) between the test values and estimation values calculated of surface temperatures for combination structure with conductive gussasphalt concrete by the estimation model are between 0.974 0 and 0.989 0. The conspicuous level values (P) are less than 0.01 and the judgment coefficients (R2) are between 0.948 7 and 0.978 1. It means that there is a good correlation between estimation values and test values. That is to say, the estimated result is accurate.

摘要: 为进一步确定浇注式导电沥青混凝土组合结构热传导效应及融雪化冰工作时间,系统研究了浇注式导电沥青混凝土组合结构传热基本原理,建立了浇注式导电沥青混凝土组合结构上面层热传导效应预估模型,分别实测和预估了不同环境温度、结构层厚度及通电时间等条件下组合结构上面层的表面温度,确定了浇注式导电沥青混凝土融雪化冰工作时间,并采用 pearson 相关性检验方法,对比分析及验证了浇注式导电沥青混凝土组合结构的热传导效应预估模型的准确性,为浇注式导电沥青混凝土在桥面铺装领域的推广应用奠定基础。结果表明:浇注式导电沥青混凝土组合结构传热过程是一种瞬态非稳态导热过程,不同环境条件下,组合结构上面层表面温度在初期上升、中期转折、后期下降等三阶段的预估误差分别维持在 0.2~0.8 °C、0.3~1.2 °C 和 0.7~5.5 °C,其融雪化冰工作时间预估误差则维持在 16 min 左右;不同环境温度、结构层厚度和通电时间等条件下,预估模型得出的组合结构上面层表面温度的预测值与实测值相关系数介于 0.974 0~0.989 0 之间,相应 P 值均小于 0.01,判定系数 R2 介于 0.948 7~0.978 1 之间,两者为显著相关,拟合优度较高,预估结果较为准确。

入藏号: CSCD:6494155

地址: Chen Qian, School of Highway, Changan University, Xi'an, Shaanxi 710064, China.

Wang Chaohui, School of Highway, Changan University, Xi'an, Shaanxi 710064, China.

Fan Zhentong, School of Highway, Changan University, Xi'an, Shaanxi 710064, China.

Hou Rongguo, Research Institute of Highway, Ministry of Transport, Beijing 100088, China.

Chen Jiao, School of Highway, Changan University;; ZHONGJIAOTONGLI Construction Co., Ltd. ;; Xi'an;; Xi'an, ;; 710064;; 710075.

地址: 陈谦, 长安大学公路学院, 西安, 陕西 710064, 中国.

王朝辉, 长安大学公路学院, 西安, 陕西 710064, 中国.

樊振通, 长安大学公路学院, 西安, 陕西 710064, 中国.

侯荣国, 交通运输部公路科学研究院, 北京 100088, 中国.

陈姣, 长安大学公路学院;; 中交通力建设股份有限公司, ;; 西安;; 西安, ;; 710064;; 710075.

电子邮件地址: wchh0205@chd.edu.cn

电子邮件地址: wchh0205@chd.edu.cn

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作者: Xu Hanzheng; Cai Changwei; Li Haoshi

作者: 许汉铮; 蔡昌伟; 李浩师

标题: Comparative Analysis on Calculation Method of Tied Arch's Suspension Rod

标题: 系杆拱桥吊杆索力计算方法对比分析研究

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作者关键词: bridge engineering; bottom-through steel box tied arch; difference iteration method; forward iteration method; construction cable force; comparative and analytic research

作者关键词: 桥梁工程; 下承式钢箱系杆拱; 差值迭代法; 正装迭代法; 施工索力; 对比分析研究

摘要: The inner part of bottom-through steel box tied arch bridge belongs to complex high-order statically indeterminate space structure. In order to determine the suspender tension force more quickly and accurately during the construction of tied arch bridge, the finite element method was used to simulate the tensioning process of the whole suspender. The difference iteration method and the forward iteration method were used to calculate the reasonable construction cable force respectively. The structure internal force and deformation difference of the tie rod and arch rib in the construction process and the bridge state were compared and analyzed, and the applicability of these two methods was discussed. The research results indicate that the difference iteration method is simpler than the forward iteration method in calculation, and the construction cable force is uniform. The internal force and deformation of the whole structure are better than the forward iteration method. It can provide practical reference value for the optimization of the construction cable force of similar bridges.

摘要: 下承式钢箱系杆拱桥内部属于复杂的高次超静定空间结构。为更快、更精确地确定系杆拱桥施工阶段吊杆张拉索力,采用有限元法对整个吊杆张拉过程进行模拟,利用差值迭代法和正装迭代法分别计算合理施工索力。对比分析施工过程及成桥状态下系杆、拱肋内力及变形差异,探讨这两种方法的适用性。研究结果表明:差值迭代法较正装迭代法计算简单,施工索力值均匀,整体结构内力、变形优于正装迭代法,能为同类桥梁的施工索力优化提供实用参考价值。

入藏号: CSCD:6493240

地址: Xu Hanzheng, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Cai Changwei, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Haoshi, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 许汉铮, 长安大学公路学院, 西安, 陕西 710064, 中国.

蔡昌伟, 长安大学公路学院, 西安, 陕西 710064, 中国.

李浩师, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: 897692148@qq.com; caichangwei0329@163.com

电子邮件地址: 897692148@qq.com; caichangwei0329@163.com

使用次数 (最近 180 天): 0

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作者: Dai Jie; Qin Fengjiang; Di Jin; Chen Yongrui

作者: 戴杰; 秦凤江; 狄谨; 陈永瑞

标题: Review on Cable Force Optimization Method for Cable-stayed Bridge in Completed Bridge State

标题: 斜拉桥成桥索力优化方法研究综述

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语言: Chinese

文献类型: Review

作者关键词: bridge engineering; cable-stayed bridge; review; completed bridge state; cable force optimization

作者关键词: 桥梁工程; 斜拉桥; 综述; 成桥状态; 索力优化

摘要: To better understand the cable force optimization problem of cable-stayed bridges in the complete bridge state, research progress and results of cable force optimization methods for such bridges were systematically reviewed in this paper. These cable force optimization methods were classified into specified structure state methods, minimum bending energy (moment) method, mathematical optimization methods, influence matrix method, and step-by-step optimization methods. Based on this classification, the solution objective and calculation process of each method were elaborated considering the determination principles of cable-stayed bridges in the reasonably complete bridge state. The characteristics, applicable scopes, and limitations of each method were summarized. The status quo and development trend of these cable force optimization methods were further discussed. The results show that the optimization methods with specified structure state have definite objectives and mechanical concepts and their calculation process is convenient. However, it is difficult to obtain globally reasonable results because the stress and deformation of girder and pylon cannot be considered simultaneously. Currently, they are used to determine the initial completed bridge state of cable-stayed bridge. The objective function of the minimum bending energy method comprehensively considers the stress and deformation of girder and pylon, reflects the essential characteristics of cable force optimization, and obtains reasonable

optimization results. However, the obtained results need to be subsequently adjusted when there are no constraints. This method is used to determine the initial completed bridge state of cable-stayed bridge. The applicability of mathematical optimization method is strong in this type of bridge because the objective function, constraint condition, and optimization algorithm can be selected according to the structural characteristics of different types of cable-stayed bridges and the obtained results consider the stress and deformation of each component of this bridge. The intelligent optimization algorithms have good global convergence, versatility, and convenience for parallel processing. They are widely used in the field of cable force optimization for cable-stayed bridge and structure optimization design. The influence matrix is a link between the cable force and the objective function. It is a comprehensive cable force optimization tool. However, it can only solve the problems under the premises of a definite objective and constraint conditions. The step-by-step optimization methods integrate the advantages of various optimization methods. According to the stress and deformation demands of different types of cable-stayed bridges, the cable forces of the cable-stayed bridge in completed bridge state can be comprehensively optimized by selecting different methods step-by-step. To adapt to the development of large span, slender girder, and diversification of structure system of cable-stayed bridge, more applicable and targeted optimization algorithms and coupling optimization of completed bridge state construction state should be explored. More intelligent optimization algorithms should be applied to the cable force optimization of cable-stayed bridge. Mathematical optimization algorithms should be embedded into finite element programs. These are the future development directions in this field.

摘要: 为了深化对斜拉桥成桥索力优化问题的认识,系统回顾斜拉桥成桥索力优化方法的研究进展与代表性研究成果;在将斜拉桥成桥索力优化方法分为指定结构状态的优化方法、弯曲能量(弯矩)最小法、数学优化方法、影响矩阵法、分步优化方法的基础上,根据斜拉桥合理成桥状态的确定原则阐述各类方法的求解思路与优化过程,并总结各类方法的特点、适用范围以及局限性;探讨斜拉桥成桥索力优化领域的未来发展趋势。研究结果表明:指定结构状态的优化方法其优化目标明确,力学概念清晰,计算方便,但无法兼顾主梁和桥塔的受力和变形,很难获得全局合理的结果,目前仅用于初定斜拉桥成桥状态;弯曲能量最小法的目标函数综合考虑了主梁和桥塔的受力和变形,体现了索力优化的本质特征,能够获得较为合理的优化结果,但在不添加任何约束条件时所得结果仍需进行后续调整,目前也多用于初定斜拉桥成桥状态;数学优化方法可根据不同类型斜拉桥的结构特点选择目标函数、约束条件与优化算法,所得结果也可兼顾斜拉桥各个构件的受力和变形,适用性较强,智能优化算法因其较好的全局收敛性、通用性和便于并行处理等特点,使得其在斜拉桥成桥索力优化乃至结构优化设计领域中的应用越来越广泛;影响矩阵是建立索力与目标函数关系的纽带,是一种综合的索力优化工具,但它需要在明确优化目标与约束条件的前提下求解;分步优化方法融合了多种优化方法的优势,可根据不同类型斜拉桥的受力和变形要求,分步骤选择不同方法全面优化斜拉桥的成桥索力;为适应斜拉桥大跨径化、主梁纤细化以及结构体系多样化的发展趋势,探索针对性或普适性更强的成桥索力优化方法、斜拉桥成桥状态与施工状态耦合优化、将更多优秀的智能优化算法应用于斜拉桥索力优化以及将数学优化算法与有限元程序进行嵌入式融合等问题均是该领域未来的发展方向。

入藏号: CSCD:6490471

地址: Dai Jie, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Yongrui, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Qin Fengjiang, Chongqing University;; School of Civil Engineering, Chongqing University, Key

Laboratory of New Technology for Construction of Cities in Mountain Area;; ;;
Chongqing;;Chongqing 400044;;400044.

Di Jin, Chongqing University;;School of Civil Engineering,Chongqing University, Key
Laboratory of New Technology for Construction of Cities in Mountain Area;; ;;
Chongqing;;Chongqing 400044;;400044.

地址: 戴杰, 长安大学公路学院, 西安, 陕西 710064, 中国.

陈永瑞, 长安大学公路学院, 西安, 陕西 710064, 中国.

秦凤江, 重庆大学;;重庆大学土木工程学院, 山地城镇建设与新技术教育部重点实验室;; ;;
重庆;;重庆 400044;;400044, 中国.

狄谨, 重庆大学;;重庆大学土木工程学院, 山地城镇建设与新技术教育部重点实验室;; ;; 重
庆;;重庆 400044;;400044, 中国.

电子邮件地址: counter_dj@163.com; qinfengjiang@cqu.edu.cn

电子邮件地址: counter_dj@163.com; qinfengjiang@cqu.edu.cn

使用次数 (最近 180 天): 2

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作者: You Qinglong; Qiu Xin; Yang Qing; Wu Jinhong

作者: 游庆龙; 邱欣; 杨青; 吴金洪

标题: Strength Properties of Ionic Soil Stabilizer Treated Red Soil

标题: 离子土壤固化剂固化红黏土强度特性

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作者关键词: road engineering; stabilized soil; experimental research; ionic soil stabilizer; red soil;
compressive strength

作者关键词: 道路工程; 加固土; 试验研究; 离子土壤固化剂; 红黏土; 抗压强度

摘要: To study the strength performance of red soil treated by the liquid Ionic Soil Stabilizer,red
soil obtained from the area of Jinhua in Zhejiang province was treated with the stabilizer produced
by Road Bond Corporation of USA.Under conditions of optimal Ionic Soil Stabilizer
contents,varying amounts of Portland cement or lime were added to the sample soil,molding
specimens of two different compaction degrees(96%,98%).Subsequently,different tests,such as,the

resilient modulus test,compressive strength test,splitting strength test,and freeze-thaw strength test were conducted on the solidified soil mixture.Next,the varying intensities of the red soil reinforced by the Ionic Soil Stabilizer was analyzed and verified on a test road.The results show that after the addition of ionic soil-curing agent in the red soil,the plasticity index of the soil decreases to form a denser structure.Adding Ionic Soil Stabilizer along with cement or lime modifies the compressive modulus of resilience of the mixture.Under the same conditions,the compressive modulus of resilience increases in range when lime is added in a greater proportion than cement.The influence of the degree of compaction is significantly greater for the 7d's unconfined compressive strength for mixtures of different ratios-98% versus 96%.Moreover,adding Ionic Soil Stabilizer,cement,or lime can also increase the splitting strength of the specimen.An increase in the content of cement increases the freeze-thaw damage BDR.The tests show that the compaction degree needs to be strictly controlled.

摘要: 为研究液态离子型土壤固化剂加固红黏土强度特性,采用美国 Road Bond 公司生产的液态离子型土壤固化剂对浙江金华地区的红黏土进行加固。在试验确定的最佳离子土壤固化剂掺量 0.014%条件下,通过在试样土中加入不同掺量水泥、石灰,成型 2 种不同压实度 (96%、98%)试件,分别进行固化土混合料的抗压回弹模量、抗压强度、劈裂强度和冻融强度试验,分析离子土壤固化剂加固红黏土强度变化规律,并铺筑试验路进行验证。研究结果表明:红黏土中加入离子土壤固化剂后,其塑性指数有所降低,形成更为密实结构,固化剂、水泥或石灰的掺入都能增加混合料的抗压回弹模量,且在其他条件相同的情况下,掺入石灰对抗压回弹模量的增强效果优于水泥;各配合比混合料的 7d 无侧限抗压强度受压实度影响较为显著,98%压实度固化效果优于 96%压实度,固化剂、水泥、石灰的掺入均可较好提升试件的劈裂强度,随着水泥掺量的增加,其冻融抗压强度损失 BDR 也随之提高,其抗冻性能越好。结合现场试验路的情况,建议在实际工程中严格控制其压实度。

入藏号: CSCD:6490475

地址: You Qinglong, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Qiu Xin, School of Engineering,Zhejiang Normal University, Jinhua, Zhejiang 321004, China.

Yang Qing, School of Engineering,Zhejiang Normal University, Jinhua, Zhejiang 321004, China.

Wu Jinhong, School of Engineering,Zhejiang Normal University, Jinhua, Zhejiang 321004, China.

地址: 游庆龙, 长安大学公路学院, 西安, 陕西 710064, 中国.

邱欣, 浙江师范大学工学院, 金华, 浙江 321004, 中国.

杨青, 浙江师范大学工学院, 金华, 浙江 321004, 中国.

吴金洪, 浙江师范大学工学院, 金华, 浙江 321004, 中国.

电子邮件地址: youqinglong0730@163.com

电子邮件地址: youqinglong0730@163.com

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 1

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作者: Liang Zhilei; Song Yifan; Yan Lei

作者: 梁志磊; 宋一凡; 闫磊

标题: Study on Positioning and Adjusting Method of Datum Strands for Suspension Bridge

标题: 悬索桥基准索股定位与调整方法研究

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作者关键词: bridge engineering; effect formula; parametric analysis; datum strands; strand adjustment formula; suspension bridge; construction control

作者关键词: 桥梁工程; 影响公式; 参数分析; 基准索股; 调索公式; 悬索桥; 施工控制

摘要: The geometric shape of datum strands of suspension bridge varies with the span, temperature and height difference of the two ends. In order to realize rapidly positioning and adjustment of datum strands of suspension bridge at the construction site, a set of effective and practical calculation method for construction control of geometric shape of datum strands is studied. The shape calculation program of cable strand considering the change of tangent point is compiled through theoretical derivation, and the effect formula for calculating the midspan elevation of the cable strand and the strand adjustment formula based on the catenary theory are established. Taking a suspension bridge as the engineering background, the parametric analysis is carried out, the formulas of the mid span elevation of cable strands varies with span length, temperature and height difference between two ends are obtained, whose calculation result is compared with those by the traditional parabolic and catenary formulas. The result shows that (1) the calculation result of the calculation program of cable strand geometric shape considering the change of saddle tangent point is in good agreement with the design result, the error is in millimeter order, it has higher accuracy; (2) compared with the traditional parabolic and catenary formulas, the influence coefficient of mid-span elevation of cable strands considering the change of tangent position varies with the influencing factors, and the shape of influence coefficient can be approximated as an oblique line; (3) the mid-span elevation of cable strands is sensitive to the changes of temperature and the distance between the two ends of the cable strands, the influence coefficient is about 2, so the temperature of cable strands and the displacement of main pylon should be strictly monitored and some effective measures should be taken when necessary in the construction; (4) whether the cable strand span, temperature and the difference between the two ends are individually and arbitrarily changed, or any combination changes, the effect formula and the strand adjustment formula can guarantee certain precision, the error is not more than 0.2%, while the maximum error of the catenary formula is 0.81%, and the maximum error of the parabolic formula is 8%, they cannot meet the requirements of engineering accuracy.

摘要: 悬索桥基准索股线形随着索股跨度、温度及两端高差变化而变化,为实现悬索桥基准索股现场的快速定位与调整,研究一套高效、实用的基准索股线形施工控制计算方法。通过理

论推导编制了考虑索鞍切点变化的索股线形计算程序,建立了基于悬链线理论的索股跨中标高影响公式和调索公式。以某悬索桥为工程背景,进行参数分析,得到索股跨中标高随索股跨度、温度、两端高差变化的影响公式,与传统的抛物线、悬链线公式计算结果进行对比分析,结果表明:考虑索鞍切点变化的索股线形计算程序的计算结果与设计结果吻合较好,误差为毫米级,具有较高的精度。与传统抛物线、悬链线公式相比,考虑切点位置变化的索股跨中标高影响系数随着影响因素的变化而变化,可近似为斜直线。索股跨中标高对温度和索股两端间距的变化比较敏感,影响系数在 2 左右,施工中应对桥塔偏位和温度进行严格的监测,必要时采取相应调整措施。无论索股跨度、温度及两端高差单独发生任意变化,还是发生任意组合变化,该影响公式和调索公式都能保证一定的精度,误差不超过 0.2%,而悬链线公式最大误差为 0.81%,抛物线公式最大误差达到 8%,此时已经不能满足工程精度的要求。

入藏号: CSCD:6490678

地址: Liang Zhilei, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Song Yifan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Yan Lei, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 梁志磊, 长安大学公路学院, 西安, 陕西 710064, 中国.

宋一凡, 长安大学公路学院, 西安, 陕西 710064, 中国.

闫磊, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: zhileiliang@163.com

电子邮件地址: zhileiliang@163.com

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作者: Shen Aiqin; Liu Bo; Guo Yinchuan; Yu Peng; Yu Muyang

作者: 申爱琴; 刘波; 郭寅川; 于澎; 喻沐阳

标题: Skid Resistance Attenuation of Steel Slag Asphalt Mixtures on Tunnel Pavement

标题: 隧道路面钢渣沥青混合料抗滑性能衰减试验研究

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作者关键词: road engineering; tunnel pavement; steel slag asphalt mixture(SSAM); skid resistance; attenuation law; attenuation mechanism

作者关键词: 道路工程; 隧道路面; 钢渣沥青混合料; 抗滑性能; 衰减规律; 衰减机理

摘要: The attenuation process of skid resistance of tunnel steel slag asphalt pavements was

simulated by the indoor accelerating wear instrument. The skid resistance attenuation rule of steel slag asphalt mixtures (SSAM) with different contents of steel slag, different loads, and different temperatures was studied. The skid resistance attenuation progress and mechanism of SSAM was analyzed by scanning electron microscopy (SEM) and mercury intrusion porosimetry (MIP). The results show that the addition of steel slag improves the skid resistance of the asphalt mixture from final attenuation value, loss rate and decay rate. The skid resistance of SSAM shows a trend of first increasing and then decreasing with the addition of steel slag, and there is an inflection point at the 50% steel slag content. The effect of load against skid resistance is mainly reflected in the second to fifth stages of the attenuation process. The effect of temperature against skid resistance is mainly reflected in the first stage. The surface texture of steel slag aggregate is complex, and its hole structure and grading are more reasonable, which improve the adhesive property of the SSAM asphalt film and the stability of the SSAM skid resistance.

摘要: 利用室内加速磨损仪模拟了隧道钢渣沥青路面的抗滑性能衰减过程,研究了钢渣沥青混合料(SSAM)在不同钢渣掺量、不同荷载和不同温度条件下的抗滑性能衰减规律,并且结合扫描电镜(SEM)及压汞(MIP)试验,分析了 SSAM 抗滑性能衰减过程及机理.结果表明:钢渣的掺入从衰减终值、损失率和衰减速率 3 个方面提高了沥青混合料的抗滑性能;SSAM 抗滑性能随钢渣掺量的增加呈现先升后降趋势,在 50%钢渣掺量处出现拐点;荷载对 SSAM 抗滑性能的影响主要表现在衰减过程的第 2 阶段至第 5 阶段,温度对 SSAM 抗滑性能的影响主要表现在第 1 阶段;钢渣集料表面纹理丰富,孔结构和孔级配更合理,从而改善了 SSAM 沥青膜的黏结性,提高了 SSAM 抗滑性能的稳定性的稳定性.

入藏号: CSCD:6486196

地址: Shen Aiqin, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Bo, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Guo Yinchuan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Yu Muyang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Yu Peng, Northwest Branch, China Airport Construction Group Corporation, Xi'an, Shaanxi 710064, China.

地址: 申爱琴, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘波, 长安大学公路学院, 西安, 陕西 710064, 中国.

郭寅川, 长安大学公路学院, 西安, 陕西 710064, 中国.

喻沐阳, 长安大学公路学院, 西安, 陕西 710064, 中国.

于澎, 中国民航机场建设集团西北分公司, 西安, 陕西 710064, 中国.

电子邮件地址: saq6305@163.com

电子邮件地址: saq6305@163.com

使用次数 (最近 180 天): 2

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作者: Bai Hua; Ma Tengfei; Yang Pengrui; Liu Jianxin

作者: 白桦; 马腾飞; 杨鹏瑞; 刘健新

标题: Impact of ancillary facilities on Reynolds number effect of aerostatic coefficients for approximate streamlined bridge

标题: 附属设施对近流线形桥梁三分力的雷诺数效应影响研究

来源出版物: 振动工程学报 卷: 32 期: 2 页: 340-349 出版年: 2019

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作者关键词: bridge engineering; wind tunnel test; Reynolds number effect; railing; maintenance track

作者关键词: 桥梁工程; 风洞试验; 雷诺数效应; 栏杆; 检修车轨道

摘要: Increasing the surface roughness of structures is an effective method to suppress the Reynolds number effect of the approximate streamlined bridge. The deck railing, maintenance track and other ancillary facilities can change the appearance of the bridge and increase the roughness of the approximate streamlined cross-section. In this paper, the impacts of the deck railing, maintenance track and other ancillary facilities on the Reynolds number effect of the approximate streamlined bridge cross-section are studied via large-scale model wind tunnel test of force and pressure measurements. The results show that the maintenance track can increase the Reynolds number effect of the drag coefficient of the streamlined bridge under the condition of 0° wind attack angle and suppress the Reynolds number effect of the drag coefficient at the other wind attack angles. The impact of the railing on the Reynolds number effect of the drag coefficient is small. The impact of the maintenance track and railing on the Reynolds number effect of the lift coefficient at negative wind attack angles is very small. The maintenance track can suppress the Reynolds number effect of the lift coefficient at positive wind attack angles and the deck railing can increase the Reynolds number effect of the lift coefficient at positive wind attack angles. Both the maintenance track and the railing can suppress the Reynolds number effect of the lifting moment coefficient at negative wind attack angles and increase the Reynolds number effect of the pitch moment coefficient at positive wind attack angles. In order to reduce the impact of the Reynolds number effect, the critical Reynolds number critical of the cylinder should be avoided as far as possible in wind tunnel test.

摘要: 增大结构表面粗糙度是抑制近流线形桥梁雷诺数效应的有效方法。桥面栏杆、检修车轨道等附属设施也会改变桥梁外形,增大近流线形断面的粗糙程度。通过大比尺模型测压与测力试验,研究栏杆、检修车轨道等附属结构对近流线形桥梁断面雷诺数效应的影响。结果表明:检修车轨道会增大近流线形桥梁 0° 攻角阻力系数雷诺数效应,抑制其余攻角阻力系数雷诺数效应。栏杆对阻力系数雷诺数效应影响很小。检修车轨道与栏杆对负攻角的升力系数雷诺数效应影响很小,检修车轨道会抑制正攻角升力系数的雷诺数效应。栏杆会增大正攻角升力系数的雷诺数效应。检修车轨道与栏杆均会抑制负攻角升力矩系数的雷诺数效应,增大

正攻角升力矩系数的雷诺数效应。为减小雷诺数效应影响,风洞试验应尽可能避开圆柱临界雷诺数区。

入藏号: CSCD:6485401

地址: Bai Hua, School of Highway, Chang'an University, Research Center of Highway Large Structure Engineering on Safety, Xi'an, Shaanxi 710064, China.

Ma Tengfei, School of Highway, Chang'an University, Research Center of Highway Large Structure Engineering on Safety, Xi'an, Shaanxi 710064, China.

Yang Pengrui, School of Highway, Chang'an University, Research Center of Highway Large Structure Engineering on Safety, Xi'an, Shaanxi 710064, China.

Liu Jianxin, School of Highway, Chang'an University, Research Center of Highway Large Structure Engineering on Safety, Xi'an, Shaanxi 710064, China.

地址: 白桦, 长安大学公路学院, 公路大型结构安全教育部工程中心, 西安, 陕西 710064, 中国.

马腾飞, 长安大学公路学院, 公路大型结构安全教育部工程中心, 西安, 陕西 710064, 中国.

杨鹏瑞, 长安大学公路学院, 公路大型结构安全教育部工程中心, 西安, 陕西 710064, 中国.

刘健新, 长安大学公路学院, 公路大型结构安全教育部工程中心, 西安, 陕西 710064, 中国.

电子邮件地址: baihua9810@163.com

电子邮件地址: baihua9810@163.com

使用次数 (最近 180 天): 0

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作者: Pei Jianzhong; Wang Yansong; Zhu Chundong; Li Yang; Lyu Lei; Li Rui; Zhang Jiupeng

作者: 裴建中; 王彦淞; 朱春东; 李阳; 吕磊; 李蕊; 张久鹏

标题: Research Progress on Automobile Exhaust Pavement Purification Materials

标题: 汽车尾气路面净化材料研究进展与思考

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作者关键词: road engineering; automobile exhaust purification material; review; mechanism; development direction; application prospect

作者关键词: 道路工程; 汽车尾气净化材料; 综述; 机理; 发展方向; 应用前景

摘要: The emission of automobile exhaust gas seriously affects air quality and endangers human health. The automobile industry has made significant effort to reduce exhaust emissions, including in-machine purification and off-board purification. As the nearest contact location after exhaust emissions, road surfaces are an effective way to reduce exhaust and have been a hot topic of recent international research. To understand the development of automotive exhaust gas pavement purification materials, this paper systematically reviews the research progress, problems, and application prospects of catalytic materials used in automobile exhaust gas purification. The catalytic materials include titanium dioxide-based photocatalysts, noble metal catalysts, ABO₃ perovskite catalysts, and mesoporous materials catalysts. The mechanism, advantages, and disadvantages of different catalysts were analyzed. Because of the open conditions of roads, there may be insufficient contact between the purification material and exhaust gas, and the catalyst may easily reach its own purification limit. Based on the improved technology of high-efficiency exhaust gas purification materials, the development of automobile exhaust pavement purification materials was proposed, namely, by reducing the amount of precious metals, developing new rare-earth composite oxidation photocatalytic materials, and by diversified and functional development. Research in this field shows high potential for application of the pavement exhaust gas purification technology.

摘要: 汽车尾气的排放严重影响空气质量,危害人类身体健康。为了减少尾气排放,汽车领域做了很多努力,包括机内净化与机外净化。作为尾气排放后最近的接触源,从道路角度切入进行治理,也被认为是行之有效的途径,近年来一直是国际上研究的热点领域。为了深入了解汽车尾气路面净化材料的发展,系统地梳理并回顾了汽车尾气净化过程中使用的催化材料的研究进展、面临的问题以及应用前景。催化材料主要包括二氧化钛基催化剂、贵金属催化剂、ABO₃ 钙钛矿结构催化剂、介孔材料催化剂以及其他催化剂,分析了不同催化剂的作用机理以及优缺点。由于道路实际的开放条件、尾气净化材料与尾气接触不够充分、易于达到自身净化极限等问题,从梳理高效路面尾气净化材料的改善技术出发,提出了路面汽车尾气净化材料研究的发展方向,即降低贵金属用量、开发新型稀土复合氧化光催化材料,以及多元化、功能化发展等。这一领域的研究,显示出路面尾气净化技术的光明应用前景。

入藏号: CSCD:6480409

地址: Pei Jianzhong, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Yansong, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhu Chundong, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Yang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Lyu Lei, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Rui, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Jiupeng, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 裴建中, 长安大学公路学院, 西安, 陕西 710064, 中国.

王彦淞, 长安大学公路学院, 西安, 陕西 710064, 中国.

朱春东, 长安大学公路学院, 西安, 陕西 710064, 中国.

李阳, 长安大学公路学院, 西安, 陕西 710064, 中国.

吕磊, 长安大学公路学院, 西安, 陕西 710064, 中国.

李蕊, 长安大学公路学院, 西安, 陕西 710064, 中国.

张久鹏, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: peijianzhong@126.com

电子邮件地址: peijianzhong@126.com

使用次数 (最近 180 天): 0

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作者: Ji Xiaoping; Chen Yun; He Chuang; Zhen Yikang

作者: 纪小平; 陈云; 何创; 甄逸康

标题: Numerical Simulation and Experimental Research on Harvesting Piezoelectric Voltage from Asphalt Pavement

标题: 沥青路面压电输出的数值模拟与试验

来源出版物: 中国公路学报 卷: 32 期: 4 页: 130-136,169 出版年: 2019

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文献类型: Article

作者关键词: road engineering; asphalt pavement; numerical simulation; piezoelectric voltage; energy harvesting

作者关键词: 道路工程; 沥青路面; 数值模拟; 压电输出; 能量收集

摘要: A numerical simulation method to model the harvest of piezoelectric voltage from asphalt pavement using ABAQUS was established. The effects of the properties and parameters of embedded piezoelectric transducers, pavement structure and temperature, and traffic loads on the piezoelectric voltage from asphalt pavement were investigated, given the significance of their influence on the optimization of the piezoelectric energy collection system. The numerical simulation results were compared against the piezoelectric voltage output of the asphalt mixture tested using the rutting test to verify its reliability. The simulation results indicate that the PZT-5X transducer achieves the maximum piezoelectric voltage, which is 1.77 and 1.97 times those achieved by PZT-4 and PZT-5H, respectively, because PZT-5X has the relatively low elastic modulus and the highest piezoelectric parameters among the three materials tested. The piezoelectric voltage obtained from the cuboidal and cylindrical piezoelectric transducers is 1.40 times that of the voltage obtained from columnar piezoelectric transducers. Moreover, PZT-5X cylindrical piezoelectric transducers with dimensions of 0.8 cm (inner diameter), 1.6 cm (outer diameter), and 0.2 cm (height) are recommended. The piezoelectric voltage is positively correlated with load and pavement temperature, but is negatively correlated with embedding depth. The flexible pavement structure has a higher piezoelectric voltage output than the semirigid pavement structure. The

measured voltages from the piezoelectric transducers embedded in the sample surface, and from points 1cm below the surface, had errors within 3.9% compared to the numerical simulation results.

摘要: 基于 ABAQUS 建立了沥青路面压电输出(电压)的数值模拟方法,系统地研究了压电换能器属性及铺设参数、路面结构与温度、轴载等对沥青路面压电输出的影响,为优化设计沥青路面压电能收集系统提供参考。通过车辙试验测试了压电式沥青混合料的电压,并与数值模拟结果进行对比,验证数值模拟方法的可靠性。结果表明:路面模型平面尺寸大于 5.0m*5.0m 可保证模拟精度;压电材料 PZT-5X 具有相对较低的弹性模量和最高的压电参数,因此电压最高,其分别是 PZT-4 与 PZT-5H 的 1.77 倍与 1.97 倍;长方体与圆筒形状压电换能器的压电基本一致,均为柱形的 1.40 倍;优先推荐使用内径 0.8cm、外径 1.6cm、高 0.2cm 的圆筒 PZT-5X 压电换能器;电压随轴载与路面温度的增加而增大、随埋置深度的增加而降低,柔性路面结构比半刚性结构的电压大。室内车辙板试件表面和距路表 1cm 处的压电换能器的实测电压与数值模拟结果的误差在 3.9%之内。

入藏号: CSCD:6480413

地址: Ji Xiaoping, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Yun, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

He Chuang, Operation Branch of Guangzhou Expressway Co., Ltd., Guangzhou, Guangdong 511385, China.

Zhen Yikang, Shenzhen Expressway Engineering Consultants Co., Ltd., Shenzhen, Guangdong 518000, China.

地址: 纪小平, 长安大学公路学院, 西安, 陕西 710064, 中国.

陈云, 长安大学公路学院, 西安, 陕西 710064, 中国.

何创, 广州市高速公路有限公司营运分公司, 广州, 广东 511385, 中国.

甄逸康, 深圳高速工程顾问有限公司, 深圳, 广东 518000, 中国.

电子邮件地址: jixp@chd.edu.cn

电子邮件地址: jixp@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Wang Chaohui; Liu Luqing; Han Xiaoxia; Li Tianyu; Han Jiguo

作者: 王朝辉; 刘鲁清; 韩晓霞; 李天宇; 韩继国

标题: Optimization of Surface Modification of Porous Expanded Shale

标题: 路用多孔页岩陶粒表面修饰优化

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作者关键词: 道路工程; 页岩陶粒; 表面修饰; 多孔岩陶粒; 优化; 性能

摘要: In order to improve the road performance and promote the heat resistance of porous expanded shale, and optimization of three organic treatment agents, the best modification process of different treatment agents was determined through water absorption, cylindrical compress strength, control mesh pass rate, and abrasion value. Based on the oil absorption, surface pore blocking rate, and scanning electron microscopy (SEM) test, the pore blocking conditions on the surface of expanded shale before and after modification were systematically studied; the effects of different treatment agents on road performance of expanded shale were compared and evaluated; and the best treatment agent for expanded shale was determined. On this basis, the road performance of expanded shale mixture before and after modification was evaluated in detail. The results showed that, the suitable concentration of phenyl silicone resin for expanded shale is 25%, with curing temperature of 160°C, the suitable concentration of silicone-acrylate emulsion is 35%, with curing temperature of 30°C, the content of auxiliaries is 3%, and the suitable concentration of building waterproofing agent is 35% with curing temperature of 85°C. Phenyl silicone resin has the best encapsulation effect on the surface of expanded shale, along with the lowest oil absorption rate in 24h and surface pore blocking rate as high as 78%. The SEM images show that the number of open pores on the surface of treated expanded shale was significantly reduced. The three treatment agents can improve the road performance of expanded shale in different degrees. The decreased water absorption rate in 24h ranged between 80.48% and 94.5%. The decrease in crushing value ranged between 4.62% and 17.52%. The decrease in abrasion value ranged between 5.33% and 30.92%, and adhesional degree increased by 0.5-2. Phenyl silicone resin has the best effect on improving the water absorption rate and adhesional degree of expanded shale particles. Silicone-acrylate emulsion has the most obvious effect on improving the crushing value and abrasion value. The best treatment agent was determined to be phenyl silicone resin. The road performance of expanded shale mixtures modified by phenyl silicone resin has been improved in different extents.

摘要: 为提高路用多孔页岩陶粒的路用性能并提升其阻热性能, 优选3种有机处理剂, 借助吸水率、筒压强度、控制筛孔通过率及磨耗值试验, 确定了不同处理剂最佳修饰工艺; 基于吸油率、表面孔隙封堵率与SEM试验, 系统研究了修饰前后页岩陶粒表面孔隙封堵情况, 对比评价了不同处理剂对页岩陶粒路用性能的影响规律, 确定了页岩陶粒最佳处理剂; 并在此基础上, 全面评价了表面修饰对页岩陶粒混合料路用性能的影响。结果表明: 苯基硅树脂的适宜浓度为25%, 固化温度为160℃, 硅丙乳液的适宜浓度为35%, 成膜温度为30℃, 助剂含量为3%, 建筑防水剂修饰页岩陶粒的适宜浓度为35%, 固化温度为85℃; 其中苯基硅树脂对页岩陶粒表面封装效果最好, 24h吸油率最低, 表面孔隙封堵率高达78%, 且SEM图像也表明经表面修饰的页岩陶粒表面开口孔隙数量明显减少; 3种处理剂均能不同程度地提高路用多孔页岩陶粒的路用性能, 24h吸水率的降幅在80.48%~94.5%之间, 压碎值降幅在4.62%~17.52%之间, 磨耗值降幅在5.33%~30.92%之间, 黏附性等级提高0.5~2级; 苯基硅树脂对页岩陶粒吸水率与黏附

性等级改善效果最佳,硅丙乳液对压碎值与磨耗值改善效果最为明显,综合考虑所有评价指标,确定了页岩陶粒最佳处理剂为苯基硅树脂;且经苯基硅树脂表面修饰后的页岩陶粒混合料各项路用性能均有不同程度提高。

入藏号: CSCD:6480420

地址: Wang Chaohui, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Luqing, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Han Xiaoxia, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Tianyu, Tianjin Municipal Engineering Design and Research Institute, Tianjin 300051, China.

Han Jiguo, China Academy of Transportation Sciences, Beijing 100029, China.

地址: 王朝辉, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘鲁清, 长安大学公路学院, 西安, 陕西 710064, 中国.

韩晓霞, 长安大学公路学院, 西安, 陕西 710064, 中国.

李天宇, 天津市市政工程设计研究院, 天津 300051, 中国.

韩继国, 交通运输部科学研究院, 北京 100029, 中国.

电子邮件地址: wchh0205@163.com

电子邮件地址: wchh0205@163.com

使用次数 (最近 180 天): 0

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作者: Li Yan; Chen Hong; Sun Xiaoke; Luo Ting; Shi Zhuanzhuan

作者: 李岩; 陈红; 孙晓科; 罗婷; 史转转

标题: An Analysis of Travel Characteristics of Urban Residents Based on Hot Spot Detection Model

标题: 基于热点探测模型的城市居民出行特征分析

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文献类型: Article

作者关键词: traffic engineering; travel of residents; hotspot detection; GPS trajectory of taxis

作者关键词: 交通工程; 居民出行; 热点探测; 出租车 GPS

摘要: Daily travel activities of urban residents present certain regularities and spatial-temporal

characteristics. Current Methods for studying travel characteristics of urban residents are mainly based on clustering algorithms. However, due to complexity of parameters of clustering algorithms, hot spot areas with low value are commonly ignored. Moreover, indiscriminate consideration of travel OD in previous studies makes potential travel characteristics of urban residents cannot be fully studied. To solve these problems, a hotspot detection model based on density field is proposed, and hotspots in density field of boarding and getting off taxis are identified and graded. A case study is conducted based on GPS data of taxis in Xi'an. The results show that: ① the model can solve the problems that low-value hot spots cannot be identified in traditional clustering algorithms; ② changing trends of frequency of boarding and getting off taxis are basically consistent; ③ in spatial distribution, the hotspots of boarding and getting off taxis mainly distribute in service areas and nearby urban arterial roads; ④ according to urban functional areas, service areas with large scale and key nodes of urban road network have higher grade of hotspot, and there is no significant difference between weekdays and weekends; ⑤ business areas have higher grade of hotspot during noon and evening peak hours than which in morning peak hours. Its grade at weekends is significantly higher than that which on weekdays during morning peak hours.

摘要: 城市居民每天的交通出行活动伴随着一定的规律性和时空特征。现阶段对居民出行特征的研究方法中以聚类算法为主。然而由于聚类算法的参数复杂性,使得低值热点区域往往被忽略。此外研究中对出行 OD 的无差别考虑,使得很多居民出行特征不能被充分挖掘。针对这一问题,提出了基于密度场的热点探测模型,分别从出租车上、下车密度场中提取热点并对热点进行分级。并以西安出租车 GPS 数据为例展开实证分析。研究结果表明:①基于密度场的热点探测模型可有效解决传统聚类算法中低值热点无法获取问题;②研究区内城市居民一天中各时段上车频次和下车频次变化趋势基本吻合;③在空间分布上,上下车热点区域集中在交通服务区和城市主干道周围;④结合城市功能定位,大型交通服务区及城市道路关键节点上下车热点等级较高,并且工作日和非工作日无明显差异;⑤商业服务区表现为午、晚高峰的上下车热点等级高于早高峰,非工作日早高峰的上车热点等级明显高于工作日。

入藏号: CSCD:6478013

地址: Li Yan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Hong, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Sun Xiaoke, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Luo Ting, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Shi Zhuanzhuan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 李岩, 长安大学公路学院, 西安, 陕西 710064, 中国.

陈红, 长安大学公路学院, 西安, 陕西 710064, 中国.

孙晓科, 长安大学公路学院, 西安, 陕西 710064, 中国.

罗婷, 长安大学公路学院, 西安, 陕西 710064, 中国.

史转转, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: 1914131366@qq.com; chh@gl.chd.edu.cn

电子邮件地址: 1914131366@qq.com; chh@gl.chd.edu.cn

使用次数 (最近 180 天): 1

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作者: Li Hui; Liu Yongjian; Zhang Ning; Liu Jiang

作者: 李慧; 刘永健; 张宁; 刘江

标题: Experimental study on shear performance of stud shear connector after undergoing freeze-thaw cycles

标题: 冻融循环作用后栓钉连接件受剪性能试验研究

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文献类型: Article

作者关键词: stud shear connector; freeze-thaw cycle; push-out test; shear performance

作者关键词: 栓钉连接件; 冻融循环; 推出试验; 受剪性能

摘要: To study the effect of freeze-thaw cycles on the shear capacity of stud connectors, 12 specimens were made for push-out tests. The main test variable was the number of freeze-thaw cycles (0, 50, 100, 150 times). At the same time, prismatic and cube specimens were made to check the dynamic elastic modulus and the compressive strength of concrete. The test results show that the degradation of stud shear connectors and cubic concrete specimens are more serious with the larger number of freeze-thaw cycles; due to the increasing number of freeze-thaw cycles, the surface failures of concrete are more serious, meanwhile, the relative dynamic modulus of elasticity, compressive strength of concrete specimens, shear bearing capacity and shear stiffness decrease. When the number of freeze-thaw cycles is smaller than 50, their effects on the decrease of shear bearing capacity and shear stiffness are the largest. The effect of freeze-thaw cycles on the cracking load is found to be greater than that on the ultimate load.

摘要: 为了研究冻融循环作用对栓钉连接件受剪性能的影响,制作了12个栓钉连接件,改变冻融循环次数(0、50、100、150次)后进行栓钉连接件推出试验,同时制作棱柱体试块和立方体试块用以检测达到相应的冻融循环次数后混凝土的动弹性模量以及抗压强度。试验结果表明:冻融循环次数越多,栓钉连接件和混凝土试块的损伤越大;随着冻融循环次数的增加,混凝土表面水泥砂浆层会加速剥落,相对动弹性模量和立方体抗压强度以及栓钉连接件的受剪承载力和受剪刚度均会显著下降;当冻融循环次数不超过50次时,开裂刚度的下降速率最快,且冻融循环次数对开裂荷载的影响大于极限荷载。

入藏号: CSCD:6479629

地址: Li Hui, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Yongjian, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Jiang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Ning, School of Highway, Chang'an University;;College of Water Resources and

Architectural Engineering, Northwest A&F University, Xi'an, Yangling, 710064;712100.

地址: 李慧, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘永健, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘江, 长安大学公路学院, 西安, 陕西 710064, 中国.

张宁, 长安大学公路学院;西北农林科技大学水利与建筑学院, 西安;杨凌, 陕西;陕西 710064;712100, 中国.

电子邮件地址: lihui2210@yeah.net; lyj.chd@gmail.com

电子邮件地址: lihui2210@yeah.net; lyj.chd@gmail.com

使用次数 (最近 180 天): 0

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作者: Lei Yong; Wang Hainian; You Zhanping; Wang Yanxi; Jiang Xin; Gao Junfeng

作者: 雷勇; 汪海年; 尤占平; 王彦玺; 姜鑫; 高俊锋

标题: Effect of mixing sequence on compaction property of hot recycled asphalt mixtures

标题: 拌和次序对热再生沥青混合料压实特性的影响

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作者关键词: mixing sequence; compaction property; super gyration compaction; hot recycled asphalt mixture

作者关键词: 拌和次序; 压实特性; 旋转压实; 热再生沥青混合料

摘要: In order to study the effect of mixing sequence on compaction property of hot recycled asphalt mixtures, three kinds of mixing sequences, i.e. A,B and C, and two asphalt binders #70 and #90, are selected to fabricate hot recycled asphalt samples. The superpave gyration compactor (SGC) is applied to investigate the change in compaction parameters during the compaction progress. The test results show that, the compaction velocity ranking of hot recycled asphalt mixture in different sequence is A>B>C. The compaction performance of hot recycled asphalt mixture conducted in sequence A is the best of all. The locking point of hot recycled asphalt mixture conducted in three sequences A,B,C, fluctuated between 40 and 43, which means the mixing sequence has little effect on formation of interlocked skeleton of hot recycled asphalt

mixture. Moreover, the stiffness growth rate of #90 recycled asphalt mixtures are greater by 4%、16% and 2% than that of #70 recycled asphalt mixtures under mixing sequences A, B, C, respectively. The compaction performance of #90 recycled mixtures compacted in three mixing sequences are better than that of #70 binder recycled mixtures at the primary stage of stable skeleton structure. Workability energy index of sample compacted in mixing sequence A is larger by 19% to 49% than that of B and C; the workability of hot recycled asphalt mixture conducted in sequence A is the best in three mixing sequences A, B and C.

摘要: 为研究拌和次序对热再生沥青混合料压实特性的影响,采用3种不同的拌和次序(A、B、C)及2个标号的沥青(70,90号)成型热再生沥青混合料试件.利用旋转压实成型仪SGC分析试件压实参数的变化情况.试验结果表明:热再生沥青混合料可压实速率从大到小排序为A>B>C,A类拌和次序下的可压实性能相对更有利于再生料稳定成型;在3种拌和次序下,热再生沥青混合料的锁点均在40~43次之间波动,拌和次序对热再生沥青混合料形成嵌挤结构的影响较小;在A、B、C3种拌和次序下,90号沥青热再生混合料的劲度增长速率分别比70号高4%、16%、2%,90号沥青热再生混合料在骨架初始稳定阶段的可压实性能优于70号;在A类拌和次序下,和易性能指数较B、C类拌和次序增长19%~49%,A类拌和次序下热再生沥青混合料的和易性能优于B、C.

入藏号: CSCD:6477506

地址: Lei Yong, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Hainian, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

You Zhanping, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Yanxi, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Jiang Xin, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Gao Junfeng, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 雷勇, 长安大学公路学院, 西安, 陕西 710064, 中国.

汪海年, 长安大学公路学院, 西安, 陕西 710064, 中国.

尤占平, 长安大学公路学院, 西安, 陕西 710064, 中国.

王彦玺, 长安大学公路学院, 西安, 陕西 710064, 中国.

姜鑫, 长安大学公路学院, 西安, 陕西 710064, 中国.

高俊锋, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: leiyong@chd.edu.cn; wanghainian@aliyun.com

电子邮件地址: leiyong@chd.edu.cn; wanghainian@aliyun.com

使用次数 (最近 180 天): 1

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作者: Zhao Jing; Wang Xuancang; Ding Longting; Fang Naren; Li Shanqiang

作者: 赵静; 王选仓; 丁龙亭; 房娜仁; 李善强

标题: Performance prediction of asphalt pavement based on grey relational analysis and support vector machine regression

标题: 基于灰色关联度分析和支持向量机回归的沥青路面使用性能预测

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作者关键词: asphalt pavement; support vector machine regression; grey relation analysis; performance prediction; pavement maintenance

作者关键词: 沥青路面使用性能; 支持向量机回归; 灰色关联度分析; 使用性能预测; 路面养护

摘要: Asphalt pavement performance prediction is complex and nonlinear when it involves multi-factor. In order to overcome the defects existing in traditional prediction models, a long-period and multi-factor prediction model with high precision needs to be established, on which the dimension of each factor is reduced by grey relational analysis, and the important relational factors are selected for nonlinear prediction by support vector machine regression. Accordingly the performance prediction model of asphalt pavement based on GRA-SVR was proposed and the measured RDI from Guangyun freeway were collected as an example to validate the proposed model. The results show that GRA-SVR model has better accuracy and maneuverability compared with GM(1,1) and PPI models. It can be used in long-term process and provide model reference for large data maintenance decision-making.

摘要: 沥青路面使用性能多因素预测是一个复杂的非线性问题,传统预测模型存在很多不足。为弥补传统模型的缺陷,建立一个高精度、长周期、多因素的预测模型,通过灰色关联度分析对各因素进行降维处理,选择与沥青路面使用性能关联度较大的影响因素进行支持向量机回归非线性预测,提出了基于灰色关联度分析和支持向量机回归(GRA-SVR)的沥青路面使用性能预测模型。最后选用广云高速实测车辙指数(RDI)值进行实例验证,并同 GM(1,1)和 PPI 两种模型的预测结果进行了对比分析。结果表明:基于 GRA-SVR 建立的多因素预测模型具有很好的精度和可操作性,可在长周期过程中使用,为大数据养护决策提供了模型参考和依据。

入藏号: CSCD:6478433

地址: Zhao Jing, Highway College, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Xuancang, Highway College, Chang'an University, Xi'an, Shaanxi 710064, China.

Ding Longting, Highway College, Chang'an University, Xi'an, Shaanxi 710064, China.

Fang Naren, Highway College, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Shanqiang, Guangdong Hualu Transportation Technology Co. Ltd., Guangzhou, Guangdong 510420, China.

地址: 赵静, 长安大学公路学院, 西安, 陕西 710064, 中国.

王选仓, 长安大学公路学院, 西安, 陕西 710064, 中国.

丁龙亭, 长安大学公路学院, 西安, 陕西 710064, 中国.

房娜仁, 长安大学公路学院, 西安, 陕西 710064, 中国.

李善强, 广东华路交通科技有限公司, 广州, 广东 510420, 中国.

电子邮件地址: 1040490114@qq.com; wxc2005@163.com

电子邮件地址: 1040490114@qq.com; wxc2005@163.com

使用次数 (最近 180 天): 0

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作者: Zhang Shasha; Dai Zhiren; Yang Xiaohua; Chen Weizhi

作者: 张莎莎; 戴志仁; 杨晓华; 陈伟志

标题: Effect of Overburden Load on Salt Expansion of Gravelly Sand Sulfate Saline Soil Subgrade

标题: 上覆荷载对砾砂类硫酸盐渍土路基盐胀的影响

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作者关键词: Subgrade engineering; Gravelly sand; Sulfate saline soil; Overburden load; Salt expansion

作者关键词: 路基工程; 砾砂; 硫酸盐渍土; 上覆荷载; 盐胀

摘要: Taking the subgrade engineering which needs to use local coarse-grained saline soil as filling material as the background, on the basis of artificial preparation of test soil samples, the gravelly sand sulfate saline soil samples from typical coarse-grained saline soil areas were chosen to study the influence of overburden load on the salt expansion of gravelly sand sulfate saline soil subgrade under different salt content, water content and initial dry density conditions, respectively. Results show that, under the action of overburden load, the salt expansion rate of gravelly sand sulfate saline soil decreases at significant amplitude with the increase of overburden load under different salt content conditions. The inhibitory effect of overburden load on gravelly sand sulfate saline soil with low salt content is better than that with high salt content. Under the condition of strict control in water content, when the overburden load exceeds 24.46~38.61kPa, it plays a leading role in inhibiting salt expansion. Under the condition of standard compaction, the overburden load of 50kPa with different water contents has an inhibitory effect of more than 85% on the salt expansion of natural gravelly sand sulfate saline soil. Moreover, the inhibitory effect on salt expansion is stronger under the condition of high water content, which can obviously reduce the salt expansion growth rate with the increase of water content.

摘要: 以需要采用当地粗颗粒盐渍土作为路基填料的路基工程为背景, 在人工配制试验土样

的基础上,选取典型粗颗粒盐渍土地区的砾砂类硫酸盐渍土,进行不同含盐量、含水率及初始干密度条件下上覆荷载对砾砂类硫酸盐渍土路基盐胀的影响规律研究。结果表明:在上覆荷载的作用下,不同含盐量条件下砾砂类硫酸盐渍土的盐胀率均随上覆荷载的增加而降低,且降幅较大;上覆荷载对低含盐量水平的砾砂类硫酸盐渍土抑制效果好于高含盐量水平;在严格控制含水率的工况下,当上覆荷载超过 24.46~38.61kPa 以后,上覆荷载对盐胀的抑制作用起主导作用。在标准压实度条件下,不同含水率下 50kPa 上覆荷载对天然砾砂类硫酸盐渍土盐胀量的抑制作用超过 85%,且在高含水率下的盐胀抑制作用较强,可明显减小随含水率增大的盐胀增长率。

入藏号: CSCD:6468827

地址: Zhang Shasha, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Yang Xiaohua, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Dai Zhiren, China Railway First Survey and Design Institute Group Co.,Ltd., Xi'an, Shaanxi 710043, China.

Chen Weizhi, China Railway Eryuan Engineering Group Co.,Ltd., Chengdu, Sichuan 610031, China.

地址: 张莎莎, 长安大学公路学院, 西安, 陕西 710064, 中国.

杨晓华, 长安大学公路学院, 西安, 陕西 710064, 中国.

戴志仁, 中铁第一勘察设计院集团有限公司, 西安, 陕西 710043, 中国.

陈伟志, 中国中铁二院工程集团有限责任公司, 成都, 四川 610031, 中国.

电子邮件地址: zss_lx@126.com

电子邮件地址: zss_lx@126.com

使用次数 (最近 180 天): 0

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作者: Sha Aimin; Cai Ruonan; Gao Jie; Tong Zheng; Li Shuai

作者: 沙爱民; 蔡若楠; 高杰; 童峥; 李帅

标题: Subgrade distresses recognition based on convolutional neural network

标题: 基于级联卷积神经网络的公路路基病害识别

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作者关键词: road engineering; convolutional neural network; GPR; subgrade distresses detection; image processing

作者关键词: 道路工程; 卷积神经网络; 探地雷达; 路基病害检测; 图像处理

摘要: Aimed at the data analysis of ground penetrating radar (GPR) technology for detecting subgrade distresses relies on manual identification, which classifying distresses was inefficient and inaccurate. The application of convolutional neural networks (CNN) was put forward to classify subgrade distresses automatically. The cascaded CNN consists of two convolutional neural networks, which were separately utilized to recognize distresses using low-resolution images and high-resolution images. The processes for developing convolutional neural networks mainly include training, validating and testing. After developing the cascaded CNN, training and testing results were used to verify the stability of the cascaded CNN. The cascaded CNN was then compared with Sobel edge detection and K-value clustering analysis to demonstrate its superiority. The results show that the accuracies of the cascaded CNN in the training and validating processes were 97.46% and 95.80%. The cascaded CNN has a high accuracy in identifying subgrade distress. When the cascaded CNN was operated at frequencies of 300, 500 and 900 MHz, the accuracies of image classification were 94.20%, 93.89%, and 94.57%, respectively. When dealing with different highway structures, the accuracies of the images were 94.80%, 94.78%, 94.28%, and 94.21%. The cascaded CNN has great stability with respect to both emission frequencies and highway structures. When the image resolution is low, Sobel edge detection and K-value clustering analysis cannot extract the distress information accurately. However, CNN can extract the distress information accurately with classifier 2. When the image resolution is high, Sobel edge detection and K-value clustering analysis can extract only some of the subgrade distress. The remaining distress information needs to be extracted manually. The cascaded CNN can identify subgrade cracks accurately and efficiently, compared with other algorithms.

摘要: 针对当前公路路基病害识别中探地雷达(GPR)技术的数据分析还依赖于人工识别,识别效率低、准确性差问题,建立了级联卷积神经网络来实现自动识别探地雷达图像所反映路基病害的任务。级联卷积神经网络系统由2个卷积神经网络组成,分别用于识别低分辨率和高分辨率探地雷达图像。神经网络的建立包括训练、验证和测试3个步骤。通过训练和测试的结果验证了级联卷积神经网络系统的稳定性,并将级联卷积神经网络和Sobel边缘检测、K值聚类分析进行比较,以论证其优越性。结果表明:级联卷积神经网络在路基病害分类训练中的识别准确率为97.46%,验证中的识别准确率为95.80%,其识别路基病害的精度较高;级联卷积神经网络对发射频率300、500、900 MHz的图像分类准确率分别为94.20%、93.89%、94.57%,对不同公路结构的图像分类准确率分别为94.80%、94.78%、94.28%、94.21%,可见级联卷积神经网络的识别准确性不受雷达发射频率和路面结构的影响;当图像分辨率较低时,Sobel边缘检测和K值聚类分析无法准确提取路基病害几何特征信息,级联卷积神经网络可通过分类器2准确识别;当图像分辨率较高时,Sobel边缘检测和K值聚类分析仅能提取路基病害的部分特征,后续病害类型的识别需要人工完成。可见级联卷积神经网络较其他算法在路基病害识别方面更准确、高效。

入藏号: CSCD:6470853

地址: Sha Aimin, School of Highway, Chang'an University;;School of Materials Science and Engineering, Chang'an University, ;; Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710061.

Cai Ruonan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Gao Jie, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Tong Zheng, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Shuai, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 沙爱民, 长安大学公路学院;;长安大学材料科学与工程学院, ;; 西安;;西安, 陕西;;陕西 710064;;710061, 中国.

蔡若楠, 长安大学公路学院, 西安, 陕西 710064, 中国.

高杰, 长安大学公路学院, 西安, 陕西 710064, 中国.

童峥, 长安大学公路学院, 西安, 陕西 710064, 中国.

李帅, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: ams@chd.edu.cn

电子邮件地址: ams@chd.edu.cn

使用次数 (最近 180 天): 2

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作者: Zhao Weifeng; Wen Junqiang; Feng Kai; Wang Mengmeng; Jia Minghui

作者: 赵伟封; 文军强; 冯凯; 王蒙蒙; 贾明晖

标题: Calculation method of responses of pile foundation adjacent to banding surcharge loads

标题: 带状堆载对邻近桩基作用效应的计算方法

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作者关键词: 道路工程; 理论计算; 带状堆载; 桩基础; 滑动面

摘要: In order to analyze the calculation method of the influence of banding surcharge loads on the mechanical characteristics of adjacent pile foundation. The surcharge loads on the ground surface were considered equivalent to the strip foundation load with 0 m depth, based on the formula of Terzaghi's foundation bearing capacity. According to the sliding surface range of general shear failure in Terzaghi's formula, the limit equilibrium method was used to derive the maximum surcharge height formula. This ensures the stability of the foundation and the scope of

influence of the formula under the impact of banding surcharge loads that provide the discriminant conditions to determine the effect of surcharge loads on the adjacent pile foundation. The depth range and soil pressure formula under lateral displacement of foundation soil was obtained. The above-mentioned mechanical effects were then applied to the pile foundation adjacent to the surcharge loads. The mechanical model of this pile foundation was simplified as the general passive pile. The pile response was calculated using the m method. The finite element model of the interaction between the surcharge loads and adjacent pile foundation was established to analyze the influence of surcharge load scale on the deformation characteristics of the adjacent pile. The result theoretical formula were compared with that of finite element results. The results show that the soil under surcharge loads is laterally deformed and the adjacent pile foundation is deflected in different degrees. Certain depth range and a primary influence zone are observed in the characteristics of lateral deformation of the soil under the surcharge loads. The effect of surcharge loads on the pile foundation is evident in this distance range. It is maintained at a low level instead of disappearing over this range. The theoretical and finite element calculations exhibit similar rules. However, the theoretical results are slightly conservative than the results of finite element. This study provides reference for similar projects.

摘要: 为研究路基等带状堆载对邻近桥梁桩基础受力影响的计算方法,基于 Terzaghi 地基承载力公式,将地表的带状堆载等效为埋深为 0 的条形基础荷载,根据承载力计算公式中地基土整体剪切破坏时的滑动面形状,采用极限平衡法,得到保证地基稳定的最大堆载高度以及带状堆载主要影响区的计算公式;判断带状堆载邻近桩基础是否受堆载影响,并得到带状堆载作用下地基土体侧移变形的计算深度及对邻近桩基础的推力计算公式,将上述作用效应施加到堆载邻近的桩基础上,使堆载作用下邻近桩基础受力模型简化为一般的被动受荷桩,采用 m 法计算了桩身效应。同时,建立带状堆载与邻近桩基础相互作用的有限元模型,分析堆载规模对邻近桩基变形特性的影响,并将理论计算结果与有限元结果进行比对。研究结果表明:堆载作用下地基土体浅层一定深度内发生了侧移变形,推挤邻近桩基而发生不同程度的挠曲,堆载作用下地基土体侧移存在影响深度范围;带状堆载作用对邻近桩基础的受力变形存在主要影响区,在该距离范围内堆载对桩基础影响明显,超过该范围后其影响并不消失,而是维持在较低水平;理论计算和有限元计算结果反映的规律基本一致,理论结果比有限元结果略保守,研究可为类似工程提供借鉴。

入藏号: CSCD:6470864

地址: Zhao Weifeng, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wen Junqiang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Feng Kai, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Mengmeng, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Jia Minghui, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 赵伟封, 长安大学公路学院, 西安, 陕西 710064, 中国.

文军强, 长安大学公路学院, 西安, 陕西 710064, 中国.

冯凯, 长安大学公路学院, 西安, 陕西 710064, 中国.

王蒙蒙, 长安大学公路学院, 西安, 陕西 710064, 中国.

贾明晖, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: weifeng5@126.com

电子邮件地址: weifeng5@126.com

使用次数 (最近 180 天): 0

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作者: Guo Jukun; Kou Hailei; Xu Honglin; Lei Shengyou

作者: 郭聚坤; 寇海磊; 许泓霖; 雷胜友

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作者关键词: 海洋黏土; 界面剪切性状; 含水率; 固结时间; 改进直剪试验

摘要: The mechanical behaviors of pile foundation are restricted by the shear behavior of pile-soil interface which is of importance for the study of pile-soil interaction mechanism. In this research, shear tests on marine clay-steel interface and marine clay-concrete interface were conducted via an improved direct shear apparatus to investigate the relationship between shear stress and shear displacement of interface with varied water content and consolidation time. Results indicate that relationship between shear stress and shear displacement of interface displayed good elastic-plasticity which can be expressed by hyperbolic model. The peak shear stress and displacement of interface increased with the climbing of normal stress, the declining of water content and the extension of consolidation time. The increment of peak shear stress concentrated within 14 days after consolidation. Moreover, the friction angle and cohesive force of interface decreased with the climbing of water content. Consolidation time had little influence on the friction angle of interface which concentrated in the range from 20 degrees to 23 degrees. The cohesive force of interface increased with the increasing of consolidation time, and such increment concentrated within 14 days after the initiation of consolidation. The research findings provide reference for estimating the resistance during the pile driving stage and for numerical simulation of marine pile foundation engineering.

摘要: 桩-土界面剪切性状制约着桩基受力特性, 对研究桩-土相互作用机理具有重要意义。利用改进后的直剪仪, 进行海洋黏土与钢板、混凝土板的界面剪切试验, 研究不同含水率、不同固结时间的海洋黏土与钢、混凝土界面的剪切应力-剪切位移关系。结果表明: 界面剪切应力-剪切位移关系表现出较好的弹塑性关系, 可用双曲线模型表示; 随着法向应力增大、含水率减

小和固结时间增长,界面峰值剪切应力增大,所需峰值剪切位移增加,峰值剪应力的增加集中在固结开始后的 14 d 内;界面摩擦角和界面黏聚力随含水率增加而减小,界面摩擦角受固结时间影响不大,集中在 20° ~ 23° 范围内,界面黏聚力随固结时间增加而增大,且集中在固结开始后的 14 d 内。研究成果可为海洋桩基工程沉桩阶段阻力估算及数值模拟提供参考。

入藏号: CSCD:6468901

地址: Guo Jukun, School of Highway, Chang'an University;; School of Highway and Architecture, Shandong Transport Vocational College, ;; Xi'an;; Weifang, ;; 710064;; 261206.

Kou Hailei, College of Engineering, Ocean University of China, Qingdao, Shandong 266100, China.

Xu Honglin, College of Engineering, Ocean University of China, Qingdao, Shandong 266100, China.

Lei Shengyou, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 郭聚坤, 长安大学公路学院;; 山东交通职业学院公路与建筑系, ;; 西安;; 潍坊, ;; 山东 710064;; 261206.

寇海磊, 中国海洋大学工程学院, 青岛, 山东 266100, 中国.

许泓霖, 中国海洋大学工程学院, 青岛, 山东 266100, 中国.

雷胜友, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: gjk_1986@126.com; kou123321@126.com

电子邮件地址: gjk_1986@126.com; kou123321@126.com

使用次数 (最近 180 天): 0

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作者: Yan Xili; Liang Chunyu; Xu Jinhua; You Qinglong; Li Ang

作者: 延西利; 梁春雨; 许金华; 游庆龙; 李昂

标题: Elastoplastic Characteristics of Cement-stabilized Aggregate Bases

标题: 水泥稳定碎石基层的弹塑性特性

来源出版物: 中国公路学报 卷: 32 期: 1 页: 29-36 出版年: 2019

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作者关键词: road engineering; cement-stabilized aggregate; compression test; elastoplastic behavior; stress hardening; constitutive model

作者关键词: 道路工程; 水泥稳定碎石; 压缩试验; 弹塑性特性; 应力强化; 本构模型

摘要: In order to determine the visco-elastoplastic properties of cement-stabilized aggregate base and optimize the calculation of pavement structure design, two common types of cement stabilized aggregates base materials (skeleton-dense and suspend-dense structure) were selected to mold standard cylinder specimens ($\Phi 150 \times 150 \text{ mm}$) by vibration compaction. By applying a microcomputer-controlled testing machine at different loading rates (0.5, 1, 1.5, 2, and 4 $\text{mm} \cdot \text{min}^{-1}$ respectively), simple loading, repeated loading and unloading, resilient modulus by compression, creep and relaxation tests were conducted to determine the specimen's stress and strain, and their variations over time. Change rules for strength, stiffness, creep and relaxation, and loading-unloading stress-strain characteristic of cement-stabilized aggregate base materials were analyzed. Further, the elastoplastic properties were studied and a modified constitutive model was proposed. The results show that the overall impact of loading rate on the test results is less than 4.4% (relative error), and the maximum value of 60-minutes creep deformation is 0.03%, and the 14-minute stress relaxation effect is less than 6.9%, this indicates that the viscosity of cement stabilized aggregate bases is very weak and thus negligible. There is always resilient and permanent deformations after each loading-unloading, which reflects the elastoplastic properties of cement-stabilized aggregate bases, this can be analyzed by an elastoplastic solid model with stress hardening, and simulated by the generalized Saint-Venant model. The modified Duncan-Chang constitutive model proposed in this paper is very effective for numerical simulation and can be used to analyze the stress-strain curve of the cement-stabilized aggregates. The secant modulus value corresponding to $0.4\sigma_{\text{max}}$ very close to the traditional resilient modulus value, which shows that the simplified $0.4\sigma_{\text{max}}$ measurement method can be applied to determine the resilient modulus. Considering overall pavement technical performance, the skeleton-dense type of cement-stabilized aggregate base is better than the suspended-dense type.

摘要: 为了认识水泥稳定碎石基层的弹黏塑性特性, 优化路面结构的设计计算, 选用路面常用的骨架密实和悬浮密实 2 种水泥稳定碎石基层材料, 振动压实成型了 $\Phi 150 \times 150 \text{ mm}$ 标准圆柱体试件, 应用微机控制万能试验机, 设定不同加载速率 (0.5, 1, 1.5, 2, 4 $\text{mm} \cdot \text{min}^{-1}$), 进行简单加载、循环加卸载、抗压回弹模量、徐变和松弛等试验, 测试试件的应力-应变及其随时间的变化, 分析强度、刚度、徐变与松弛等变化规律及加卸载应力-应变特性, 研究水泥稳定碎石基层的弹塑性特性, 提出改进型本构模型。结果表明: 加载速率对试验结果的总体影响小于 4.4% (相对误差), 且 60min 的徐变变形最大为 0.03%, 14min 的应力松弛最大为 6.9%, 表明水泥稳定碎石基层的黏性极弱, 可以忽略不计; 每次加载卸载后均有回弹变形和永久变形出现, 反映了水泥稳定碎石基层的弹塑性性质, 且服从有应力强化的弹塑性固体模型, 可以用广义圣维南模型模拟分析; 提出的改进型邓肯-张本构模型数值模拟具有很好的有效性, 可以用来分析水泥稳定碎石的应力-应变曲线; $0.4\sigma_{\text{max}}$ (σ_{max} 为水稳碎石混合料的破坏强度) 对应的割线模量十分接近传统的回弹模量, 说明简化的 $0.4\sigma_{\text{max}}$ 取值法可以用来测试水泥稳定碎石基层的回弹模量; 从总体路用技术性能来看, 骨架密实型的水泥稳定碎石基层要优于悬浮密实型。

入藏号: CSCD:6432979

地址: Yan Xili, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

You Qinglong, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Ang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liang Chunyu, School of Transportation, Jilin University, Changchun, Jilin 130025, China.

Xu Jinhua, Sichuan E-gang Road Construction Co.Ltd., Chengdu, Sichuan 610041, China.

地址: 延西利, 长安大学公路学院, 西安, 陕西 710064, 中国.

游庆龙, 长安大学公路学院, 西安, 陕西 710064, 中国.

李昂, 长安大学公路学院, 西安, 陕西 710064, 中国.

梁春雨, 吉林大学交通学院, 长春, 吉林 130025, 中国.

许金华, 四川俄岗公路工程建设有限责任公司, 成都, 四川 610041, 中国.

电子邮件地址: xili.yan@chd.edu.cn

电子邮件地址: xili.yan@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Gao Chao

作者: 高超

标题: Characteristics of Fracture Curve of MMLS3 Test and Fatigue Damage Mechanism of Foam Asphalt Cold Recycled Mixture

标题: 泡沫沥青冷再生混合料 MMLS3 试验轮辙曲线特征及影响机理

来源出版物: 中国公路学报 卷: 32 期: 1 页: 46-56 出版年: 2019

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作者关键词: road engineering; foam asphalt cold recycled; accelerated loading test; rutting curve characteristic; rut deformation

作者关键词: 道路工程; 泡沫沥青冷再生; 加速加载试验; 轮辙曲线特征; 车辙变形

摘要: The long-term performance of foam asphalt cold recycled mixture was studied by MMLS3 accelerated loading under the condition of room temperature. The effects of the asphalt cold recycled mixture on the rutting depth, deformation rate, and cross section are investigated. The characteristics of the rutting curve of the foamed asphalt cold regenerated mixture are analyzed, and X-ray non-destructive scanning of the specimen at the track is carried out. The effects of different times of loading on the asphalt cold recycled mixture are investigated. The porosity distribution and the law of coarse aggregate movement reveal the fatigue damage law of foam asphalt cold regenerated mixture. The results show that the rutting of the trough is not U-shaped

along the cross section, and the regenerated mixture of 1%-2.5% cement is used as the cold recycled mixture of foam asphalt. Under different loading times (N), $RDD = ANB$ can be used to estimate the rutting development of foam asphalt in the MMLS3 loading test. This law can be divided into the compaction stage, creep stabilization stage, and shear failure stage. The torsional deformation under the repeated fatigue load is mainly due to the vertical displacement and coarse aggregate produced by the compression deformation of the foam asphalt mortar and the load. The horizontal rotation of the coarse aggregate is changed from the unstable state to the flat state, and the orientation angle of the coarse aggregate decreases exponentially with the increase in loading time.

摘要: 对泡沫沥青冷再生混合料进行常温条件下的 MMLS3 加速加载试验, 研究泡沫沥青冷再生混合料的长期使用性能, 探讨泡沫沥青冷再生混合料的车辙变深度、变形速率及横断面轮辙曲线特征, 给出泡沫沥青冷再生混合料车辙深度随加载次数的变化趋势, 并对不同加载次数下轮迹处 MMLS3 试件进行 X-ray 无损扫描, 分析不同加载次数下泡沫沥青冷再生混合料的空隙率分布特征及粗集料运动规律, 揭示泡沫沥青冷再生混合料的疲劳损伤规律。研究结果表明: 对于未掺加水泥的泡沫沥青冷再生混合料试件, 轮迹处车辙沿横断面分布呈 U 形; 掺加 1%~2.5% 水泥后, 泡沫沥青冷再生混合料试件横断面车辙分布呈 W 形, 可采用车辙深度 $RDD = ANB$ 预估不同加载次数 N 下的车辙深度发展规律; MMLS3 加载试验过程中泡沫沥青冷再生混合料车辙发展规律可分为 3 个阶段, 即压密阶段、蠕变稳定阶段、剪切破坏阶段; 重复疲劳荷载作用下轮辙变形主要来源于泡沫沥青砂浆压密变形和集料受荷载作用产生的竖向位移及粗集料自身由不稳定状态转变为平躺状态所发生的水平转动位移, 粗集料取向角随加载次数增大呈指数函数关系减小。

入藏号: CSCD:6432981

地址: Gao Chao, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 高超, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: 254341756@qq.com

电子邮件地址: 254341756@qq.com

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作者: Duan Lan; Wang Chunsheng; Zhu Jingwei; Zhai Xiaoliang

作者: 段兰; 王春生; 朱经纬; 翟晓亮

标题: Bending performance of circle tubular up-flange steel and concrete composite girder with concrete flange

标题: 带混凝土翼板的圆管上翼缘钢-混凝土组合梁抗弯性能

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作者关键词: bridge engineering; circle tubular up-flange composite girder; bending behavior test; capacity; ductility

作者关键词: 桥梁工程; 圆管上翼缘组合梁; 抗弯性能试验; 承载力; 延性

摘要: The different loading methods and widths of bottom flange were considered, the bending behavior experiments were conducted for 3 circle tubular up-flange steel and concrete composite girders with concrete flange, and their bending performances and failure modes were analyzed. Based on the bending characteristics of test girders, the simplified formulas of yielding moment and ultimate moment of composite girder were derived. Research result shows that all test girders fail in typically plastic bending mode and have satisfied stability. When attaining the ultimate capacity, the measured slips between the upper flange steel tube and concrete flange are no more than 0.43mm at the beam ends, which shows the excellent overall working ability for the test beams. The stiffness and bending capacity of test girder increase with increasing the width of bottom flange. The width of bottom flange is 150, 260, and 300mm, respectively, the corresponding ratio of yield moments is 1 : 1.44 : 1.55, and the ratio of ultimate bending capacities is 1 : 1.31 : 1.40. With the bending moment of test girder increasing, when the plastic neutral axis rises to the concrete flange, the concrete filled steel tubular flange is in tension, and the confinement effect between the steel tube and inner filled concrete may be neglected. When the plastic neutral axis locates in the up-flange concrete filled steel tube, the confinement effect between the steel tube and inner filled concrete may be neglected in the calculation of ultimate bending capacity, but it may enhance the ductility of test girder. The displacement ductility coefficients of test girders are all greater than 3.35, therefore, the test girders have good ductility. The ratios of theoretical to experimental values of yield bending moment and ultimate bending moment are between 1.02 and 1.04, and between 0.96 and 1.03, respectively, which shows good agreement between the theoretical calculation results and test results. Thus, the simplified theoretical formulas are simple and reliable. 3 tabs, 14 figs, 27 refs.

摘要: 考虑不同加载方式与下翼缘宽度,对3根带混凝土翼板的圆管翼缘钢-混凝土组合梁进行抗弯性能试验,分析了试验梁的抗弯承载性能与破坏形态;基于试验梁的抗弯特征,推导了组合梁屈服弯矩和极限弯矩简化计算公式。研究表明:试验梁均发生典型的塑性弯曲破坏,稳定性良好;达到极限承载力时,梁端处上翼缘钢管与混凝土翼板相对滑移均小于0.43mm,试验梁体现了良好的协同工作性能;随下翼缘宽度的增加,试验梁刚度与承载力增大,对于下翼缘宽度分别为150、260、300mm的试验梁,其屈服弯矩的比值为1:1.44:1.55,极限承载力的比值为1:1.31:1.40;随着试验梁承受弯矩的增大,当中性轴上升至混凝土翼板时,钢管混凝土处于受拉状态,可不考虑钢管与内填混凝土的套箍效应,而当塑性中性轴位于上翼缘钢管混凝土内时,可不计入该套箍作用对极限抗弯承载力的影响,但其可促进延性的继续发展;试验梁的位移延性系数均大于3.35,延性较好;屈服弯矩、极限弯矩理论计算值与试验值的比值分别为1.02~1.04、0.96~1.03,吻合良好,因此,所提出的简化理论计算公式简单、可靠。

入藏号: CSCD:6451289

地址: Duan Lan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Chunsheng, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhu Jingwei, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhai Xiaoliang, CCCC First Highway Consultants Co.,Ltd., Xi'an, Shaanxi 710075, China.

地址: 段兰, 长安大学公路学院, 西安, 陕西 710064, 中国.

王春生, 长安大学公路学院, 西安, 陕西 710064, 中国.

朱经纬, 长安大学公路学院, 西安, 陕西 710064, 中国.

翟晓亮, 中交第一公路勘察设计研究院有限公司, 西安, 陕西 710075, 中国.

电子邮件地址: DL0310DL@163.com; wcs2000wcs@163.com

电子邮件地址: DL0310DL@163.com; wcs2000wcs@163.com

使用次数 (最近 180 天): 0

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作者: Feng Zhongju; Wang Xiqing; Li Xiaoxiong; Hu Minghua; Yuan Fengbin; Yin Honghua; Dong Yunxiu

作者: 冯忠居; 王溪清; 李孝雄; 胡明华; 袁枫斌; 尹洪桦; 董芸秀

标题: Effect of sand liquefaction on mechanical properties of pile foundation under strong earthquake

标题: 强震作用下的砂土液化对桩基力学特性影响

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作者关键词: 桥梁工程; 桩基; 振动台模型试验; 砂土液化; 动力响应; 桩基损伤

摘要: In order to improve the seismic resistance behavior of bridge pile foundation located at the liquefied layer,the shaking table model test with three directions and six degrees of freedom was carried out,the dynamic responses of pile tops'horizontal displacements and piles' accelerations and bending moments were analyzed under the seismic waves,and the damages of pile foundations under the actions of seismic waves were studied.Experiment result shows that, under the actions of seismic waves,the lateral expansion effect gradually decreases with the increase of the depth of

liquefied layer. Therefore, the peak horizontal displacement of pile top gradually decreases. However, the peak horizontal displacement of pile top will no longer be affected by the liquefied layer depth when the seismic acceleration exceeds 0.6g. The pile accelerations increase significantly in the fine sand layer because of the liquefaction of fine sand layer under the seismic loads. The stress caused by the overburden soil can enhance the shear strength of lower layer, therefore, the amplification factor of pile top increases as the depth of liquefied layer increases. Moreover, the amplification factor is the largest under the action of Kobe wave, and the smallest under the action of 5002 wave. The sand liquefaction also causes the strength of soil layer to decrease, leading to the acceleration magnification in the soil layer. All the maximum bending moments of piles appear at the boundary between the liquefied layer and non-liquefied layer, and under the same seismic intensity, the maximum bending moment of pile increases with the increase of liquefaction layer depth. When the seismic acceleration increases from 0.30g to 0.35g, the bending moment of pile shows a maximum increase of 33.3%. The pile foundations experience no difference in the damages caused by different types of seismic waves. Under the acceleration of 0.35g, the fundamental frequency of pile foundation has no change. But when the seismic wave strength exceeds 0.40g, the fundamental frequency of pile foundation suddenly drops from 1.65Hz to 0.45Hz. The pile foundations in the sand layer laterally displace due to the liquefaction, and the piles deform due to the shear stress, eventually leading to the damages of pile foundations. In conclusion, when the liquefied layer is relatively shallow, the excessive horizontal displacements of pile tops under the actions of seismic waves should be fully considered. In the seismic design of pile foundation, the bending resistance of pile foundation at the boundary between the liquefied and non-liquefied layer, and the liquefied layer depth must be considered. 2 tabs, 22 figs, 33 refs.

摘要: 为了提高位于液化土层桥梁桩基的抗震性能,基于三向六自由度大型振动台模型试验,分析了地震波作用下桩顶水平位移、桩身加速度及弯矩等动力响应,并研究了地震波加载后桩基的损伤。试验结果表明:在地震波作用下,随着液化层埋深的增加,土体液化后产生的侧扩效果逐渐减弱,因此,桩顶水平位移峰值逐渐减小,但是当地震加速度超过 0.6g 时,桩顶水平位移峰值不受液化层埋深的影响;因地震荷载作用下粉细砂土层液化,桩身加速度在该土层位置明显增大;上部覆盖层压力作用使土层抗剪强度增大,因此,桩顶放大系数随着液化层深度的增加而增大,且桩顶放大系数在 Kobe 波作用下最大,5002 波作用下最小,砂土液化同时造成土层强度降低,从而使桩身加速度在该土层出现放大效应;桩身弯矩最大值均出现在液化层和非液化层分界处,且在相同强度地震波作用下,桩身弯矩最大值随着液化层埋深的增加呈增大趋势,当地震加速度从 0.30g 增大到 0.35g 后,桩身弯矩增幅为 33.3%,增幅最大;不同类型地震波对桩基的破坏程度并无差异,在加速度 0.35g 作用下,桩基基频无变化,但当地震波强度超过 0.40g 时,桩基基频从 1.65Hz 突降到 0.45Hz,因砂土层液化产生侧向位移,桩身剪切变形,最终导致桩基损坏。综上所述,当液化层较浅时,应重点考虑地震波作用下过大的桩顶水平位移;在桩基抗震设计时,必须考虑液化层和非液化层分界处桩基的抗弯能力和液化层埋深的影响。

入藏号: CSCD:6451291

地址: Feng Zhongju, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Xiqing, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Dong Yunxiu, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Xiaoxiong, School of Highway, Chang'an University;; School of Geographic Information and Tourism, Chuzhou University, ;; Xi'an;; Chuzhou, Shaanxi;; Anhui 710064;; 239000.

Hu Minghua, School of Highway, Chang'an University;; Anhui Transport Consulting and Design

Institute Co.,Ltd., ;, Xi'an;;Hefei, Shaanxi;;Anhui 710064;;230088.
Yuan Fengbin, School of Highway,Chang'an University;;China Highway Engineering Consultants Corporation, ;, Xi'an;;, Shaanxi;;Beijing 710064;;100089.
Yin Honghua, School of Highway,Chang'an University;;Guangdong Communication Planning and Design Institute Co.,Ltd., ;, Xi'an;;Guangzhou, Shaanxi;;Guangdong 710064;;510507.
地址: 冯忠居, 长安大学公路学院, 西安, 陕西 710064, 中国.
王溪清, 长安大学公路学院, 西安, 陕西 710064, 中国.
董芸秀, 长安大学公路学院, 西安, 陕西 710064, 中国.
李孝雄, 长安大学公路学院;;滁州学院地理信息与旅游学院, ;, 西安;;滁州, 陕西;;安徽 710064;;239000, 中国.
胡明华, 长安大学公路学院;;安徽省交通规划设计研究总院股份有限公司, ;, 西安;;合肥, 陕西;;安徽 710064;;230088, 中国.
袁枫斌, 长安大学公路学院;;中国公路工程咨询集团有限公司, ;, 西安;;, 陕西;;北京 710064;;100089, 中国.
尹洪桦, 长安大学公路学院;;广东省交通规划设计研究院股份有限公司, ;, 西安;;广州, 陕西;;广东 710064;;510507, 中国.
电子邮件地址: ysf@gl.chd.edu.cn; xiqingc@hotmail.com
电子邮件地址: ysf@gl.chd.edu.cn; xiqingc@hotmail.com
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作者: Xu Mingfei; Guo Ping; Li Jun

作者: 徐明非; 郭平; 李俊

标题: Study on Road Performance of Asphalt Mixture Composite Modified with Montmorillonite and SBS

标题: 蒙脱土/SBS 复合改性沥青混合料路用性能研究

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作者关键词: road engineering; road performance; laboratory test; montmorillonite; composite

modification; anti-aging performance

作者关键词: 道路工程; 路用性能; 室内试验; 蒙脱土; 复合改性; 抗老化性能

摘要: In order to analyze the effect of montmorillonite on road performances for SBS modified asphalt mixture, montmorillonite is utilized to composite modify the SBS modified asphalt. Road performance tests, including rutting test, low-temperature bending test, immersion Marshall test and freeze-thaw split test, are carried out by using the prepared composite modified asphalt mixture. First, the effects of montmorillonite dosage on high temperature performance, low temperature performance and moisture stability, of composite modified asphalt mixture are studied, and the optimal montmorillonite dosage is recommended based on grey correlation analysis. Then, the anti-aging performance of composite modified asphalt mixture is analyzed by measuring its road performance under different aging conditions, comparing with the anti-aging performance of SBS modified asphalt mixture. The investigation result shows that (1) adding montmorillonite properly can improve the high temperature performance and moisture stability of composite modified asphalt mixture, but the further improvement degree of high temperature performance is not obvious and the moisture stability decreases instead when montmorillonite dosage is too large; (2) the low temperature performance decreases when using montmorillonite. The grey correlation analysis shows that the influence degrees of montmorillonite dosage on road performance indicators are low temperature performance > moisture stability > high temperature performance in sequence. So, unilaterally increasing montmorillonite dosage to improve the high temperature performance is unsuitable. Combining with the relations of montmorillonite dosage with various road performance indicators, the range of montmorillonite dosage is recommended from 2% to 4%, and 3% is selected as the optimal dosage. The anti-aging performance of composite modified asphalt mixture with optimal montmorillonite dosage is improved observably compared with that of SBS modified asphalt mixture, especially the low temperature anti-aging performance. Although the low temperature performance of the composite modified asphalt mixture before aging is inferior to that of SBS modified asphalt mixture, due to the smaller attenuation degree, its low temperature performance is superior to that of SBS modified asphalt mixture after aging.

摘要: 为了分析蒙脱土对 SBS 改性沥青混合料路用性能的影响, 采用蒙脱土对 SBS 改性沥青进行复合改性, 并制备复合改性沥青混合料, 开展了车辙试验、低温弯曲试验、浸水马歇尔试验和冻融劈裂试验。首先研究了蒙脱土掺量对复合改性沥青混合料高温性能和水稳定性的影响, 并结合灰关联分析推荐了蒙脱土最佳掺量。然后以 SBS 改性沥青混合料作为对照, 通过测试不同老化条件下路用性能, 分析了复合改性沥青混合料的抗老化性能。研究表明: 适当掺加蒙脱土可以提高复合改性沥青混合料的高温性能和水稳定性, 但是掺量过大时高温性能提升幅度不大, 水稳定性反而有所下降。掺加蒙脱土会对复合改性沥青混合料的低温性能产生不利影响。灰关联分析表明蒙脱土掺量对各项路用性能指标的影响程度大小依次为低温性能 > 水稳定性 > 高温性能, 因此不宜为了提升高温性能而片面增大蒙脱土掺量。结合蒙脱土掺量与各项路用性能指标的关系, 推荐蒙脱土掺量范围为 2% ~ 4%, 并选取 3% 作为最佳掺量。最佳蒙脱土掺量条件下, 复合改性沥青混合料的抗老化性能较之 SBS 改性沥青混合料得到显著提高, 尤其是低温抗老化性能, 虽然老化前复合改性沥青混合料的低温性能要差于 SBS 改性沥青混合料, 但是经老化后前者的衰减幅度较小, 其低温性能反而优于后者。

入藏号: CSCD:6410431

地址: Xu Mingfei, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Guo Ping, Xi'an Highway Institute, Xi'an, Shaanxi 710065, China.

Li Jun, Research Institute of Highway, Ministry of Transport, Beijing 100088, China.

地址: 徐明非, 长安大学公路学院, 西安, 陕西 710064, 中国.

郭平, 西安公路研究院, 西安, 陕西 710065, 中国.

李俊, 交通运输部公路科学研究院, 北京 100088, 中国.

电子邮件地址: mm1966@163.com

电子邮件地址: mm1966@163.com

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作者: Bai Hua; Ji Naichuan; Zhang Liangliang; Liu Jianxin; He Hanxin

作者: 白桦; 姬乃川; 张亮亮; 刘健新; 何晗欣

标题: Influence of Turbulent Wind Characteristic Parameters on Wind Pressure Distribution on Approximate Streamlined Bridge Surface

标题: 紊流风特性参数对近流线形桥梁表面风压分布影响

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作者关键词: bridge engineering; turbulence intensity; wind tunnel test; turbulence integral scale; approximate streamlined bridge; wind pressure

作者关键词: 桥梁工程; 紊流强度; 风洞试验; 紊流积分尺度; 近流线形桥梁; 风压

摘要: The buffeting, flutter and VIV test results of bridge structure in wind tunnel is affected by the simulation precision of turbulent wind characteristic parameters. To improve the test accuracy, analyze the influence of simulation error of turbulent wind parameters and summarize the influence rule of the turbulent wind parameters on the wind pressure distribution on surface of the bridge structure, the grid turbulence is used in the wind tunnel, which composed some partial wind fields with the same turbulence intensity but different integral scales and others with the same integral scale but different turbulence intensities, the influence of the turbulent wind parameters on the wind pressure distribution rule on the bridge structure is studied. The result shows that (1) The increase of turbulent intensity will reduce the absolute value of the mean wind pressure coefficient on the bridge surface, and the decreasing amplitude will be affected by the factors such as structural surface position, wind attack angle. When the position or wind attack angle changes, the absolute value reduction amplitude of the mean wind pressure coefficient due to the increase of turbulence intensity will also change, it is difficult to make quantitative correction.

(2) The fluctuating wind pressure coefficient increases with the increase of turbulence intensity in most positions. However, this trend may be reversed due to the influence of railings, wind fairings, orbits of maintenance car and other attachment structures. (3) The increase of turbulence integral scale will increase the mean wind load on the approximate streamlined bridge surface, while it has little effect on the fluctuating wind load. (4) When carrying out the aeroelastic model test of bridge, the turbulence intensity should be accurately simulated at first, and the turbulence integral scale should be accurately simulated when conditions permit. The smaller the turbulence integral scale is, the less the surface pressure correlation coefficient is. (5) The fluctuating wind pressure correlation coefficient at adjacent positions is mainly affected by signature turbulence and is independent of integral scale of inlet flow.

摘要: 风洞试验时紊流风特性参数的模拟精度会对桥梁结构的抖振、颤振、涡振等试验结果产生影响,为了提高试验精度,分析紊流风特性参数模拟误差所带来的影响、总结桥梁结构表面风压分布受紊流风参数的影响规律,在风洞中采用格栅紊流,分别形成了紊流强度相同但积分尺度不同与积分尺度相同但紊流强度不同的几种局部紊流风场,以此来研究紊流风特性参数单独变化对桥梁结构表面风压分布规律的影响.结果表明:紊流强度增大会使桥梁表面平均风压系数绝对值减小,减小的幅度会受结构表面位置、风攻角等因素的影响.当位置或风攻角发生变化后,紊流强度增大导致平均风压系数绝对值减小的幅度也会发生变化,很难进行定量修正.大部分位置的脉动风压系数会随紊流强度增大而增大.但受栏杆、风嘴、检修车轨道等附属结构影响,这种趋势可能出现相反的变化.紊流积分尺度增大会使近流线形桥梁表面平均风荷载增大,对脉动风荷载影响很小.进行桥梁气弹模型试验时,应首先保证准确模拟紊流强度,在条件许可的情况下再准确模拟紊流积分尺度.积分尺度越小,表面压力相关系数也越小.相邻位置的脉动风压相关系数主要受特征紊流影响,与来流的积分尺度无关.

入藏号: CSCD:6410440

地址: Bai Hua, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Ji Naichuan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Jianxin, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Liangliang, School of Highway, Chang'an University;; Shanxi Transportation Research Institute, ;; Xi'an;; Taiyuan, Shaanxi;; Shanxi 710064;; 030006.

He Hanxin, School of Civil Engineering, Xi'an University of Architecture and Technology, Xi'an, Shaanxi 710055, China.

地址: 白桦, 长安大学公路学院, 西安, 陕西 710064, 中国.

姬乃川, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘健新, 长安大学公路学院, 西安, 陕西 710064, 中国.

张亮亮, 长安大学公路学院;; 山西省交通科学研究院, ;; 西安;; 太原, 陕西;; 山西 710064;; 030006, 中国.

何晗欣, 西安建筑科技大学土木工程学院, 西安, 陕西 710055, 中国.

电子邮件地址: baihua9810@163.com

电子邮件地址: baihua9810@163.com

使用次数 (最近 180 天): 0

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作者: Yang Shaowei; Yang Hui; Pan Binghong; Ouyang Jianghu

作者: 杨少伟; 杨荟; 潘兵宏; 欧阳江湖

标题: Study on Net Distance between End of Continuous Long Downhill Section of Expressway and Main Line Toll Station

标题: 高速公路连续长大下坡终点与主线收费站间的净距研究

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作者关键词: 道路工程; 净距; 减速模型; 载重汽车; 连续长大下坡; 主线收费站

摘要: Aiming at the existence of the continuous long downhill section followed by main line toll station in mountainous expressway, considering that the setting position of main line toll station not only affects the expressway's service level, but also affects the smooth traffic and the safety of toll collectors at the toll station, so it is necessary to study the net distance between the continuous long downhill and the main toll station. By analyzing the influencing factors of setting up the abovementioned main line toll station, selecting truck as the calculation vehicle type, the brake temperature of the truck running on the continuous long downhill is studied. According to the relationship between braking moment and brake temperature as well as the relationship of braking performance attenuation with average slope gradient and length after truck passing a continuous long downhill, taking the value at most disadvantageous situation and considering the full load of the truck, the slope gradient and the length that can guarantee the effectiveness of the truck brake after truck passing the continuous long downhill without auxiliary braking are obtained, the maximal deceleration attenuation coefficient of the brake is put forward to calculate the deceleration provided by the brake after truck passing the continuous long downhill. Finally, a model for calculating the net distance based on driver's sign visual recognition distance, vehicle deceleration distance and driver's discriminating lane distance at the toll station is established. The recommended net distance between the end of the continuous long downhill and the main line toll station under different design speeds and transition slopes is proposed. The result shows that (1) under the condition that the truck brake is still effective after truck passing the continuous long downhill, the distance between the end of the continuous long downhill section and the main line toll station is related to the attenuation degree of the truck's braking performance; (2) in the case of a certain design speed, the larger the longitudinal slope gradient of the transition section is, the

smaller the net distance between the continuous long downhill and the main toll station is.

摘要: 针对山区高速公路中存在连续长大下坡后接主线收费站的情形,考虑到主线收费站的设置位置不仅影响着高速公路的服务水平,还影响到收费站处的交通顺畅以及收费人员的安全,因此对高速公路连续长大下坡与主线收费站间的净距研究是有必要的。通过对连续长大下坡终点后设置主线收费站的影响因素进行分析,选择以载重汽车作为计算车型,研究载重汽车在连续长大下坡行驶时制动器的温度情况;根据制动力矩与制动器温度的关系,及驶完连续长大下坡之后载重汽车制动器制动性能的衰减情况与平均坡度、坡长的关系,以最不利情况取值,考虑载重汽车的满载状态,得出在无辅助制动下可以保证载重汽车制动器仍有效的连续长大下坡坡度与坡长值,提出制动器的减速度最大衰减系数,从而可以计算出在连续长大下坡之后载重汽车制动器所能提供的减速度;最后建立了基于驾驶员标志视认距离、汽车减速距离和驾驶员判别收费站内车道距离的净距计算模型,提出在不同设计速度和过渡段纵坡坡度下,连续长大下坡终点与主线收费站之间净距的建议值。结果表明:在驶完连续长大下坡后载重汽车制动器仍有效的情况下,连续长大下坡终点与主线收费站间的净距和载重汽车制动器制动性能的衰减程度有关,且在设计速度一定的情况下,过渡段纵坡坡度越大,连续长大下坡与主线收费站间的净距越小。

入藏号: CSCD:6444734

地址: Yang Shaowei, School of Highway,Chang'an University;;;;Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

Yang Hui, School of Highway,Chang'an University;;;;Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

Pan Binghong, School of Highway,Chang'an University;;;;Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

Ouyang Jianghu, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 杨少伟, 长安大学公路学院;;长安大学, ;;特殊地区公路工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

杨荟, 长安大学公路学院;;长安大学, ;;特殊地区公路工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

潘兵宏, 长安大学公路学院;;长安大学, ;;特殊地区公路工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

欧阳江湖, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: gl06@chd.edu.cn

电子邮件地址: gl06@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Li Rui; Ma Rongguo; Liang Guohua; Deng Yajuan; Wang Baojie

作者: 李瑞; 马荣国; 梁国华; 邓亚娟; 王宝杰

标题: Optimization and coordination model for speed limit section in freeway

标题: 高速公路限速区段安全与效率优化协调模型

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作者关键词: traffic engineering; speed limit section; optimal coordination model for speed limit section; freeway; safety and efficiency

作者关键词: 交通工程; 分区段限速; 限速区段优化协调模型; 高速公路; 安全与效率

摘要: To improve the safety and efficiency of freeway under the management of partition speed limit and reduce drivers'burden caused by improper speed limit and frequent speed changes,this research optimized and coordinated freeway speed limit sections under the management of partition speed limit. First,the optimal coordination model for freeway speed limit was constructed in three cases on the basis of the principle of minimum loss time. Second,the minimum length of the speed limit section and the number of speed limit sections used in the process of the coordinated optimization were determined based on the theoretical calculation of drivers'cognitive distance,psychological stability distance,speed limit sign front distance,and a questionnaire survey. Then the risk function and income function were used to characterize the traffic safety and efficiency of freeway and construct the corresponding evaluation model. Finally,the effectiveness of the proposed method was tested by simulating the original setting of the speed limit section and the traffic condition of a project freeway. Results show that after the optimization the comprehensive safety index decreased by 45.51% and the comprehensive efficiency index increased by 26.78%,which means the state of safety and efficiency has come closer to the ideal point (a,b). This feasible and effective method can improve traffic safety and efficiency level,and provides a theoretical basis for the safety and efficiency management of speed limit sections.

摘要: 为改善高速公路分区段限速管理下的运行安全与效率,缓解由于限速区段设置不当、频繁换速造成的驾驶负担,对高速公路分区段限速管理下的限速区段进行优化协调设置.首先,以损失时间最小为原则,提出3种情形下的高速公路限速区段优化协调模型;其次,依据驾驶人认知距离、心理稳定距离和限速标志前置距离,及驾驶员问卷调查统计数据,对模型计算中的最小限速区段长度和最大限速区段数目两参数进行标定;最后,根据经济学风险与收益的原理,分别用风险函数和收益函数表征高速公路交通安全和效率,构建高速公路安全指数、效率指数评价模型,并结合案例高速公路初始限速区段设置情况,对所提限速区段最优协调模型的实效性进行仿真检验.结果表明:案例高速公路应用所提优化模型进行限速区段协调控制后,高速公路综合安全指数数值减小 45.51%、综合效率指数数值增大 26.78%,安全、效率状态更加靠近理想点(a,b).针对分区段限速控制的高速公路交通安全与效率的提升,该方法具有较好的可行性与实效性,可为高速公路限速管理提供理论支持.

入藏号: CSCD:6461341

地址: Li Rui, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Ma Rongguo, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.
Liang Guohua, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.
Deng Yajuan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.
Wang Baojie, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 李瑞, 长安大学公路学院, 西安, 陕西 710064, 中国.

马荣国, 长安大学公路学院, 西安, 陕西 710064, 中国.

梁国华, 长安大学公路学院, 西安, 陕西 710064, 中国.

邓亚娟, 长安大学公路学院, 西安, 陕西 710064, 中国.

王宝杰, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: mrg@chd.edu.cn

电子邮件地址: mrg@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Ye Fei; Han Xin; Liu Yanpeng; Tang Yongsan; Lin Jianfei

作者: 叶飞; 韩鑫; 刘燕鹏; 唐勇三; 林剑飞

标题: Analyze on the Dynamic Evolution Mechanism and Rule of Pressure Arch in Tunnel

标题: 隧道压力拱动态演变机制及规律分析

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作者关键词: 隧道工程; 动态压力拱; 演变机制; 拱体厚度; 理论分析

摘要: The pressure arch in tunnel develops dynamically with the progressive failure of surrounding rock. Based on the final state of the unsupported-tunnel in weak surrounding rock, the dynamic pressure arch was divided into three types including stable type without collapse arch, stable type with collapse arch and unstable type without collapse arch, and the development of dynamic pressure arch was divided into four typical states including the original stress state, the miniature pressure arch state, the initial pressure arch state and the collapsed pressure arch state, which improves the dynamic pressure arch theory. The thickness of the initial and collapsed

pressure arch was deduced, and the factors which affect the dynamic development of pressure arch were revealed theoretically. By a case study, the relationship among cover depth, lateral pressure coefficient and thickness of initial pressure arch was gained, and the regular pattern of the dynamic evolution of collapsed pressure arch varying with the collapse height was also analyzed. The results show that the thickness of the initial pressure arch is negatively correlated with lateral pressure coefficient and positively correlated with cover depth. The influence of lateral pressure coefficient on the thickness of the initial pressure arch increases with cover depth increasing. With the increasing of the collapse height, the range of pressure arch tends to be stable after increasing, while the thickness of pressure arch decreases after increasing to a maximum value. The collapse will develop to earth surface if the stable collapse arch can't occur before the thickness of pressure arch reach a maximum value.

摘要: 隧道开挖后形成的压力拱是随着围岩的渐进性破坏而动态发展的。以毛洞情况下隧道的最终状态为依据将动态压力拱分为稳定无塌落拱、稳定有塌落拱和不稳定无塌落拱三类, 将围岩压力拱的动态发展分为原始应力状态、锥形压力拱状态、初始压力拱状态、塌落压力拱状态 4 个典型的时间段, 从而对动态压力拱理论进行了完善。对初始压力拱和塌落压力拱的拱体厚度进行了理论推导, 从理论上揭示了围岩压力拱动态发展的影响因素。通过实例计算得到了隧道埋深、侧向土压力系数与初始压力拱拱体厚度的关系以及塌落压力拱随塌落高度发展的动态演化规律。结果表明: 初始压力拱拱体厚度与侧压力系数呈线性负相关, 与隧道埋深呈正相关; 侧压力系数对初始压力拱拱体厚度的影响随隧道埋深的增加而增大; 随着塌落高度的增加, 围岩压力拱范围先增大后逐渐趋于稳定, 而拱体厚度则先增大后减小; 若塌方在拱体厚度达到最大时仍无法稳定, 则最终会发展为塌穿型塌方。

入藏号: CSCD:6446701

地址: Ye Fei, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Han Xin, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Yanpeng, School of Highway, Chang'an University; CCCC First Highway Consultants Co., Ltd., Xi'an, Xi'an, 710064; 710075.

Tang Yongsan, Fujian Expressway Construction Headquarters, Fuzhou, Fujian 350001, China.

Lin Jianfei, Putian Meiyu Expressway Co., Ltd., Putian, Fujian 351100, China.

地址: 叶飞, 长安大学公路学院, 西安, 陕西 710064, 中国.

韩鑫, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘燕鹏, 长安大学公路学院; 中交第一公路勘察设计研究院有限公司, 西安; 西安, 710064; 710075.

唐勇三, 福建省高速公路建设总指挥部, 福州, 福建 350001, 中国.

林剑飞, 莆田湄渝高速公路有限责任公司, 莆田, 福建 351100, 中国.

电子邮件地址: xianyefei@126.com

电子邮件地址: xianyefei@126.com

使用次数 (最近 180 天): 0

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作者: Wang Xing; Shi Jiangtao; Chai Lunlei; Han Xingbo; Hu Qiang

作者: 王星; 师江涛; 柴伦磊; 韩兴博; 胡强

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标题: 考虑人员逃生公路隧道火灾控制风速研究

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作者关键词: 隧道火灾; 人员逃生; 控制风速; 火源释放率

摘要: The safety evacuation of highway tunnel fire is closely related to the control of ventilation velocity. Based on the PHOENICS software, 9 kinds of calculation models of two, three and four lanes under rectangular, circular and horseshoe cross sections were established. 2 kinds of fire rate of bus (20 MW) and no-load truck (30 MW) were selected. The inlet wind speed of 2.0 m/s, 2.5 m/s, 3.0 m/s, 3.5 m/s and 4.0 m/s were considered, and 40 main common fire conditions were considered totally, taking into account the effects of longitudinal ventilation on temperature limit value of human body. Yangtao's revised dynamic HRR curve and Zhou Yongdi's revised Krani formula were used, and appropriate personnel evacuation conditions were adopted. 10 characteristic temperature values and curves at 8 characteristic moments of each working condition were given. The temperature and smoke pattern of the vertical and horizontal cross-section of the fire at 5 min, 12 min and 30 min after combustion were given, and the tolerance time and the evacuation time of the safety evacuation were obtained under the 8 characteristic positions of the upstream and downstream of the fire burning position. The research results show that the control of ventilation velocity of the two-lane rectangular section tunnel is 3.0 m/s when the HRR is 20 MW, 2.5 m/s for three and four lanes, and the velocities of the two-lane, three-lane, four-lane rectangular section tunnel are 3.5 m/s when the HRR is 30 MW; the control of ventilation velocity of the two-lane, three-lane, four-lane circular and horseshoe cross sections tunnel is 3.5 m/s when the HRR is 20 MW, 4.0 m/s for the two-lane and 3.5 m/s for the three and four lanes when the HRR is 30 MW. After the fire occurred 1 min, the personnel can be evacuated from the upstream and downstream of the fire source with the speed of 1 m/s safely.

摘要: 公路隧道火灾人员逃生与控制风速关系密切。本研究基于 PHOENICS 软件, 建立了矩形、圆形及马蹄形断面下二、三及四车道 9 种计算模型, 选取了大客车 (20 MW) 及无载重货车 (30 MW) 2 种火源释放率, 选取了 2.0 m/s、2.5 m/s、3.0 m/s、3.5 m/s 及 4.0 m/s 的入口风速共计 40 种主要常见火灾工况, 考虑了纵向通风对人体极限温度承受值的影响, 采用了杨涛修正的动态火源释放率曲线及周勇狄修正的克拉尼公式, 选用了适当的人员逃生条件, 给出了每

种工况 8 个特征时刻的 10 个特征点的温度值及曲线图,给出了燃烧 5 min、12 min、30 min 后火源处的纵横断面温度云图及中轴面烟气云图,给出了对应于火源燃烧位置上下游 8 个特征位置下人员逃生的忍受时间与逃离时间。研究得出:在基于人员逃生条件下矩形断面隧道在火源释放率为 20 MW 时二车道控制风速为 3.0 m/s,三、四车道均为 2.5 m/s; 30 MW 时二、三、四车道控制风速均为 3.5 m/s,圆形与马蹄形断面隧道在火源释放率为 20 MW 时二、三、四车道控制风速均为 3.5 m/s,30 MW 时二车道控制风速均为 4.0 m/s,三、四车道均为 3.5 m/s。在火灾发生 1 min 后,人员以 1 m/s 从火源上下游进行疏散均可安全逃生。

入藏号: CSCD:6446716

地址: Wang Xing, Highway College, Chang 'an University, Xi 'an, 710064.

Chai Lunlei, Highway College, Chang 'an University, Xi 'an, 710064.

Han Xingbo, Highway College, Chang 'an University, Xi 'an, 710064.

Hu Qiang, Highway College, Chang 'an University, Xi 'an, 710064.

Shi Jiangtao, Highway College, Chang 'an University;;Gansu Province Transportation Research Institute Co.,Ltd., ;; Xi 'an;;Lanzhou, ;; 710064;;730050.

地址: 王星, 长安大学公路学院, 西安, 陕西 710064, 中国.

柴伦磊, 长安大学公路学院, 西安, 陕西 710064, 中国.

韩兴博, 长安大学公路学院, 西安, 陕西 710064, 中国.

胡强, 长安大学公路学院, 西安, 陕西 710064, 中国.

师江涛, 长安大学公路学院;;甘肃省交通科学研究院有限公司, ;; 西安;;兰州, ;; 710064;;730050.

电子邮件地址: 1548622258@qq.com

电子邮件地址: 1548622258@qq.com

使用次数 (最近 180 天): 0

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作者: Zhang Shasha; Xie Shanjie; Yang Xiaohua; Chen Weizhi

作者: 张莎莎; 谢山杰; 杨晓华; 陈伟志

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作者关键词: high-speed railway; subgrade engineering; sulfate saline soil; volcanic ash; coarse particle soil

作者关键词: 高速铁路; 路基工程; 硫酸盐渍土; 火山灰; 粗粒土

摘要: For the gravelly sand type sulfate soil with sodium sulfate content of 2%,the compaction tests,salt expansion tests,collapsibility tests and unconfined compressive strength tests with different ratios of lime,lime+ volcanic ash are carried out.Based on these tests,the improved mechanism and micro-characteristics are analyzed.The results show that adding lime or lime+ volcanic ash can reduce the salt expansion effectively and reduce the sensitive temperature range of salt expansion.In the case of using inorganic modifiers to improve the salt expansion deformation of the sulfate saline soil,considering the local climatic conditions,the amount of modifiers can be appropriately reduced in the areas with higher temperature,and when the temperature is lower,the amount of modifiers should be appropriately increased.Compared to that of the lime-improved soil,the compaction stage of the volcanic ash-improved soil is shortened,the elastic stage is increased,the generated strain when the soil sample reaches the strength limit is reduced,the soil structure is stronger,and the deformation resistance is enhanced.The addition of volcanic ash can also accelerate the strength growth rate of such saline soils.The deformation rate of salt expansion and collapsibility are both less than 1% by adding lime higher than 11% or lime+volcanic ash not less than 15%,and the 7-day saturated unconfined compressive strength of the improved soil is not less than 0.35 MPa.

摘要: 针对硫酸钠含量为 2%的砾砂类硫酸盐渍土,开展了在不同石灰配比、石灰+火山灰配比工况下的击实试验、盐胀试验、溶陷试验、无侧限抗压强度试验,在此基础上,分析了其改良机理和微观特性,结果表明:掺加石灰或石灰+火山灰改良剂不仅可以有效减少砾砂类硫酸盐渍土的盐胀量,而且可以降低盐胀敏感温度区间;在采用无机改良剂改善硫酸盐渍土的盐胀变形时,应结合当地气候条件考虑,在温度较高地区可以适当减少改良剂掺量,温度较低时,适当增加改良剂掺量;相比于石灰改良土,掺加火山灰后,土样的压密阶段缩短,弹性阶段增长,土样达到强度极限时产生的应变减小,土体的结构性变强,抗变形性能增强;添加火山灰对于此类盐渍土的强度增长速率亦有加速作用;采用石灰掺量高于 11%时或采用石灰+火山灰不少于 15%时,改良后土体的盐胀和溶陷变形率均小于 1%,7 d 饱和无侧限抗压强度均不小于 0.35 MPa。

入藏号: CSCD:6457073

地址: Zhang Shasha, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Yang Xiaohua, School of Highway,Chang'an University, Xi'an, Shaanxi 710064, China.

Xie Shanjie, China Railway Siyuan Survey and Design Group Co.,Ltd.;;School of Highway,Chang'an University, ;; Wuhan;;Xi'an, ;; 430063;;710064.

Chen Weizhi, China Railway Eryuan Engineering Group Co.,Ltd., Chengdu, Sichuan 610031, China.

地址: 张莎莎, 长安大学公路学院, 西安, 陕西 710064, 中国.

杨晓华, 长安大学公路学院, 西安, 陕西 710064, 中国.

谢山杰, 中铁第四勘察设计院集团有限公司;;长安大学公路学院, ;; 武汉;;西安, 湖北;;陕西 430063;;710064, 中国.

陈伟志, 中国中铁二院工程集团有限责任公司, 成都, 四川 610031, 中国.

电子邮件地址: zss_lx@126.com

电子邮件地址: zss_lx@126.com

使用次数 (最近 180 天): 0

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作者: Guo Jukun; Lei Shengyou; Kou Hailei; Wang Rui; Wang Xiaowei

作者: 郭聚坤; 雷胜友; 寇海磊; 王瑞; 王晓伟

标题: STUDY OF SHEAR BEHAVIOR BETWEEN STEEL WITH DIFFERENT ROUGHNESS AND SAND WITH DIFFERENT PARTICLE SIZES

标题: 考虑粗糙度和粒径影响的钢-砂界面剪切特性试验研究

来源出版物: 工业建筑 卷: 49 期: 1 页: 100-106 出版年: 2019

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文献类型: Article

作者关键词: sand; particle size; roughness; shear strength; shear surface; shear strength index

作者关键词: 砂; 粒径组; 粗糙度; 抗剪强度; 剪切面; 剪切强度指标

摘要: Roughness of structural surface and particle size of sand influence significantly the frictional characteristics of structural interface. An improved direct shear apparatus was used to study the interface shear stress-displacement relationship, including surface characteristic, roughness and normal stress. The sand with four different particle sizes were used. Test results indicated that the peak values of shear stress increased with normal stress, particle size and interface roughness. The shearing surface between plain steel plate and sands was a smooth horizontal plane. The shearing surface between steel plates cut grains and sands were different with width of grain and ticle sizes. As the width of grain was large than the particle sizes, the shearing surface was a curve between sands. As the width was 1 to 2 times the particle diameter, the shearing surface was alternative a curve between sands or between steel plate and sands. When the particle sizes were much larger than the width, the shearing surface was horizontal discontinuity between sands and steel plate. The shear strength of steel plate engraved surface was composed by cut and uncut areas. The interface friction angle increased with particle size and roughness, the values ranged from 22° to 30°.

摘要: 结构表面粗糙度和土颗粒组成大小对界面的摩擦特性有重要影响,揭示不同介质间界面的力学特性对工程建设具有重要意义。利用改进的直剪仪,对钢板与四组不同粒径组砂粒进行界面剪切试验,研究不同砂粒组、粗糙度和法向应力下的钢-砂界面剪切应力-位移关系、粗糙界面剪切面性状、粗糙界面抗剪强度构成。结果表明:界面峰值剪切应力随法向应力、砂粒组和粗糙度的增大而增加;光面钢板与砂粒在接触表面形成光滑的剪切面,刻纹路部位钢

板与砂粒间的剪切面随纹路宽度与粒径的大小而有所不同;粒组粒径不大于刻纹宽度时,在砂-砂间形成剪切面;粒组粒径介于刻纹宽度1~2倍时,可能在砂-砂间形成曲形剪切面,也可能在钢-砂接触部分形成剪切面,粒径远大于刻纹宽度的,形成水平间断剪切面;刻有纹路的抗剪强度由未刻纹路区域与纹路区域提供;界面摩擦角随粒径和粗糙度增大而增加,大致在22°~30°。

入藏号: CSCD:6432373

地址: Guo Jukun, School of Highway, Chang'an University;; School of Highway and Architecture, Shandong Transport Vocational College, ;; Xi'an;; Weifang, ;; 710064;; 261206.

Lei Shengyou, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Kou Hailei, College of Engineering, Ocean University of China, Qingdao, Shandong 266100, China.

Wang Rui, School of Highway and Architecture, Shandong Transport Vocational College, Weifang, Shandong 261206, China.

Wang Xiaowei, School of Highway and Architecture, Shandong Transport Vocational College, Weifang, Shandong 261206, China.

地址: 郭聚坤, 长安大学公路学院;; 山东交通职业学院公路与建筑系, ;; 西安;; 潍坊, ;; 山东 710064;; 261206.

雷胜友, 长安大学公路学院, 西安, 陕西 710064, 中国.

寇海磊, 中国海洋大学工程学院, 青岛, 山东 266100, 中国.

王瑞, 山东交通职业学院公路与建筑系, 潍坊, 山东 261206, 中国.

王晓伟, 山东交通职业学院公路与建筑系, 潍坊, 山东 261206, 中国.

电子邮件地址: kou123321@126

电子邮件地址: kou123321@126

使用次数 (最近 180 天): 0

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作者: Bai Hua; Zhang Liangliang; Liu Jianxin

作者: 白桦; 张亮亮; 刘健新

标题: Effects of Turbulence Parameters on Surface Fluctuating Wind Load of Square Structure

标题: 紊流风特性参数对方形结构表面脉动风荷载影响研究

来源出版物: 应用基础与工程科学学报 卷: 27 期: 1 页: 104-115 出版年: 2019

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作者关键词: civil engineering; wind tunnel test; turbulence intensity; turbulence integral scale; wind pressure

作者关键词: 土木工程; 风洞试验; 紊流强度; 紊流积分尺度; 风压

摘要: Turbulent parameters such as turbulence intensity and integral scale test simulation precision influence the structural wind-induced vibration test results. In order to obtain the rules, this paper analyzed the laws about the effects of turbulent parameters on surface fluctuating wind load of square structure. The grille was used in wind tunnel to form same identical turbulence intensities but different integral scale wind fields, and same identical integral scale but different turbulence intensity wind fields. Make the other turbulent parameters as a constant, studied the effects of a single parameter such as turbulence intensity or integral scale on structural surface wind pressure distribution. The results show that the probability distribution curve of square structural base area is good agreement with the Gauss distribution. With the increasing of the turbulence intensity, the offset range of the distribution curve compared with the Gauss curve has an increasing trend. The fluctuating wind pressure coefficient increases with the increasing of turbulence intensity on the square structural surface, and the middle and upper area of windward surface are sensitive to the turbulence intensity. Turbulence integral scale has little effect on the fluctuating wind pressure coefficient, and the larger turbulence integral scale, the better horizontal correlation and vertical correlation.

摘要: 紊流风特性参数如紊流强度与紊流积分尺度的试验模拟精度会影响风洞试验结果, 导致不同的风振响应。为得到影响规律, 分析了紊流风特性参数对方形结构表面脉动风荷载的影响。为减小干扰因素, 利用格栅形成局部紊流场, 在此流场中研究紊流强度或紊流积分尺度单参数变化, 其它参数不变对结构表面脉动风荷载分布规律的影响。结果表明: 方形结构底部区域的概率分布曲线与高斯分布吻合较好, 随来流紊流强度增大, 分布曲线较高斯分布偏移幅度有增大趋势。紊流强度增大会导致脉动风压系数增大, 方形结构迎风面上上部区域对紊流强度非常敏感。紊流积分尺度对脉动风压系数的影响很小, 来流积分尺度越大, 水平相关性与竖向相关性越好。

入藏号: CSCD:6421466

地址: Bai Hua, School of Highway, Chang'an University, Research Center of Highway Large Structure Engineering on Safety, Xi'an, Shaanxi 710064, China.

Liu Jianxin, School of Highway, Chang'an University, Research Center of Highway Large Structure Engineering on Safety, Xi'an, Shaanxi 710064, China.

Zhang Liangliang, Shanxi Transportation Research Institute, Taiyuan, Shanxi 030006, China.

地址: 白桦, 长安大学公路学院, 公路大型结构安全教育部工程中心, 西安, 陕西 710064, 中国.

刘健新, 长安大学公路学院, 公路大型结构安全教育部工程中心, 西安, 陕西 710064, 中国.

张亮亮, 山西省交通科学研究院, 太原, 山西 030006, 中国.

电子邮件地址: baihua9810@163.com

电子邮件地址: baihua9810@163.com

使用次数 (最近 180 天): 0

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作者: Jiang Lei; Liu Yongjian; Wang Kangning

作者: 姜磊; 刘永健; 王康宁

标题: Development of welded tubular joints and comparison of fatigue behaviour

标题: 焊接管节点结构形式发展及疲劳性能对比

来源出版物: 建筑结构学报 卷: 40 期: 3 页: 180-191 出版年: 2019

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文献类型: Article

作者关键词: welded tubular joint; structural development; fatigue behavior; hot spot stress range-number of cycle; stress concentration factor

作者关键词: 焊接管节点; 结构形式发展; 疲劳性能; 热点应力幅-循环次数曲线; 热点应力集中系数

摘要: In order to compare the fatigue behaviour of different types of welded tubular joints, the structural development and innovation on welded tubular joints were introduced and the corresponding statistics on stress concentration factor (SCF) and fatigue life were conducted. The S_h-N curves based on hot spot stress method of different welded tubular joints were developed for practical fatigue design. The comparisons of fatigue behaviour for different welded joints were made based on S_h-N curves and SCFs. The results show that as for S_h-N curves of joints with thickness $t \leq 4$ mm, the weld defects become the critical effects, leading to lower fatigue life. In the current design guidelines, the S_h-N curve in CIDECT design guide No.8 is unsafe for all joints. The S_h-N curve in DNV-RP-C203 can be used for square bird-beak SHS joints and diamond bird-beak SHS joints, but it is unsafe for the other joints. In API RP 2A-WSD, the so called X' S_h-N curve is lower than X S_h-N curve. The X' curve can be applied for bird-beak joints (both square bird-beak SHS joints and diamond bird-beak SHS joints), conventional CHS-CHS, RHS-RHS joints and the corresponding joints with concrete infill in the chords. The X curve is unsafe for all joints. Under the same geometrical parameters β, γ, τ (where β, γ, τ are the brace-to-chord width ratio, width-to-wall thickness ratio of the chord and brace-to-chord thickness ratio, respectively), fatigue resistance decreases with following order, CHS-CFCHS joints, CHS-CHS joints, RHS-CFRHS joints, and RHS-RHS joints. The fatigue behaviour of CHS-CFRHS is slightly better than RHS-RHS joints. The fatigue behaviour of CHS-RHS joints is worse than RHS-RHS joints. The square bird-beak SHS joints and diamond

bird-beak SHS joints are recommended for practical fatigue design when $\beta \leq 0.7$.

摘要: 为研究不同类型焊接管节点疲劳性能差异,梳理焊接管节点结构形式发展和构造创新,总结各类节点热点应力集中系数静力试验和疲劳试验成果,回归分析给出各类节点用于疲劳设计的热点应力幅-循环次数(S_h-N)曲线,并从热点应力幅曲线和热点应力集中系数两方面,对比各类节点疲劳性能差异。结果表明:对于 S_h-N 曲线,当钢管板厚 $t \leq 4$ mm 时,焊缝缺陷成为影响疲劳强度的主要因素,使得疲劳强度显著降低;现行规范中,CIDECT 规范(Design guide No.8)的 S_h-N 曲线对各类节点设计均偏于危险,DNV-RP-C203 的 S_h-N 曲线可适用于方形鸟嘴式钢管节点和钻石形鸟嘴式钢管节点疲劳设计,但对于其他节点设计偏危险;API RP 2A-WSD 中的 X'曲线的疲劳强度低于 X 曲线的,X'曲线适用于鸟嘴式节点和传统的圆形、矩形钢管节点及相应的主管内填混凝土节点设计,X 曲线对任何节点设计均偏危险;在相同的几何参数 β 、 2γ 和 τ (β 、 2γ 、 τ 分别为支主管宽度比、主管宽厚比及支主管厚度比)下,各类节点的疲劳性能优劣顺序为,圆形钢管混凝土节点、圆形钢管节点、矩形钢管混凝土节点、矩形钢管节点;圆管-矩形钢管混凝土节点疲劳性能略优于矩形钢管节点的疲劳性能,圆管-矩形钢管节点疲劳性能劣于矩形钢管节点的疲劳性能;当 $\beta \leq 0.7$ 时,建议采用方形鸟嘴式钢管节点和钻石形鸟嘴式钢管节点。

入藏号: CSCD:6437946

地址: Jiang Lei, School of Highway, Chang'an University;;Department of Civil Engineering, Queen's University, ;; Xi'an;;Kingston, ;;Canada 710064;;K7L 3N6.

Liu Yongjian, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Kangning, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 姜磊, 长安大学公路学院;;女王大学土木工程系, ;; 西安;;金斯顿, 陕西;; 710064;;K7L 3N6, 中国.

刘永健, 长安大学公路学院, 西安, 陕西 710064, 中国.

王康宁, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: jiangleichd@gmail.com; lyj.chd@gmail.com

电子邮件地址: jiangleichd@gmail.com; lyj.chd@gmail.com

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作者: Huang Xiaofeng; Ma Biao; Wei Kun; Sun Silin

作者: 黄晓凤; 马彪; 魏堃; 孙思林

标题: Research on Solid Solution Treatment of NiTi Alloy Phase Change Material and Its Temperature Control Effect

标题: 路面 NiTi 合金相变材料固溶处理及调温效果

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作者关键词: NiTi alloy; phase change material; solid solution treatment; temperature control effect

作者关键词: NiTi 合金; 相变材料; 固溶处理; 调温效果

摘要: NiTi alloy sample was subjected to solution treatment at different temperatures(300 °C ,400 °C , 500 °C ,600 °C ,700 °C ,800 °C)for various period of time(15min,30min,45min,60min),respectively and then quenched.Effects of solution treatment on transformation temperature and enthalpy of the NiTi alloys were investigated by differential scanning calorimeter(DSC).Latent heat asphalt mixture was made by replacing powder and fine aggregate with equal volume proportion of NiTi alloy.It's controlling temperature effect was tested by temperature control test.Results show that the temperature distance of phase transformation of the NiTi alloy solution treated at 400 °C ,500 °C is wider than that solution treated at 600 °C ,700 °C ,800 °C .Martensite transformation enthalpy is mainly affected by solid-solution temperature,while the holding time has little effect on it and the temperature distance of phase transformation has a similar influence to them.With the increase of NiTi alloy phase change material,asphalt mixture has a better effect on adjusting temperature.

摘要: NiTi 合金相变材料试样经不同温度(400、500、600、700 及 800℃)保温不同时间(15、30、45 及 60min)后进行淬火处理,利用差示扫描量热仪测试其性能,研究不同固溶处理工艺对 NiTi 合金相变焓值、相变温度等性能的影响。将该 NiTi 合金相变材料作为功能组分,制备 NiTi 合金相变材料改性的沥青混合料,通过调温试验对比不同 NiTi 合金掺量的沥青混合料的调温效果。结果表明:固溶处理温度为 400 及 500℃时的相变温度区间宽于 600、700 及 800℃时的相变温度区间;该相变材料的马氏体转变与逆转变的焓值主要受处理温度影响,保温时间对焓值影响不大、对相变温度区间的影响规律相似;随着 NiTi 合金相变材料掺量的增加,调温效果越好。

入藏号: CSCD:6434903

地址: Huang Xiaofeng, Highway School, Chang'an University, Key Laboratory of Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Ma Biao, Highway School, Chang'an University, Key Laboratory of Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Wei Kun, Highway School, Chang'an University, Key Laboratory of Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

Sun Silin, Highway School, Chang'an University, Key Laboratory of Special Area Highway Engineering of Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 黄晓凤, 长安大学公路学院, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

马磊, 长安大学公路学院, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

魏堃, 长安大学公路学院, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

孙思林, 长安大学公路学院, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中

国.

电子邮件地址: xiaophenix@hotmail.com; mb@gl.chd.edu.cn

电子邮件地址: xiaophenix@hotmail.com; mb@gl.chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Shao Haipeng; Zheng Binbin; Long Linxu

作者: 邵海鹏; 郑斌斌; 隆林栩

标题: Signal Control Strategy and Simulation for Vehicles Alternately Passing Construction Area of Two-lane Road

标题: 双向双车道施工区信号控制方法及仿真研究

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作者关键词: traffic engineering; two-lane road; signal control of two-lane road; simulation of Vissim

作者关键词: 交通工程; 双向双车道道路; 施工封闭段信号控制; Vissim 仿真

摘要: The construction area of the two-lane roads can form the road bottlenecks easily, leading to the capacity of the road reducing. Aiming to keep the vehicle passing the construction area safely and efficiently, we added the strategy of signal control in the construction area. We built a suitable signal control model for the construction area of the two-lane road. By using the simulation software of Vissim, we established the related simulation models. By using the control variable method to change the simulation parameters and by changing the arrival traffic and speed, we got the influences and rules to the transportation performance. When the road maintenance is in a short-distance and the mix rate of large vehicle is at about 0.2, it has larger influence in traffic flow to the construction area of the road and the state of traffic flow is instability; when the mix rate of large vehicle is less than 0.2, the car effect is more significant.

摘要: 双向双车道施工封闭段易形成道路瓶颈, 降低施工区通行能力。为保障施工区行车安全高效, 增设信号控制, 建立适用于双向交替通行的信号控制模型, 借助 Vissim 软件建立仿真模型, 运用控制变量法改变各仿真参数, 通过对比分析得出施工段车速、到达交通量对道路运行情况的影响及规律。仿真结果表明, 短距离和长距离养护, 大车混入率分别在 0.2 和 0.3 左右对施工封闭段的交通流影响效应较大, 且小于 0.2 和 0.3 时大车效应较为显著。

入藏号: CSCD:6442037

地址: Shao Haipeng, School of Highway,Changan University;;Virginia Polytechnic Institute and State University, ;;, Xian;;Blacksburg, ;;U.S 710064;;24060.

Zheng Binbin, School of Highway,Changan University, Xian, 710064.

Long Linxu, School of Highway,Changan University, Xian, 710064.

地址: 邵海鹏, 长安大学公路学院;;弗吉尼亚理工大学, ;;, 西安;;黑堡, 陕西;;美国 710064;;24060, 中国.

郑斌斌, 长安大学公路学院, 西安, 陕西 710064, 中国.

隆林栩, 长安大学公路学院, 西安, 陕西 710064, 中国.

使用次数 (最近 180 天): 0

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作者: Xiang Yu; Cong Deming; Zhang Yang; Yuan Fei

作者: 项煜; 丛德铭; 张洋; 袁飞

标题: Two-Stream Neural Network Fusion Model for Highway Fog Detection

标题: 基于双路神经网络融合模型的高速公路雾天检测

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作者关键词: image processing; fog detection; depth map; dark channel prior; deep learning

作者关键词: 图像处理; 雾天检测; 深度图; 暗通道先验; 深度学习

摘要: The real-time detection of weather conditions on highways has a significant impact on high-speed traffic safety.However,the weather forecast reports weather conditions over a wide range of areas only,which cannot meet the demand of real-time detection of weather conditions in various sections of high-speed traffic.Therefore,we present here a two-stream neural network fusion model for fog detection,which detect current weather condition for the surveillance area automatically.This model is based on a dual branches of deep neural networks,which integrates visual depth maps and dark-channel images for fog detection.These two modalities of features are discriminative in representing the pattern of fog and extracted from the surveillance video frame.The intermediate scores produced by the neural networks are fed into a mean fusion layer for the final prediction.To comprehensively evaluate the performance of our algorithm,we built an Express Way Fog Detection dataset (EWFD),which covers highway scenes across multiple

provinces of China. A variety of highway weather conditions are contained in the EWFD. We conducted a comprehensive analysis and comparison experiment on the EWFD dataset. The results of the experiment also demonstrate that the two-stream neural network fusion model proposed here achieved an accuracy of 93.7%, which is a more than 10% improvement compared to the state-of-the-art classification method ResNet-101.

摘要: 高速公路天气状况实时监察对于高速行车安全具备重要意义,然而气象检测只能对大范围区域的气象情况进行预报,不能满足高速行车各个路段气象情况实时检测的需求.为此,提出一种基于双路神经网络融合模型的高速公路雾天检测算法.该算法基于双路深度神经网络融合模型,提取雾天图像的可视深度图以及暗通道图像两种视觉特征,并利用深度神经网络进行建模,获得初步分类结果;然后,再利用均值融合层进行分数融合.为了全面评测该算法的性能,构建了一个覆盖多个省份高速公路的视频监控雾天数据集(express way fog detection dataset,EWFD),该数据集能够全面涵盖国内高速公路的天气情况,并在该数据集上做了全面的分析对比实验.实验结果显示,本文所提出的双路神经网络融合模型的雾天监测算法取得了93.7%的准确率,与国际前沿的检测分类算法101层残差网络(ResNet-101)相比,本文提出的算法准确率提高了10%以上.

入藏号: CSCD:6424721

地址: Xiang Yu, School of Highway Engineering, Changan University, Xian, 710064.

Cong Deming, School of Information Science and Technology, Southwest Jiaotong University, Chengdu, Sichuan 611756, China.

Zhang Yang, Transportation Department of Henan Province, Zhengzhou, Henan 450016, China.

Yuan Fei, Henan Expressway Network Monitoring Charge Communication Service Company, Zhengzhou, Henan 450000, China.

地址: 项煜, 长安大学公路学院, 西安, 陕西 710064, 中国.

丛德铭, 西南交通大学信息学院, 成都, 四川 611756, 中国.

张洋, 河南省交通运输厅, 郑州, 河南 450016, 中国.

袁飞, 河南省高速公路联网监控收费通信服务公司, 郑州, 河南 450000, 中国.

电子邮件地址: 409676667@qq.com

电子邮件地址: 409676667@qq.com

使用次数 (最近 180 天): 0

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作者: Wan Chenguang; Shen Aiqin; Guo Yinchuan; Li Peng

作者: 万晨光; 申爱琴; 郭寅川; 李鹏

标题: Interlaminar shear behavior of bridge deck pavement interlayer structure

标题: 混凝土桥桥面铺装层间结构剪切行为

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作者关键词: 道路工程; 桥面铺装; 层间结构; 力学分析; 抗剪强度; 层间剪切行为

摘要: In view of the problems associated with concrete bridge deck pavement structures, the most unfavorable shear position of the interlayer layer structure was determined, by combining theoretical calculations and laboratory testing methods. Based on the special linear relationship between the interlaminar shear stress and the compressive stress of nodes of the most unfavorable position, an interlayer shear evaluation index was proposed. A sensitivity analysis of the key influencing factors of most unfavorable shear position of the interlayer layer was also conducted. The relationship between the shear strength regression equation of the composite structure with vertical pressure condition was established, and the shear behavior of the bridge deck pavement was analyzed. The results show that the most unfavorable shear position of the interlayer structures is the front boundary line of the loading area, which along the traveling direction under the action of uniformly distributed rectangular and double loads. The shear state of the interlayer structure rapidly deteriorates with an increase in the load lateral force coefficient. For interlayer structure 1, the slope of the fitted equation is 0.6930 when the horizontal force coefficient is 0.5, is an increase of 103%, as compare to when the horizontal force coefficient is 0, this is a very significant increase. When the pressure of a braking vehicle is more than 1.2 MPa, the interlayer structure with emulsified asphalt as an adhesive layer may be subjected to one-time shear failure. The blasting interface structure does not appear in one-time shear failure due to overloading, whereas for interlayer structure 2 with the original interface, the critical failure state occurs when the pressure is 0.85 MPa. For a bridge deck pavement under heavy traffic, the surface treatment measures of using an SBS-modified asphalt adhesive layer and a shot blasting leveling layer should be adopted.

摘要: 针对混凝土桥面铺装层间结构病害多发问题,将理论计算与室内试验相结合,找出层间结构最不利剪切位置,根据最不利剪切位置节点受到的层间剪应力与压应力所呈现的特殊线性关系,给出铺装结构层间剪切评价指标,同时进行层间剪切状态关键影响因素敏感性分析,并与存在垂直压力条件的组合结构层间抗剪强度回归方程建立联系,进行桥面铺装层间结构剪切行为分析。研究表明:双矩形均布荷载作用下,层间结构最不利剪切位置是荷载作用区域沿行车方向的前端边界线;层间结构剪切状态会随荷载水平力系数的增加而迅速恶化,对于层间结构一,水平力系数 0.5 时拟合方程斜率为 0.693,较水平力系数为 0 时的拟合方程斜率 0.342 增加了 103%,增幅十分显著;不考虑材料本身剪切破坏情况下,增加层间结构上部沥青层厚度可在一定程度上改善其剪切状态;接地压强大于 1.2 MPa 的车辆紧急刹车时,采用乳化沥青黏层的层间结构一有可能发生一次性剪切破坏;采用抛丸界面的层间结构二不会出现由于车辆超载而导致的一次性剪切破坏,而对于采用原状界面的层间结构二,接地压强为 0.85 MPa 时车辆紧急刹车即可使其处于临界破坏状态。对于重载交通下的桥面铺装,建议层间结构采用 SBS 改性沥青黏层和抛丸调平层表面处治措施。

入藏号: CSCD:6428618

地址: Wan Chenguang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Shen Aiqin, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Guo Yinchuan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Peng, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 万晨光, 长安大学公路学院, 西安, 陕西 710064, 中国.

申爱琴, 长安大学公路学院, 西安, 陕西 710064, 中国.

郭寅川, 长安大学公路学院, 西安, 陕西 710064, 中国.

李鹏, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: 610510686@qq.com; 672121381@qq.com

电子邮件地址: 610510686@qq.com; 672121381@qq.com

使用次数 (最近 180 天): 0

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作者: Cao Yangsen; Sha Aimin; Cai Ruonan; Liu Zhuangzhuang

作者: 曹阳森; 沙爱民; 蔡若楠; 刘状壮

标题: Influence of open-circuit voltage on sandwich piezoelectric transducer

标题: 夹层式压电换能器开路电压影响

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作者关键词: 道路工程; 压电换能器; 荷载试验; 开路电压

摘要: In order to determine the variation rule of the open-circuit voltage of piezoelectric transducers with various influence factors, and to provide a theoretical basis for improving the effect of energy collection of piezoelectric pavement, sandwich piezoelectric transducers were fabricated by using PZT-5H piezoelectric ceramic wafers and polyurethane boards. By means of laboratory vibration loading tests, the variation in the open-circuit voltage of piezoelectric transducers under different loads, load frequencies, and parallel number of piezoelectric ceramic wafers were studied. On this basis, small-size piezoelectric pavement structure models were prepared, and the influence of surface type and surface temperature on the open-circuit voltage of

the piezoelectric transducer embedded in the structure was analyzed by the moving loading test. The results show that the open-circuit voltage is positively correlated with the load and load frequency, but the growth rate of the open-circuit voltage gradually decreases with an increase in the load and load frequency. The load directly affects the stress of the piezoelectric ceramic wafer. When the applied load is 5 kN and the loading frequency is 4 Hz, the open-circuit voltage of piezoelectric transducer is stable at 9.44 V. The open-circuit voltage decreases with an increase in the number of parallel piezoelectric ceramic wafers in the piezoelectric transducer. The number of piezoelectric ceramic wafers increases, and the load of a single piezoelectric ceramic wafer decreases. When the number increases from 1 to 3, the open-circuit voltage drops by 26.6%. Different types of asphalt mixtures have different mechanical properties. The open-circuit voltage under the AC-13 surface layer is higher than that under the AC-10 and OGFC-13 surface layer, and the matching effect between the AC-13 surface layer and the piezoelectric transducer is better. Temperature affects not only the structure performance of the asphalt mixture but also the performance of the piezoelectric ceramic wafer. With an increase in temperature, the structural performance of the asphalt mixture worsens, the working performance of the piezoelectric ceramic wafer decreases, and the open-circuit voltage decreases.

摘要: 为探明压电换能器开路电压随各影响因素的变化规律,从而为提高压电路面能量收集效果提供理论依据,采用压电陶瓷晶片 PZT-5H 及聚氨酯基板制备了夹层式压电换能器。通过室内振动加载试验,研究压电换能器开路电压在不同荷载水平、荷载频率、压电陶瓷晶片并联数量下的变化规律。在此基础上,制备了小尺寸压电路面结构模型,并通过移动加载试验分析面层类型和面层温度对埋置在结构内部的压电换能器开路电压的影响。结果表明:开路电压与荷载水平和荷载频率正相关,但开路电压增长速度随荷载水平和荷载频率的提高逐渐变缓,荷载水平直接影响压电陶瓷晶片应力大小,当施加荷载为 5 kN,加载频率为 4 Hz 时,压电换能器开路电压稳定在 9.44 V;开路电压随压电换能器中压电陶瓷晶片并联个数增加而减小,压电陶瓷晶片个数增加,单个压电陶瓷晶片承受荷载变小,当并联个数由 1 个增加到 3 个时,开路电压下降 26.6%;不同类型的沥青混合料力学性能不同,AC-13 面层下开路电压较 AC-10 和 OGFC-13 大,AC-13 面层与压电换能器匹配效果较好;温度不仅影响沥青混合料的结构性能还影响压电陶瓷晶片工作性能,温度升高,沥青混合料结构性能变差,压电陶瓷晶片工作性能降低,开路电压降低。

入藏号: CSCD:6428624

地址: Cao Yangsen, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Cai Ruonan, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Zhuangzhuang, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Sha Aimin, School of Highway, Chang'an University;;Chang'an University, ;;Key Laboratory for Special Area Highway Engineering of Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

地址: 曹阳森, 长安大学公路学院, 西安, 陕西 710064, 中国.

蔡若楠, 长安大学公路学院, 西安, 陕西 710064, 中国.

刘状壮, 长安大学公路学院, 西安, 陕西 710064, 中国.

沙爱民, 长安大学公路学院;;长安大学, ;;特殊地区公路工程教育部重点实验室, 西安;;, 陕西;; 710064;;710064, 中国.

电子邮件地址: yscao@chd.edu.cn; zzliu@chd.edu.cn

电子邮件地址: yscao@chd.edu.cn; zzliu@chd.edu.cn

使用次数 (最近 180 天): 0

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地质工程与测绘学院

第 1 条, 共 95 条

作者: Ma Ji; Shi Zhen; Zhang Xuwei

作者: 马骥; 石震; 张学伟

标题: Research on break-through error simulated estimation of underground traverse with gyro observation in an immersed tunnel

标题: 沉管隧道加测陀螺边的地下导线贯通误差预计模拟法研究

来源出版物: 测绘通报 期: 3 页: 67-70,102 出版年: 2019

文献号: 0494-0911(2019)3<67:CGSDJC>2.0.TX;2-5

来源出版物: Bulletin of Surveying and Mapping 期: 3 页: 67-70,102 出版年: 2019

文献号: 0494-0911(2019)3<67:CGSDJC>2.0.TX;2-5

语言: Chinese

文献类型: Article

作者关键词: gyro azimuth; underground traverse; break-through error estimation; immersed tunnel; Monte Carlo random simulation

作者关键词: 陀螺方位角; 地下导线; 贯通误差预计; 沉管隧道; 蒙特卡洛模拟法

摘要: The mutual compensation of random errors is often neglected in traditional analytical method of break-through error estimation for underground traverse with gyro observation, and it leads to an overestimation of the error. Based on Monte Carlo random simulation technology, a break-through error estimation method is proposed. The method is tested on an equivalent mock-up network of the tunnels associated with the Hong Kong-Zhuhai-Macau Bridge. The results prove that the proposed method could effectively estimate break-through error, and has a good application effect for underground traverse with gyro observation.

摘要: 针对传统加测陀螺边的地下导线贯通误差预计的解析法没有考虑随机误差的相互抵偿性,使预计结果偏于保守的问题,基于蒙特卡洛模拟方法,顾及陀螺定向测量的观测方式和误差分布规律,提出一种利用模拟观测值代替陀螺观测值进行贯通误差预计的方法,并以港珠澳大桥沉管隧道 1 : 1 实景模拟试验验证该方法的可行性与可靠性。结果显示,该模拟方法能够有效预计贯通误差,对加测陀螺边的地下导线网型有良好的应用效果,可以为优化地下导线控制网提供参考。

入藏号: CSCD:6460883

地址: Ma Ji, Chang'an University, Xi'an, Shaanxi 710054, China.

Shi Zhen, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Xuwei, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 马骥, 长安大学, 西安, 陕西 710054, 中国.

石震, 长安大学, 西安, 陕西 710054, 中国.
张学伟, 长安大学, 西安, 陕西 710054, 中国.
电子邮件地址: maji_pony@qq.com
电子邮件地址: maji_pony@qq.com
使用次数 (最近 180 天): 2
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第 2 条, 共 95 条

作者: Li Nan; Men Yuming; Wang Banqiao; Han Dongdong; Liu Xueling

作者: 李楠; 门玉明; 汪班桥; 韩冬冬; 刘雪玲

标题: SHAKING MODEL TEST ON SOIL LANDSLIDE SUPPORTED WITH MICROPILES

标题: 微型桩群桩支护均质土滑坡的振动台模型试验

来源出版物: 工程地质学报 卷: 27 期: 6 页: 1371-1378 出版年: 2019

文献号: 1004-9665(2019)27:6<1371:WXZQZZ>2.0.TX;2-X

来源出版物: Journal of Engineering Geology 卷: 27 期: 6 页: 1371-1378 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: Earthquake; Micropiles; Soil landslide; Acceleration response; Failure characteristic

作者关键词: 地震; 微型桩; 土质滑坡; 加速度响应; 破坏特征

摘要: This paper examines the seismic response of soil landslide supported with micropiles. It is based on tests of large-scale shaking table. A landslide model with a scale of 8 : 1 is made. The El Centro wave, Wenchuna wave, Kobe wave and Sinusoidal wave are regarded as the seismic excitation. The landslide failure characteristics and acceleration response under the seismic waves were analyzed. The test results indicate the following findings. (1) The failure pattern of micropile after earthquake shows the reverse S-type, which is similar to that under static loads. The destruction area of micropile mainly distributes in 1.4-4 times pile diameter above the sliding surface and 1.4-3.4 times pile diameter below the sliding surface. (2) Acceleration response is different under different seismic waves with different spectrum characteristics. The closer excitation frequency to the natural frequency of landslide, the stronger the dynamic response of the landslide. The acceleration response of the landslide with micropiles has obvious elevation amplification effect. The higher the excitation frequency is, the more significant the elevation effect is. (3) Micropiles can suppress seismic waves. The acceleration in landslide surface that supported by micropiles is weaker than that inside the landslide (especially the landslide toe). However, with the increase of height, it ends to weaken, consequently, the upper part without

supporting structure has surface effect.

摘要: 为研究地震作用下微型桩群桩支护均质土滑坡的地震动力响应特性,依托大型振动台,设计完成几何相似比为 8:1(原型:模型)的物理试验模型。试验以 El Centro 波、汶川波、Kobe 波以及不同频率的正弦波为激励波,研究地震动力作用下微型桩群桩的破坏模式、加桩后土质滑坡的加速度响应规律等。试验结果表明:(1)地震激励后微型桩的破坏模式与静力情况类似,呈反 S 型变形,弯曲破坏范围主要分布在滑面上 1.4~4 倍桩径内和滑面下 1.4~3.4 倍桩径内。(2)不同频谱特性的地震波激励时,滑坡加速度响应不同。激励频率越靠近滑坡自振频率,其加速度响应越强烈。微型桩群桩支护滑坡的加速度响应具有高程放大效应,且激励频率越靠近坡体自振频率,其高程放大效应越显著。(3)微型桩群桩支护结构对地震波有一定的阻滞作用,支护部位(尤其是坡脚)坡面的加速度响应明显弱于坡内,可限制坡表效应,但伴随坡高的增大,这种阻滞作用趋于减弱,无支护部位的上部坡体仍会出现坡表效应。

入藏号: CSCD:6637986

地址: Li Nan, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Men Yuming, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Banqiao, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Han Dongdong, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Liu Xueling, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 李楠, 长安大学, 地质工程与测绘学院, 西安, 陕西 710054, 中国.

门玉明, 长安大学, 地质工程与测绘学院, 西安, 陕西 710054, 中国.

汪班桥, 长安大学, 地质工程与测绘学院, 西安, 陕西 710054, 中国.

韩冬冬, 长安大学, 地质工程与测绘学院, 西安, 陕西 710054, 中国.

刘雪玲, 长安大学, 地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: linan1990111@163.com; dcmenym@qq.com

电子邮件地址: linan1990111@163.com; dcmenym@qq.com

使用次数 (最近 180 天): 1

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作者: Zhang Bing; Qu Wei; Ling Qing; Gao Yuan; An Dongdong; Wang Dong; He Yunqiao

作者: 张冰; 瞿伟; 凌晴; 高源; 安东东; 王栋; 贺云峤

标题: Analysis of present crustal structure deformation characteristics of the Weihe basin based on

the multi-surface function

标题: 基于多面函数法的渭河盆地现今地壳构造形变特征分析

来源出版物: 地球物理学进展 卷: 34 期: 3 页: 986-991 出版年: 2019

文献号: 1004-2903(2019)34:3<986:JYDMHS>2.0.TX;2-X

来源出版物: Progress in Geophysiscs 卷: 34 期: 3 页: 986-991 出版年: 2019

文献号: 1004-2903(2019)34:3<986:JYDMHS>2.0.TX;2-X

语言: Chinese

文献类型: Article

作者关键词: Weihe basin; Multi-surface function; Reference ellipsoid; Spherical distance; Strain field; Source mechanism solution

作者关键词: 渭河盆地; 多面函数; 参考椭球; 球面距离; 应变场; 震源机制解

摘要: The frequent occurrence of geological disasters within the Weihe basin are closely related to its crustal tectonic activity. In this paper, the regional crustal velocity and strain field models were established by employing the multi-surface function method in the spherical coordinate system based on the high-precision GPS monitoring data from 2001 to 2010 of the Weihe basin. Also the optimization of the plane and spherical distance in the construction of the multi-surface function model was discussed. The results show that: (1) By applying the multi-surface function method to establish the velocity field of the Weihe basin, with the increasing numbers of the nodes the fitting accuracy of the spherical distance was better than that of the plane distance; (2) The high gradient shear strain bands in the basin were mainly located in the Sanyuan-Fuyang-Xianyang, Baoji-Laoshan areas. These areas are also significant overshoots of surface expansion and surface compression, and have frequent occurrences of earthquakes; (3) The P and T axis azimuths obtained from the focal mechanism solutions of the medium and strong earthquakes were in a good agreement with the dominant direction of the principal strain axes in the basin. The overall trend of large scale crustal deformation was further obtained in the paper, which will further providing reference for understanding the regional crust deformation and the deep driving mechanism of geological disasters in the Weihe basin.

摘要: 渭河盆地频发的地质灾害与其活跃的现今地壳构造活动密切相关. 本文利用渭河盆地 2001-2010 年高精度 GPS 监测资料, 采用多面函数法在球坐标系下建立了区域地壳速度与应变场模型, 并探讨了平面与球面距离在多面函数模型构建中的最优化问题. 结果表明: (1) 利用多面函数法建立渭河盆地速度场时, 随着区域结点数的增大, 球面距离拟合精度较平面距离提升更大; (2) 盆地内剪应变高梯度带主要位于三原-泾阳-咸阳、宝鸡-岐山一带, 同时上述区域也是面膨胀与面压缩的显著过渡带, 且为地震活动的多发区域; (3) 盆地内最大、最小主应变轴优势方向与中强震震源机制解获得的 P、T 轴分布方位具有较好的一致性. 研究结果进一步在大范围尺度内获得了渭河盆地现今地壳形变趋势性变化特征, 为掌握该区域地壳运动及地质灾害深部驱动机制提供了一定的参考.

入藏号: CSCD:6519879

地址: Zhang Bing, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Qu Wei, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Gao Yuan, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

An Dongdong, School of Geology Engineering and Geomatics, Chang'an University, Xi'an,

Shaanxi 710054, China.

Wang Dong, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

He Yunqiao, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Ling Qing, School of Geology Engineering and Geomatics, Chang'an University;; School of Civil Engineering, Lanzhou University of Technology, ;; Xi'an;; Lanzhou, ;; 710054;; 730050.

地址: 张冰, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

瞿伟, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

高源, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

安东东, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

王栋, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

贺云峤, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

凌晴, 长安大学地质工程与测绘学院;; 兰州理工大学土木工程学院, ;; 西安;; 兰州, ;; 710054;; 730050.

电子邮件地址: 510081834@qq.com; maikerqq@163.com

电子邮件地址: 510081834@qq.com; maikerqq@163.com

使用次数 (最近 180 天): 0

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作者: Zhang Liang; Jia Xiaolin; Wang Haichun; Sun Pengfei

作者: 张亮; 贾小林; 王海春; 孙鹏飞

标题: Accuracy analysis of BDS-3 pseudo-range single point positioning

标题: 北斗三号基本系统伪距单点定位性能分析

来源出版物: 全球定位系统 卷: 44 期: 6 页: 20-26 出版年: 2019

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文献类型: Article

作者关键词: BDS-2/BDS-3; PDOP; BDS-2/BDS-3; PDOP; number of visible satellites; pseudo-range single point positioning; accuracy analysis

作者关键词: 卫星可见数; 伪距单点定位; 精度分析

摘要: The basic system of BDS-3 has been completed. The global service was officially launched

on December 27,2018.The data of 13 international GNSS monitoring and assessment system(iGMAS)tracking stations were selected.These stations are evenly distributed globally.Pseudo-range single-point positioning studies in different positioning modes were carried out and its PDOP,number of visible satellite and pseudo-range single-point positioning result were analyzed.The results show that:BDS-3 single-frequency positioning accuracy from high to low as:B1C,B2a,B1I,B3I;BDS-3dual-frequency positioning accuracy from high to low as:B1C/B2a,B1I/B3I.In the Asia-Pacific region,the BDS-2/BDS-3 positioning accuracy improvement is more than 14%compared with BDS-2.

摘要: 北斗三号(BDS-3)已经完成基本系统建设,并于2018年12月27日开始正式提供全球服务.本文选取了全球分布的12个国际GNSS监测评估系统(iGMAS)跟踪站数据,对北斗二号(BDS-2)和北斗三号(BDS-3)及其组合的定位性能进行研究,分析了空间位置精度因子(PDOP)、卫星可见数,以及单双频伪距单点定位精度.结果表明:BDS-3各频点单频定位精度由高到低的顺序为B1C、B2a、B1I、B3I,BDS-3双频定位精度B1C/B2组合优于B1I/B3I组合;在亚太区域,BDS-2/BDS-3相对于BDS-2定位精度提升大于14%.

入藏号: CSCD:6663699

地址: Zhang Liang, College of Geological Engineering and Geomatics,Chang'an University, Xi'an, 710054.

Wang Haichun, College of Geological Engineering and Geomatics,Chang'an University, Xi'an, 710054.

Sun Pengfei, College of Geological Engineering and Geomatics,Chang'an University, Xi'an, 710054.

Jia Xiaolin, Xi'an Research Institute of Surveying and Mapping, Xi'an, 710054.

地址: 张亮, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

王海春, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

孙鹏飞, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

贾小林, 西安测绘研究所, 西安, 陕西 710054, 中国.

电子邮件地址: 13891907401@163.com

电子邮件地址: 13891907401@163.com

使用次数 (最近 180 天): 0

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作者: Yang Liping; Liu Fei; Li Yanfei; Liu Jing; Li Guoqiang; Jin Ming

作者: 杨丽萍; 刘飞; 李雁飞; 刘晶; 李国强; 金明

标题: Simulation of backscattering characteristics of bare surface based on the AIEM model in arid areas

标题: 基于 AIEM 模型的干旱区裸露地表后向散射特性模拟

来源出版物: 兰州大学学报. 自然科学版 卷: 55 期: 2 页: 176-182 出版年: 2019

文献号: 0455-2059(2019)55:2<176:JYAMXD>2.0.TX;2-2

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文献号: 0455-2059(2019)55:2<176:JYAMXD>2.0.TX;2-2

语言: Chinese

文献类型: Article

作者关键词: advanced integrated equation model; radar incidence angle; soil moisture; roughness parameters; backscattering coefficient

作者关键词: 高级积分方程模型; 雷达入射角; 土壤水分; 粗糙度参数; 后向散射系数

摘要: Juyan Lake, a dried-up lake located in the southeast of Ejin Banner, Inner Mongolia, China, was used as the study area. Responses of radar backscattering coefficient to incidence angle (θ), soil moisture (M), root mean square height (S) and correlation length (L) under different conditions were simulated using advanced integrated equation model. The results showed that the backscattering coefficient increased gradually in Juyan Lake with the decrease of θ , the increase of M and S, as well as the decrease of L. With the increase of θ , M and S, as well as L, the sensitivity of backscattering coefficient to all the above parameters decreased slowly over the bare surface.

摘要: 以内蒙古额济纳旗东南的居延泽为研究区, 利用高级积分方程模型模拟了不同条件下, 后向散射系数对雷达入射角(θ)、土壤水分(M)、均方根高度(S)和相关长度(L)的响应关系. 结果表明, 在居延泽地区, 随着 θ 的减小、M 的提高、S 的增加和 L 的减小, 裸露地表的后向散射系数逐渐增大; 随着 θ 的增大、M 的提高、S 的增大以及 L 的增加, 裸露地表后向散射系数对各参数的敏感性均逐渐降低.

入藏号: CSCD:6663428

地址: Yang Liping, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Liu Fei, School of Earth Sciences and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Yanfei, School of Earth Sciences and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Liu Jing, School of Earth Sciences and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Guoqiang, College of Earth and Environmental Sciences, Lanzhou University, Lanzhou, Gansu 730000, China.

Jin Ming, College of Earth and Environmental Sciences, Lanzhou University, Lanzhou, Gansu 730000, China.

地址: 杨丽萍, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

刘飞, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李雁飞, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

刘晶, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李国强, 兰州大学资源环境学院, 兰州, 甘肃 730000, 中国.

金明, 兰州大学资源环境学院, 兰州, 甘肃 730000, 中国.

电子邮件地址: zylpyang@chd.edu.cn

电子邮件地址: zylpyang@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Yang Liping; Liu Jing; Pan Xueping; Liu Fei; Feng Xiaodong

作者: 杨丽萍; 刘晶; 潘雪萍; 刘飞; 冯晓东

标题: Land surface temperature retrieval and influential factor analysis in Xi'an based on Landsat-8 image

标题: 基于 Landsat-8 影像的西安市地表温度遥感反演与影响因子研究

来源出版物: 兰州大学学报. 自然科学版 卷: 55 期: 3 页: 311-318 出版年: 2019

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语言: Chinese

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作者关键词: Landsat-8; land surface temperature; retrieval; single-channel algorithm; Landsat-8

作者关键词: 地表温度; 反演; 单通道算法

摘要: Based on Landsat-8 image of Xi'an, the single-channel algorithm was used to retrieve the land surface temperature (LST) and the retrieval accuracy was validated by the simultaneously measured surface temperature. The relationships between various surface types, normalized difference vegetation index (NDVI), normalized difference built-up index (NDBI) and LST were analyzed respectively. The results indicated that the single-channel algorithm manifested relatively high retrieval accuracy, and the retrieved surface temperature could effectively reflect the spatial distribution of LST in Xi'an. Distinct LST differences were detected between various surface types, where the LST of urban development land was the highest, while agricultural land was the lowest. The linear fitting of NDVI and NDBI with LST in both the east-west and north-south profile lines demonstrated that NDVI was negatively correlated with the LST, while NDBI was positively correlated, suggesting that vegetation had a cooling effect on the land surface, while urban constructions could markedly exacerbate the effect of urban heat island.

摘要: 基于西安市的 Landsat-8 数据, 采用单通道算法进行了地表温度(LST)的反演, 并通过实测 LST 值对反演精度进行了评价, 同时分析了 LST 与不同地表类型、归一化植被指数(NDVI)以及归一化建筑指数(NDBI)之间的关系. 结果表明, 单通道算法反演 LST 精度较高, 反演结果能较好地反演西安市 LST 的空间分布特征; 不同地表类型对应的 LST 有明显的差异, 城镇建设用地 LST 最高, 农用地 LST 最低; 通过在东西方向/南北方向剖面线上分别对 NDVI、NDBI

与 LST 进行线性拟合,发现 NDVI 与 LST 呈负相关线性关系,NDBI 与 LST 呈正相关线性关系,进一步说明植被对地表起到了一定的降温作用,城镇建筑则加剧了城市热岛效应.

入藏号: CSCD:6663448

地址: Yang Liping, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Liu Jing, School of Earth Sciences and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Pan Xueping, School of Earth Sciences and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Liu Fei, School of Earth Sciences and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Feng Xiaodong, School of Earth Sciences and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 杨丽萍, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

刘晶, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

潘雪萍, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

刘飞, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

冯晓东, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

电子邮件地址: zylpyang@chd.edu.cn

电子邮件地址: zylpyang@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Cui Xincheng; Jin Zhao; Peng Jianbing; Chu Guangchen

作者: 崔新盛; 金钊; 彭建兵; 褚光琛

标题: Application of Electrical Resistivity Tomography (ERT) to monitor soil moisture distribution in the backfilling area of the gully head through gully consolidation and tableland protection on the Dongzhi loess tableland

标题: 电阻率成像法在董志塬固沟保塬水分场监测中的应用

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语言: Chinese

文献类型: Article

作者关键词: ERT; Chinese Loess Plateau; ERT; soil moisture content; soil resistivity; function model

作者关键词: 黄土高原; 土壤含水量; 电阻率; 函数模型

摘要: Background, aim, and scope In recent years, the project of Gully Consolidation and Tableland Protection (GCTP) has been implemented to control the headward erosion in the Dongzhi loess tableland. One of the GCTP methods is refilling the area of the gully head and holding back the headward erosion. However, soil structure of the refilled area is totally different from the original tableland and the laws and paths of water migration also change a lot. How can we accurately monitor the water migration in the deep profile of the refilled area is an urgent issue, which is meaningful for controlling the soil erosion and disasters in the refilled area. In recent years, the geophysical tool of Electrical Resistivity Tomography (ERT) has showed the potential to monitor the soil migration processes, especially in the deep soil profile. Therefore, the method of ERT has been applied in this study and the aim is to solve the difficulty of using ERT measurement results to directly express volumetric soil moisture. Materials and methods In November 2018, five test sites that located in the Dongzhi loess tableland were selected. In each sit, the ERT measurement and the real-time point observation of soil moisture were performed. Results A univariate function model between soil resistivity measured by ERT and volumetric soil moisture measured by real-time soil moisture sensors was established. The 2-D spatial distribution of soil resistivity and volumetric soil moisture at different test sites were obtained. Discussion we found that when the soil moisture content was less than 22%, the estimated soil moisture was greater than the measured. Value of the soil moisture content was above 22%, the estimated soil moisture was lower than the measured value. The accuracy of soil moisture estimation needs to be further improved. There were many factors affecting the estimation of soil moisture, including the complexity of the surface system, the disturbance of the human engineering activities and the strong regionality of the function model. Conclusions The results showed that the relationship between soil resistivity and volumetric soil moisture could be well described by power function model. Moreover, we found that there was a significant linear correlation between the measured and estimated soil moisture content, which indicates that the estimated soil moisture through the established power function model is acceptable. Recommendations and perspectives We conclude that the 2-D soil moisture information produced by ERT and the established power function model can used in the soil moisture monitoring of the Gully Consolidation and Tableland Protection Project in the Dongzhi loess tableland.

摘要: 近年来,电阻率成像法(Electrical Resistivity Tomography,ERT)在土壤水分场监测方面受到广泛关注。为解决 ERT 测量结果难以直接表达土壤含水量的问题,以董志塬固沟保塬工程相关的五个试验点为研究对象,对每个试验点进行了 ERT 测量和土壤水分实时点位观测,建立了 ERT 测量的土壤电阻率与电容式水分传感器测量的土壤体积含水量之间的单变量函数模型。结果表明:幂函数模型能够较好地描述土壤电阻率与体积含水量之间的相关关系。此外,研究发现土壤含水量的实测值与估算值之间表现出极显著的线性相关关系,指示估算的土壤含水量有较高的准确性;同时发现当土壤含水量低于 22%时,估算的含水量大于实测含水量;高于 22%时,估算的含水量小于实测含水量。利用 ERT 测量的土壤电阻率,进行幂函数转换后形成二维土壤含水量信息,在董志塬固沟保塬二维土壤水分场监测中具有适用性。

入藏号: CSCD:6663829

地址: Cui Xinsheng, College of Geological Engineering and Geomatics, Chang'an University;;Institute of Earth Environment, Chinese Academy of Sciences, ;;State Key Laboratory

of Loess and Quaternary Geology, Xi'an;;Xi'an, ;; 710054;;710061.

Jin Zhao, Institute of Earth Environment, Chinese Academy of Sciences;;CAS Center for Excellence in Quaternary Science and Global Change, State Key Laboratory of Loess and Quaternary Geology;;CAS Center for Excellence in Quaternary Science and Global Change, Xi'an;;Xi'an, ;; 710061;;710061.

Peng Jianbing, College of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Chu Guangchen, Institute of Earth Environment, Chinese Academy of Sciences, State Key Laboratory of Loess and Quaternary Geology, Xi'an, Shaanxi 710061, China.

地址: 崔新盛, 长安大学地质工程与测绘学院;;中国科学院地球环境研究所,;;黄土与第四纪地质国家重点实验室, 西安;;西安,;; 710054;;710061.

金钊, 中国科学院地球环境研究所;;中国科学院第四纪科学与全球变化卓越创新中心, 黄土与第四纪地质国家重点实验室;;中国科学院第四纪科学与全球变化卓越创新中心, 西安;;西安,;; 710061;;710061.

彭建兵, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

褚光琛, 中国科学院地球环境研究所, 黄土与第四纪地质国家重点实验室, 西安, 陕西 710061, 中国.

电子邮件地址: jinzhao@ieecas.cn

电子邮件地址: jinzhao@ieecas.cn

使用次数 (最近 180 天): 0

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作者: 魏峥嵘; 杨飞龙; 刘保华; 裴彦良

作者: Wei Zhengrong; Yang Feilong; Liu Baohua; Pei Yanliang

标题: Inverse Gaussian-beam common-reflectionpoint- stack imaging in crosswell seismic tomography

标题: 井间地震逆高斯束共反射点叠加成像

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作者关键词: crosswell seismic; Gaussian; weight function; inverse beam; common reflection; stack; imaging

作者关键词: 井间地震; 高斯射线束正演; 逆高斯束; 共反射点叠加; 成像

摘要: To solve problems in small-scale and complex structural traps, the inverse Gaussian-beam stack-imaging method is commonly used to process crosswell seismic wave reflection data. Owing to limited coverage, the imaging quality of conventional ray-based crosswell seismic stack imaging is poor in complex areas; moreover, the imaging range is small and with severe interference because of the arc phenomenon in seismic migration. Thus, we propose the inverse Gaussian-beam stack imaging, in which Gaussian weight functions of rays contributing to the geophones energy are calculated and used to decompose the seismic wavefield. This effectively enlarges the coverage of the reflection points and improves the transverse resolution. Compared with the traditional VSP-CDP stack imaging, the proposed method extends the imaging range, yields higher horizontal resolution, and is more adaptable to complex geological structures. The method is applied to model a complex structure in the K-area. The results suggest that the wave group of the target layer is clearer, the resolution is higher, and the main frequency of the crosswell seismic section is higher than that in surface seismic exploration. The effectiveness and robustness of the method are verified by theoretical model and practical data.

摘要: 为了解决地下复杂微小构造的精细勘探问题, 使用基于高斯射线束理论的逆高斯束叠加成像方法对井间地震反射波进行成像研究。井间地震常规射线类叠加成像方法由于覆盖次数受到限制, 构造复杂区精细成像质量欠佳, 而以波动方程为基础的井间地震偏移方法的成像时效性不高。本文方法借鉴高斯束合成地震记录的思想, 将共炮集地震数据逆高斯束分解成共反射点道集数据, 然后选取合适的面元进行共反射面元数据叠加, 实现了井间地震逆高斯射线束共反射点叠加。与传统的 VSP-CDP 叠加成像方法相比, 成像范围更加广泛, 且适应复杂地质构造。该方法不仅能够对二维井间地震勘探资料进行成像, 针对三维井间地震资料采用基于宽线处理思路的逆高斯束叠加成像方法仍可以处理复杂构造及斜井成像问题。理论模型及实际资料试算验证了本文研究方法的有效性与稳健性。

入藏号: CSCD:6643688

地址: Wei Zhengrong, College of the Geological Engineering and Geomatics, Changan University, Xian, 710046.

Yang Feilong, College of the Geoscience and Engineering, Xian Shiyou University, Xian, 710064.

Liu Baohua, National Deep See Center, Qingdao, Shandong 266273, China.

Pei Yanliang, The First Institute of Oceanography, SOA, Qingdao, Shandong 266061, China.

地址: 魏峥嵘, 长安大学地质工程与测绘学院, 西安, 陕西 710046, 中国.

杨飞龙, 西安石油大学地球科学与工程学院, 西安, 陕西 710064, 中国.

刘保华, 国家深海基地管理中心, 青岛, 山东 266273, 中国.

裴彦良, 国家海洋局第一研究所, 青岛, 山东 266061, 中国.

电子邮件地址: 544109454@qq.com; feilongy@xsyu.edn.cn

电子邮件地址: 544109454@qq.com; feilongy@xsyu.edn.cn

使用次数 (最近 180 天): 0

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作者: Wang Jun; Yang Xiaomei; Sui Lichun; Kang Junmei; Wang Zhihua

作者: 王君; 杨晓梅; 隋立春; 康军梅; 王志华

标题: Dynamic change monitoring and landscape pattern analysis of vegetation coverage in Xi'an city from 1995 to 2016

标题: 西安市 1995-2016 年植被覆盖度动态变化监测及景观格局分析

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作者关键词: dimidiate pixel model; vegetation fraction; dynamic change; landscape pattern; change monitoring

作者关键词: 像元二分模型; 植被覆盖度; 动态变化; 景观格局; 变化监测

摘要: Based on Landsat TM/OLI remote sensing image data, the vegetation coverages of Xi'an from 1995 to 2016 were retrieved. Then, the characteristics of vegetation coverage in different periods were extracted and analyzed. Moreover, landscape indexes were also introduced to quantitatively understand the spatial changes of vegetation coverage over the past 20 years. The statistical results of whole area showed that the vegetation coverage of Xi'an City in 1995, 2002, 2009, and 2016 was 45.40%, 50.03%, 55.97%, and 59.42%, respectively, which indicated the steady growth of the vegetation coverage. From 1995 to 2016, the extremely low coverage area decreased by 1427.9337 km², and the extremely high vegetation coverage area increased by 1252.9080 km². These indicate that the natural environment of Xi'an was becoming better. The statistical results of separating area showed that the vegetation along the hilly hills and loess terraces significantly grew, the southern mountainous areas and the flood plain of the Weihe River kept unchanged, and the vegetation degradation mainly occurred in the new construction urban areas and the major development areas. The landscape analysis also showed that the plaque density and the number of plaques were on the rise, and the degree of fragmentation was increasing. This indicated that the environment was becoming worse for the biodiversity when the resources were developed. In conclusion, our study shows that the vegetation coverage of Xi'an is growing, but we still need to pay close attention to the environment that maintains biodiversity.

摘要: 基于 Landsat TM/OLI 遥感影像数据反演了西安市 1995-2016 年的植被覆盖度, 分析了西安市不同时期的植被覆盖度变化特征, 并运用景观格局对植被覆盖度的空间格局变化进行了量化分析。总体统计结果显示: 西安市 1995 年、2002 年、2009 年、2016 年平均植被覆盖度分别为 45.40%、50.03%、55.97%、59.42%, 呈现逐年增加趋势, 其中 1995-2016 年极低覆盖度面积减少了 1427.9337 km², 极高植被覆盖度面积增加了 1252.9080 km², 表明西安市自然生态环境明显转好。分区统计结果显示: 南部山区秦岭和渭河洪冲积平原的植被生长保持稳定; 沿山丘陵、黄土台塬区植被增长趋势显著; 植被退化主要发生在新建城市区域和主要发展开发区。景观格局分析显示: 西安市在此 20 年间, 植被覆盖度的斑块密度和斑块数量呈上

升趋势,破碎化程度加大,这不仅表明西安市资源不断被开发利用,同时也表明生物多样性的环境向不利趋势方向发展。这提醒我们尽管西安市总体植被覆盖度变好,但仍需要在资源开发利用过程中密切关注保持生物多样性的环境。

入藏号: CSCD:6643276

地址: Wang Jun, College of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shanxi 710054, China.

Kang Junmei, College of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shanxi 710054, China.

Yang Xiaomei, Institute of Geographic Sciences and Natural Resources Research, CAS, State Key Laboratory of Resources and Environment Information System, Beijing 100101, China.

Wang Zhihua, Institute of Geographic Sciences and Natural Resources Research, CAS, State Key Laboratory of Resources and Environment Information System, Beijing 100101, China.

Sui Lichun, College of Geological Engineering and Geomatics, Chang'an University;;National Geographic Condition Monitoring National Mapping Geographic Information Bureau Engineering Center, ;; Xi'an;;Xi'an, Shanxi;;Shanxi 710054;;710054.

地址: 王君, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

康军梅, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

杨晓梅, 中国科学院地理科学与资源研究所, 资源与环境信息系统国家重点实验室, 北京 100101, 中国.

王志华, 中国科学院地理科学与资源研究所, 资源与环境信息系统国家重点实验室, 北京 100101, 中国.

隋立春, 长安大学地质工程与测绘学院;;地理国情监测国家测绘地理信息局工程中心, ;; 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: 2017026007@chd.edu.cn; zhwang@lreis.ac.cn

电子邮件地址: 2017026007@chd.edu.cn; zhwang@lreis.ac.cn

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作者: Shen Yueqiang; Shen Wei; Li Tonglu; Guo Jian; Lei Yulu

作者: 沈月强; 沈伟; 李同录; 郭剑; 雷雨露

标题: NUMERICAL INVESTIGATION ON IMPACT OF BED ENTRAINMENT TO THE MOBILITY OF RAPID FLOW-LIKE LANDSLIDES

标题: 基底侵蚀对高速流动性滑坡运动性影响的模拟分析

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作者关键词: Rapid flow-like landslides; Bed entrainment; Numerical simulation; Finite difference method

作者关键词: 高速流动性滑坡; 基底侵蚀; 数值模拟; 有限差分法

摘要: Rapid flow-like landslides are characterized by their high mobility and catastrophic consequences. These landslides tend to entrain a great amount of loose materials along their travelling paths, resulting in the enlargement of landslide volume and covering area. This phenomenon is called bed entrainment/scouring in literatures. Although previous studies showed that bed entrainment was a significant factor influencing the mobility of rapid flow-like landslides, few of them considered its impact on the rheology of the sliding mass, and needless to say quantifying this impact in numerical modeling. Therefore, this paper proposes an improved finite difference model based on momentum conservations of both the landslide and erodible mass. In this model, the influence of bed entrainment on the rheology of a landslide is quantified by modifying the rheological parameters of the landslide according to the calculated entrainment depth. Then the Ximiaodian landslide, a typical rapid flow-like landslide located at the south bank of the Jinghe River in Shaanxi Province, is simulated by the new model. It shows that the run-out process of this landslide can be divided into the rapid acceleration stage (0 ~ 5 s) and the slow deceleration stage (5 ~ 14 s). During the acceleration stage, the extent of entrainment is small, so its impact on the motion of this landslide is slight. However, the entrainment obviously promotes the mobility of this landslide at the deceleration stage by reducing the basal resistance. In addition, the modeling results of considering and not considering bed entrainment show totally different patterns. The simulated covering area and final deposit agree well with the measured data when adopting the improved model, while those neglecting the impact of bed entrainment-induced rheology change are obviously smaller than that of the fact. It turns out that the new model proposed here is more suitable for simulating those rapid flow-like landslides with similar bed entrainment phenomenon.

摘要: 高速流动性滑坡运动距离远,破坏性强。这类滑坡在运动过程中常裹挟大量的松散物质,导致滑坡的体积和致灾范围增大,该现象被称为基底侵蚀效应。以往的研究指出基底侵蚀效应对这类滑坡的运动性有显著的影响,但却很少有研究考虑其对滑体性质的影响,以及如何对其进行量化。因此,本文基于动量守恒原理建立了考虑基底侵蚀效应的滑坡运动模型,利用有限差分法求解,并依据滑坡的侵蚀深度来计算侵蚀导致的滑坡性质变化。利用改进的模型对陕西泾河南岸的西庙店滑坡进行模拟分析。结果表明,滑坡运动可分为启动加速阶段(0~5 s)和运动减速阶段(5~14 s)。在启动加速阶段,基底侵蚀程度低,对滑体运动的影响较弱。而在运动减速阶段,基底侵蚀效应降低了滑带土强度,对该滑坡的运动产生了明显的促进作用,致使其发生远程运动。此外,对比考虑和不考虑基底侵蚀两种工况的模拟结果还发现,考虑这种影响时,模拟所得的运动范围及地形与实测吻合良好,而未考虑时模拟所得运动范围明显偏小。因此,本文的模型可对这类滑坡的运动过程进行更为有效的模拟。

入藏号: CSCD:6637990

地址: Shen Wei, Department of Biological, Geological and Environmental Sciences, University of

Bologna, Bologna, Emilia-Romagna 40121, Italy.

Shen Yueqiang, Department of Geological Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Tonglu, Department of Geological Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Guo Jian, Department of Geological Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Lei Yulu, Department of Geological Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 沈月强, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李同录, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

郭剑, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

雷雨露, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

沈伟, Department of Biological, Geological and Environmental Sciences, University of Bologna, Bologna, Emilia-Romagna 40121, Italy.

电子邮件地址: 825177498@qq.com; dcdgx08@chd.edu.cn

电子邮件地址: 825177498@qq.com; dcdgx08@chd.edu.cn

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作者: He Ming; Zhai Dongliang; Qiao Jianwei; Wang Feiyong; Kang Chenyun

作者: 贺鸣; 翟栋梁; 乔建伟; 王飞永; 康尘云

标题: Basic features and mechanism of Dalyu-Baizhang ground fissure in Yuncheng Basin, Shanxi Province

标题: 山西运城盆地大吕-白张地裂缝的基本特征与成因分析

来源出版物: 中国地质灾害与防治学报 卷: 30 期: 6 页: 74-83 出版年: 2019

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作者关键词: Yuncheng Basin; ground fissures; development characteristic; formation mechanics

作者关键词: 运城盆地; 地裂缝; 基本特征; 成因分析

摘要: The Dalyu-BaiZhang ground fissure is located in the southeast of Yuncheng basin in Shanxi

Province,has destroyed a large number of houses,roads and farmlands.In order to acquaint its basic characteristics and causes,using field investigation,trenching,geological drilling and geophysical exploration to describe the basic characteristics of ground fissures,including 4 aspects,section,near-surface and deep aspects.Basal structure analysis,fracture structural condition analysis and InSAR settlement monitoring were used to analyze the genetic mechanism of ground fissures from the aspects of gestation environment,fracture control and pumping induction.The investigation results show that the Dalv-BaiZhang ground fissure is located in the middle of the Zhongtiao mountain fault and the east side of the Mingtiaogang fault,crossing 8 villages,extending 9.2 km intermittently,the overall trend is NE 45°,and the inclination angle is 70° ~ 85°.The ground fissure is wide on the top and narrow below,The amount of dislocation increases with the increase of depth,showing the nature of the same sedimentary fault.The ground fissures are dominated by vertical dislocations,and horizontal stretches are also found.Besides,the ground fissure shows different activities along its strike.The Dalv-Baizhang ground fissure is formed by a combination of various factors.The regional extension and basement extension cause the basement to rupture,which creates conditions for the birth of the ground fissure,the tectonic fracture controls the development and activity of the ground fissure;Pumping induces ground fissures and causes them to emerge from the surface;surface water erosively enlarges the scale of the activity of the ground fissures and eventually forms the current ground fissures.This paper is important not only for disaster prevention and mitigation in Yuncheng Basin,but also provides theoretical support for economic construction in the region.

摘要: 大吕-白张地裂缝位于山西省运城盆地东南部,已破坏大量沿线的房屋、道路和农田,造成了巨大的经济损失。为探明其基本特征及成因,利用野外实地调查和槽探,基于钻探、地球物理勘探详细地描述了地裂缝的基本特征,包括平面、剖面、近地表和深部4个方面;基于区域应力基底构造分析、断裂构造条件分析和InSAR沉降监测,从孕育环境、断裂控制和抽水诱发等方面分析了地裂缝的成因机理。调查结果显示大吕-白张地裂缝位于中条山断裂和鸣条岗东侧断裂上盘,穿越8个村庄,断续延伸9.2 km,整体走向NE45°,倾角为70°~85°。地裂缝上宽下窄,两侧地层被不同程度的错断,位错量随着深度的增加而增加,表现出同沉积断层的性质。地裂缝以垂直位错为主,兼具水平拉张,且具有沿走向的活动差异性。大吕-白张地裂缝是在多种因素共同作用下形成的,区域拉张和基底伸展导致基底破裂,为地裂缝的孕育创造了条件;构造断裂控制地裂缝的发育和活动;抽水诱发地裂缝并导致其出露地表;地表水潜蚀扩大地裂缝的活动规模并最终形成现今地裂缝。本文不仅对于运城盆地的防灾减灾具有重大意义,可为该地区的经济建设提供理论支撑。

入藏号: CSCD:6633100

地址: He Ming, College of Geological Engineering and Geomatics,Changan University, Xian, Shaanxi 710054, China.

Wang Feiyong, College of Geological Engineering and Geomatics,Changan University, Xian, Shaanxi 710054, China.

Kang Chenyun, College of Geological Engineering and Geomatics,Changan University, Xian, Shaanxi 710054, China.

Zhai Dongliang, Sichuan Zhide Geotechnical Engineering Co.,Ltd, Chengdu, Sichuan 610041, China.

Qiao Jianwei, China JIKAN Research Institute of Engineering Investigation and Design,Co.,Ltd., Xian, Shaanxi 710043, China.

地址: 贺鸣, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

王飞永, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.
康尘云, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.
翟栋梁, 四川志德岩土工程有限责任公司, 成都, 四川 610041, 中国.
乔建伟, 机械工业勘察设计研究院有限公司, 西安, 陕西 710043, 中国.

电子邮件地址: 2017126074@chd.edu.com; qiaojw@jk.com.cn

电子邮件地址: 2017126074@chd.edu.com; qiaojw@jk.com.cn

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作者: Zhang Panpan; Guo Chunxi; Nie Jianliang; Ma Yange

作者: 张盼盼; 郭春喜; 聂建亮; 马艳鸽

标题: Applicability analysis of gradient method in spherical harmonic synthesis

标题: 梯度法在球谐综合中的适用性分析

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作者关键词: DTM2006.0; EGM2008; Spherical harmonic synthesis; DTM2006.0; EGM2008; Gradient method; Gravitational field functional

作者关键词: 球谐综合; 梯度法; 重力场泛函

摘要: Aiming at the problem of considering elevation information in the process of spherical harmonic synthesis of the earth's surface, based on the topographic model DTM2006.0 and the ultra-highorder gravity field model EGM2008, the gravity field function in the spherical harmonic synthesis process is extended by gradient method in ellipsoid coordinate system and spherical coordinate system, respectively. Analyzing the applicability of gradient method in ellipsoidal coordinate system and spherical coordinate system. In the experimental region, the calculation results show that the gradient method can reduce the approximate error caused by elevation information to the degree of irrelevance significance for practical application, and can calculate the surface gravity field function at any dense grid point.

摘要: 针对地球表面球谐综合过程中要求考虑高程信息的问题, 在球谐综合过程中, 基于地形模型 DTM2006.0 和超高阶的重力场模型 EGM2008, 分别在椭球坐标系与球坐标系下, 利用梯度法对球谐综合过程中的重力场泛函进行一定阶次扩展, 分析梯度法在椭球坐标系与球坐标

系下的适用性.在实验区域,计算结果表明,在球谐综合过程中,利用梯度法计算重力场泛函,它能够把高程信息带来的近似误差减少到对实际应用无关紧要的程度,可计算任意密集网格点上的表面重力场泛函.

入藏号: CSCD:6637802

地址: Zhang Panpan, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Ma Yange, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Guo Chunxi, School of Geology Engineering and Geomatics, Chang'an University;; Geodetic Data Processing Center, State Bureau of Surveying and Mapping, Xi'an, Shaanxi 710054, China.

Nie Jianliang, Geodetic Data Processing Center, State Bureau of Surveying and Mapping, Xi'an, Shaanxi 710054, China.

地址: 张盼盼, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

马艳鸽, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

郭春喜, 长安大学地质工程与测绘学院;; 自然资源部大地测量数据处理中心, 西安, 陕西 710054, 中国.

聂建亮, 自然资源部大地测量数据处理中心, 西安, 陕西 710054, 中国.

电子邮件地址: zppmyg@163.com; guochunxi1963@163.com

电子邮件地址: zppmyg@163.com; guochunxi1963@163.com

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作者: Wang Tengjun; Zhao Minghai; Yang Yun; Zhang Yang; Cui Qinfang; Li Longtong

作者: 王腾军; 赵明海; 杨耘; 张扬; 崔琴芳; 李陇同

标题: Inversion of Heavy Metals Content in Soil Using Multispectral Remote Sensing Imagery in Daxigou Mining Area of Shaanxi

标题: 多光谱影像的陕西大西沟矿区土壤重金属含量反演

来源出版物: 光谱学与光谱分析 卷: 39 期: 12 页: 3880-3887 出版年: 2019

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作者关键词: Soil heavy metal; Multispectral remote sensing imagery; Inversion; Spatial

distribution; M5model tree

作者关键词: 土壤重金属; 多光谱遥感影像; 反演; 空间分布; M5 模型树

摘要: The problem of low efficiency and higher cost exists in the traditional method mainly onfield-work point sampling then indoor experimental analysis. Also the problem that how to choose the optimal factors indicating the content of heavy metals in soils is difficult to solve for the quantitative inversion of high precision using multispectral remote sensing technology. Using Landsat8/OLI satellite imagery, DEM data and soil samples data, the paper performed the analysis indicators of heavy metals in soil and the quantitative inversion of the content of heavy metals in soil in order to achieve an improved accuracy, taking a study case of a mountainous and forestry mining area called Daxigou mineral of Shaanxi in China. The work was as follows: A soil sampling scheme considering terrain and geomorphology characteristics was designed and evenly sampled in both sides along main topographic feature lines in the study area and 45 soil samples were acquired. Furthermore, a mixed samples from 45 samples were analyzed in laboratory so as to choose the most interested metals (i.e. Cu, Zn, As) as our focus according to both the degree of metals content bigger than that of national authoritative statistics and the type of mineral. Secondly, the paper suggested three types of factors including six spectral reflectivity from band two to seven of Landsat8/OLI imagery, and several spectral indices such as CMR, MNDWI, DVI, EVI etc., derived from Landsat8 image and also slope and aspect factors derived from DEM data were adopted to indicate the characteristics of the spatial distribution of the content of the three metals candidates considering land use and terrain circumstances in the study area. Subsequently, a correlation analysis of the content of three interested metals individually with six spectral reflectivity data, eight spectral indices and three terrain indicators was done using Least Squares principle. According to the consequence of the correlation analysis, the paper introduced the rule-based M5 model tree in the form of piecewise linear model which was used to estimate the content of Cu, Zn, As three metals in the principle of minimizing error rate. And an inversion model for the content of the three metals was constructed through the simulation, smoothing and pruning of the model tree with an input of all three types and 17 indicators mentioned above and 80% training samples. Also, a set of optimal indicators focusing on spectrum for the inversion were determined according to the principle of minimizing RMSE. Finally, the inversion results using 20% random samples were verified, showing that our suggested method achieved a decrease of RMSE value by 27.3%, 24.6%, 20.9%, and an improvement in confidence level for Cu and As, compared to that of the three interested metals using ordinary linear regression model. Also the thematic images showing the spatial distribution were mapped using the model. Then, the comparisons between the estimated value of the content of three metals and the background value published by Chinese government in 1990 were made. Furthermore, the statistical distribution rules of the three metals were concluded and verified using field survey results.

摘要: 传统的以点采样+实验室分析为主的土壤重金属含量分析技术成本高、效率低下,而基于多光谱遥感的土壤重金属高精度定量反演中存在重金属含量影响因子的优化这一难题,以陕西大西沟矿区这类山区地形条件下的金属矿区为例,利用 Landsat8/OLI 多光谱卫星影像、DEM 数据以及外业土壤采样分析数据,开展了矿区土壤重金属含量指示因子分析及定量反演研究。首先,考虑研究区地形地貌特点,设计了沿研究区地形特征线及其两侧坡面均匀分布的样点分布方案,采集了 45 个样本。并对 45 个样本的混合样中的 8 种重金属含量进行了兴趣度分析,根据含量超标程度及矿的类型选取了铜、铅、砷 3 种元素作为分析对象。其次,根

据研究区土地利用现状及地形特点,提出了以 Landsat8/OLI 影像 B2 至 B7 波段光谱反射率、粘土矿物比(CMR)、改进归一化水体指数(MNDWI)、差异植被指数(DVI)等八种光谱指数、以及反映研究区地形坡度和坡向三类因子作为反映土壤重金属含量空间分布特征的候选因子。进而,对上述三类候选因子与样本中 3 种金属含量进行了最小二乘相关性分析。根据分析结果,引入了基于估算误差最小准则的金属含量估算模型---基于规则的 M5 模型树的分段线性估算模型。以上述三大类共 17 个指示因子作为模型的输入,利用 80%的土壤样本分析数据作为模型的训练数据,经过 M5 模型树的构建、平滑和树枝修剪过程,建立了 3 种金属的反演模型实现了研究区中土壤中 3 种金属含量的估算。同时,基于均方根误差(RMSE)最小准则确定了以光谱因子为主的最利于反演的最佳指示因子集。最后,用随机选取的 20%的检验样本对模型进行了反演精度分析,验证了该模型对铜、铅、砷 3 种金属含量的反演精度比普通的线性模型分别提高了 27.3%,24.6%,20.9%,同时,铜、铅元素的可信度也有所提高。利用上述模型的反演结果实现了 3 种金属含量的空间分布制图,并将反演结果与 1990 年公布的国家土壤元素背景值进行了对比。此外,分析了研究区铜、铅、砷 3 种金属的空间分布规律,并利用野外调查结果进行了验证。

入藏号: CSCD:6631967

地址: Wang Tengjun, College of Geology Engineering and Surveying,Chang'an University;;Key Laboratory of Degraded and Unused Land Consolidation Engineering,the Ministry of Land and Resources, ;;Key Laboratory of Degraded and Unused Land Consolidation Engineering,the Ministry of Land and Resources, Xi'an;;Xi'an, ;; 710054;;710016.

Zhao Minghai, Shaanxi Railway Institute, Weinan, Shaanxi 714000, China.

Yang Yun, College of Geology Engineering and Surveying,Chang'an University, Xi'an, Shaanxi 710054, China.

Cui Qinfang, College of Geology Engineering and Surveying,Chang'an University, Xi'an, Shaanxi 710054, China.

Li Longtong, College of Geology Engineering and Surveying,Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Yang, Key Laboratory of Degraded and Unused Land Consolidation Engineering,the Ministry of Land and Resources;;Land Construction Group of Shaanxi, Key Laboratory of Degraded and Unused Land Consolidation Engineering,the Ministry of Land and Resources;;, Xi'an;;Xi'an, ;; 710016;;710075.

地址: 王腾军, 长安大学地质工程与测绘学院;;国土资源部退化及未利用土地整治工程重点实验室, ;;国土资源部退化及未利用土地整治工程重点实验室, 西安;;西安, 陕西;;陕西 710054;;710016, 中国.

赵明海, 陕西铁路工程职业技术学院, 渭南, 陕西 714000, 中国.

杨耘, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

崔琴芳, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李陇同, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

张扬, 国土资源部退化及未利用土地整治工程重点实验室;;陕西省土地工程建设集团, 国土资源部退化及未利用土地整治工程重点实验室;;, 西安;;西安, 陕西;;陕西 710016;;710075, 中国.

电子邮件地址: wangtj@chd.edu.cn; yangyunbox@163.com

电子邮件地址: wangtj@chd.edu.cn; yangyunbox@163.com

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作者: Yang Liping; Ma Meng; Xie Wei; Pan Xueping

作者: 杨丽萍; 马孟; 谢巍; 潘雪萍

标题: Fusion algorithm evaluation of Landsat 8 panchromatic and multispectral images in arid regions

标题: 干旱区 Landsat8 全色与多光谱数据融合算法评价

来源出版物: 国土资源遥感 卷: 31 期: 4 页: 11-19 出版年: 2019

文献号: 1001-070X(2019)31:4<11:GHQLQS>2.0.TX;2-I

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文献号: 1001-070X(2019)31:4<11:GHQLQS>2.0.TX;2-I

语言: Chinese

文献类型: Article

作者关键词: fusion algorithm; spectral information; spatial information; object - oriented classification; effect evaluation

作者关键词: 图像融合; 光谱信息; 空间信息; 面向对象分类; 效果评价

摘要: With lower contrast and confidence level, single factor evaluation index is not very effective in the comprehensive evaluation of pixel level image fusion algorithms of Landsat 8 in arid regions. Based on the Landsat 8 image of Juyanze area, 11 single factor indicators and object - oriented classification method were used to compare the following six image fusion algorithms, i. e., Principal Component (PC), Brovey Transform (BT), Hue - Saturation - Value Transform (HSV), Gram - Schmidt Pan Sharpening (G - S), High - pass filtering (HPF) and Wavelet Transform (WT) according to the spatial information quantity, spectral feature and classification accuracy. The results indicate that the spatial resolution and texture features of all fusion images are enhanced in comparison with the original image. HSV is proved to be the best algorithm to highlight the texture features in arid regions, but its spectral fidelity is bad. WT exhibits an excellent capability in maintaining the spectral information, and its capability of revealing spatial details is just next to the HSV method. Therefore, WT is considered the most suitable algorithm for image fusion of Landsat 8 in this study. Taking the spatial information quantity and spectral features into account simultaneously, the authors hold that PC and G - S have moderate performance, and their performance is a little lower than that of HPF, while the performance of BT is the worst. The classification results show that the classification accuracy of WT and HPF is improved to some extent compared with the original image.

摘要: 针对目前 Landsat8 影像像素级融合算法中单因素评价指标对比性不强、置信度较低、

难以实现融合效果综合评估的问题,基于居延泽地区的 Landsat8 影像,采用 11 种单因素指标和面向对象分类方法,从空间信息量、光谱特征及地物分类精度 3 个方面综合评价了主成分变换法(principle component transform,PC) 、 比值变换法(brovey transform, BT) 、 HSV(hue - saturation - value)变换法、 相位恢复变换法(Gram - Schmidt pan sharpening,G - S) 、 高通滤波算法(high pass filtering,HPF)和小波变换法(wavelet transform,WT)等 6 种融合算法的融合效果。结果表明,各融合算法的空间分辨率及纹理特征相较于原始影像均得到增强。HSV 法表达空间细节的能力最佳,但其光谱保真度较差; WT 法可最大程度地保持光谱特征,且空间细节表达能力仅次于 HSV 法,最适用于 Landsat 8 的影像融合;综合考虑空间信息量与光谱特征,PC 法和 G - S 法效果适中,略低于 HPF 法,BT 法最劣。从分类结果来看,WT 法和 HPF 法的分类精度相较于原始影像的分类精度有一定的提高。

入藏号: CSCD:6623445

地址: Yang Liping, School of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Ma Meng, School of Earth Sciences and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Xie Wei, School of Earth Sciences and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Pan Xueping, School of Earth Sciences and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 杨丽萍, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

马孟, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

谢巍, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

潘雪萍, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

电子邮件地址: zylpyang@chd.edu.cn

电子邮件地址: zylpyang@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Wang Haichun; Jia Xiaolin; Li Ding; Mao Yue

作者: 王海春; 贾小林; 李鼎; 毛悦

标题: Accuracy assessment and analysis of broadcast ephemeris of BDS-3 satellites

标题: 北斗三号卫星广播星历精度评估分析

来源出版物: 导航定位学报 卷: 7 期: 4 页: 60-63,74 出版年: 2019

文献号: 2095-4999(2019)7:4<60:BDSHWX>2.0.TX;2-M

来源出版物: Journal of Navigation and Positioning 卷: 7 期: 4 页: 60-63,74 出版

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文献号: 2095-4999(2019)7:4<60:BDSHWX>2.0.TX;2-M

语言: Chinese

文献类型: Article

作者关键词: BeiDou navigation satellite system with global coverage (BDS-3); satellite laser ranging; broadcast orbit accuracy; broadcast clock accuracy; signal-in-space ranging error

作者关键词: 北斗三号; 卫星激光测距; 广播轨道精度; 广播钟差精度; 空间信号测距误差

摘要: In order to analyze the broadcast ephemeris accuracy of BDS-3 satellites the paper used post-event precise ephemeris to evaluate the broadcast ephemeris accuracy of BDS-3 satellites, and compared the accuracy of broadcast ephemeris between BDS-3 satellites with BDS-2 satellites, then tested the result by using satellite laser ranging. Results showed that:the broadcast orbit accuracy of BDS-3 satellites would be much higher than that of BDS-2 satellites; the radial error of broadcast orbit of BDS-3 satellites would be less than 0.1 m, three-dimensional accuracy would be better than 1 m, and the average accuracy of broadcast clock difference would be about 1.5 ns; the signal-in-space ranging error of BDS-3 MEO satellites would be less than 0.5 m, meanwhile, that of BDS-2 MEO satellites would be about 1 m.

摘要: 为了分析北斗三号卫星广播星历的精度,采用事后精密星历对北斗三号卫星的广播星历精度进行评估,对比北斗三号和北斗二号卫星广播星历精度,并利用卫星激光测距进行检核。结果表明:北斗三号卫星广播轨道精度相对北斗二号有较大提升;北斗三号卫星广播轨道径向误差优于 0.1 m,3 维精度优于 1 m,广播钟差平均精度在 1.5 ns 左右;北斗三号中圆轨道卫星空间信号测距误差优于 0.5 m,北斗二号同类卫星误差在 1 m 左右。

入藏号: CSCD:6619578

地址: Wang Haichun, College of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Ding, College of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Jia Xiaolin, State Key Laboratory of Geo-information Engineering;;Xi'an Research Institute of Surveying and Mapping, State Key Laboratory of Geo-information Engineering;;, Xi'an;;Xi'an, ;; 710054;;710054.

Mao Yue, State Key Laboratory of Geo-information Engineering;;Xi'an Research Institute of Surveying and Mapping, State Key Laboratory of Geo-information Engineering;;, Xi'an;;Xi'an, ;; 710054;;710054.

地址: 王海春, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李鼎, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

贾小林, 地理信息工程国家重点实验室;;西安测绘研究所, 地理信息工程国家重点实验室;;, 西安;;西安, ;; 710054;;710054.

毛悦, 地理信息工程国家重点实验室;;西安测绘研究所, 地理信息工程国家重点实验室;;, 西安;;西安, ;; 710054;;710054.

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作者: Ren Chaofeng; Peng Xiaodong

作者: 任超锋; 彭晓东

标题: Extraction method of image pairs for low-altitude UAV image matching

标题: 低空无人机影像匹配像对的提取方法

来源出版物: 测绘工程 卷: 28 期: 6 页: 36-41 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: image matching; UAV; track point; oblique image; image pair

作者关键词: 影像匹配; 无人机; 连接点; 倾斜影像; 待匹配像对

摘要: Aiming at the problem that existing UAV image matching algorithm needs the prior information of the camera and the measuring area, as well as low reliability, this paper proposes a UAV image matching algorithm based on the initial spatial position of image. First, the images to be matched are sorted according to the location of the image. Then based on the exhaustive matching algorithm is used to automatically identify the search depth of the sorted image. Finally, the structure of the track point is used to automatically identify the missing image pairs to be matched. In order to validate the effectiveness of the proposed algorithm, three types of UAV image data are selected: the traditional down looking single-camera, double-camera and five-camera oblique camera. The experimental result shows that the proposed algorithm can adapt to all types of UAV image matching, in which the reliability of single-camera data increases by 2.4%, the double-camera data increases by 5.3% and the five-camera data increases by 24.3%.

摘要: 针对已有的无人机影像匹配算法需要相机、测区先验知识且可靠性不高的问题, 提出一种基于影像初始空间位置的无人机影像匹配算法。首先依据影像的位置信息对待匹配影像进行排序; 然后基于盲匹配算法自动识别排序影像的搜索深度; 最后根据跟踪所得的连接点结构信息, 自动识别遗漏的待匹配像对。为验证文中算法的有效性, 选择 3 种典型的无人机影像数据: 传统的下视单相机、双相机倾斜相机、五相机倾斜相机。试验结果表明, 算法能够适应各种类型的无人机影像匹配, 其中单相机数据可靠度提升 2.4%, 双相机数据提升 5.3%, 五相机数据提升 24.3%。

入藏号: CSCD:6617831

地址: Ren Chaofeng, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Peng Xiaodong, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 任超锋, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

彭晓东, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

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作者: Han Junqiang; Huang Guanwu; Huang Guanwen; Zhang Qin; Du Yuan

作者: 韩军强; 黄观武; 黄观文; 张勤; 杜源

标题: Multi-monitoring methods joint application in landslide deformation monitoring

标题: 多种监测手段在滑坡变形中的组合应用

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语言: Chinese

文献类型: Article

作者关键词: GNSS-RTK; landslide monitoring; total station; extensometer; GNSS-RTK; joint application

作者关键词: 滑坡监测; 全站仪; 位移计; 组合应用

摘要: Aiming at the economic and efficient use of various monitoring methods in landslides, the paper proposed a proper joint solution that could be conducted to effectively detect and warn the dangerous of landslides at different stages of landslides at the lowest cost based on an analyzation of the characters of high precision total station, extensometer, as well as GNSS-RTK (Real-Time Kinematic with Global Navigation Satellite System). The results showed that the total station could be mainly used to monitoring the landslide during stabilization phase; in the acceleration phase of landslide, the real-time methods of extensometer and GNSS-RTK, which could be more flexible and efficient, should be additionally needed to realize the collapse of landslide with a safety warning.

摘要: 针对多种监测手段在滑坡中如何经济并高效的使用问题, 该文结合高精度智能全站仪、地表位移计及全球卫星导航系统-实时动态差分(GNSS-RTK)3种监测技术的各自特点, 基于实际滑坡变形监测应用, 提出不同滑坡阶段应采取多种手段组合监测, 实现经济、高效的滑坡变形状态识别并进行安全预警。结果显示: 滑坡稳定阶段, 全站仪可作为主要监测手段进行周期性监测; 滑坡加速阶段, 增加GNSS-RTK和位移计两种实时监测技术, 可以更灵活、高效地实现滑坡体垮塌的快速捕捉, 进行安全预警。

入藏号: CSCD:6618171

地址: Han Junqiang, School of Geology Engineering and Geomatics, Chang'an University, Xi'an,

Shaanxi 710054, China.

Huang Guanwen, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Qin, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Du Yuan, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Huang Guanwu, College of Geomatics, Xi'an University of Science and Technology, Xi'an, Shaanxi 710054, China.

地址: 韩军强, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

黄观文, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

张勤, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

杜源, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

黄观武, 西安科技大学测绘科学与技术学院, 西安, 陕西 710054, 中国.

电子邮件地址: 281394283@qq.com

电子邮件地址: 281394283@qq.com

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作者: Ma Yange; Zhao Lihua; Zhang Panpan; Lu Jianing

作者: 马艳鸽; 赵丽华; 张盼盼; 吕佳凝

标题: Establishment of 3D Deformation Field by GPS-InSAR Data Fusion Method Based on Function and Stochastic Model

标题: 函数模型与随机模型双约束的 GPS-InSAR 数据融合方法建立三维形变场

来源出版物: 大地测量与地球动力学 卷: 39 期: 11 页: 1112-1117 出版年: 2019

文献号: 1671-5942(2019)39:11<1112:HSMXYS>2.0.TX;2-H

来源出版物: Journal of Geodesy and Geodynamics 卷: 39 期: 11 页: 1112-1117 出版年: 2019

文献号: 1671-5942(2019)39:11<1112:HSMXYS>2.0.TX;2-H

语言: Chinese

文献类型: Article

作者关键词: InSAR; GPS; InSAR; GPS; stochastic model; function model; double constraint model; three-dimensional deformation

作者关键词: 随机模型; 函数模型; 双约束模型; 三维形变场

摘要: Aiming at the problem of insufficient monitoring information when InSAR technology is used to study the surface three-dimensional deformation, a three-dimensional deformation model with stochastic model constraints is established with GPS monitoring information as a priori. Considering that the LOS observation is insensitive to the North-South deformation due to the polar orbit of SAR satellite, the function constraint condition of 3D deformation solution is constructed with the strong constraint of GPS north-south deformation observation. The results of the simulation data and the measured data in Xi'an area show that the least squares solution based on the combination of stochastic model and functional model is more accurate than the parametric solution, with only functional model constraint or stochastic model constraint, and the parametric solution without any constraint.

摘要: 针对 InSAR 技术研究地表三维形变时监测信息不足的问题, 以 GPS 监测信息为先验信息, 建立附有随机模型约束的地表三维形变模型。考虑到 SAR 卫星极轨方式运行导致 LOS 向观测量对南北向形变不敏感的问题, 以 GPS 南北向形变观测值作为强约束, 构建三维形变解算的函数约束条件。模拟数据与西安地区实测数据的计算结果表明, 基于随机模型与函数模型共同约束的地表三维形变参数最小二乘解的精度优于仅有函数模型约束或仅有随机模型约束及无任何约束的参数解精度。

入藏号: CSCD:6609391

地址: Ma Yange, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhao Lihua, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Panpan, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Lu Jianing, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 马艳鸽, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

赵丽华, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

张盼盼, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

吕佳凝, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: mygzpp@163.com; zhaolih@chd.edu.cn

电子邮件地址: mygzpp@163.com; zhaolih@chd.edu.cn

使用次数 (最近 180 天): 1

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作者: Wei Jiancheng; Xiao Yun; Wang Li; Meng Ning; Zou Jiasheng

作者: 韦建成; 肖云; 王利; 孟宁; 邹嘉盛

标题: Filtering of Strapdown Marine Gravity Data by Wavelet Threshold

标题: 捷联式海洋重力数据的小波阈值滤波

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语言: Chinese

文献类型: Article

作者关键词: strapdown marine gravimetry; wavelet thresholding; Butterworth low-pass filter

作者关键词: 捷联式海洋重力测量; 小波阈值; Butterworth 低通滤波器

摘要: Based on strapdown marine gravity real data,we check the effectiveness of using wavelet threshold in filtering marine gravity anomaly.We test different wavelet,threshold techniques and decomposition levels.Results show that the db6,db7,db8,db9,db10,sym6,sym7,sym8,sym9,sym10,coif3,coif4 and coif5 are the thirteen wavelets suited for marine gravimetry,and wavelet decomposition level can be taken to 8 or 9 layers.The unbiased risk threshold filtering effect is better.When the wavelet is decomposed into the 8 th and 9 th layers,the result of the wavelet threshold filtering agrees well with the filtering results using the Butterworth low-pass filter with 0.005Hz and 0.0033Hz cutoff frequency,but the result of the wavelet threshold filtering is more smoothing than the Butterworth low-pass filter.Further,the RMSE of the difference between the two filtering results is within 0.25 mGal.Wavelet threshold filtering is easier to decompose the noise component than the Butterworth low-pass filter,which can eliminate gravity distortion more effectively.

摘要: 基于捷联式海洋重力测量数据,对比不同小波、阈值及施加方式对滤波效果的影响。结果表明,db6、db7、db8、db9、db10、sym6、sym7、sym8、sym9、sym10、coif3、coif4和coif5小波较适用于海洋重力测量,小波分解层次可取至8层或9层,采用史坦无偏风险阈值滤波效果较好;小波分解至第8、9层时,阈值滤波结果与截止频率为0.005Hz和0.0033Hz的Butterworth低通滤波器的滤波结果吻合较好,但小波阈值滤波结果更加平滑,两者差值的RMSE在0.25 mGal以内,且小波阈值滤波更容易分解出噪声成分,可以更有效地消除重力畸变。

入藏号: CSCD:6609395

地址: Wei Jiancheng, School of Geological Engineering and Geomatics,Chang'an University;;State Key Laboratory of Geographic Information Engineering;;The 20 th Research Institute of China Electronics Technology Group Co, ;;State Key Laboratory of Geographic Information Engineering;;, Xi'an;;Xi'an;;Xi'an, ;;; 710054;;710054;;710054.

Xiao Yun, State Key Laboratory of Geographic Information Engineering;;Xi'an Research Institute of Surveying and Mapping, State Key Laboratory of Geographic Information Engineering;;, Xi'an;;Xi'an, ; 710054;;710054.

Wang Li, School of Geological Engineering and Geomatics,Chang'an University;;State Key Laboratory of Geographic Information Engineering, ;;State Key Laboratory of Geographic Information Engineering, Xi'an;;Xi'an, ; 710054;;710054.

Meng Ning, School of Geological Engineering and Geomatics,Chang'an University;;State Key

Laboratory of Geographic Information Engineering, ;;State Key Laboratory of Geographic Information Engineering, Xi'an;;Xi'an, ;; 710054;;710054.

Zou Jiasheng, School of Geological Engineering and Geomatics,Chang'an University;;State Key Laboratory of Geographic Information Engineering, ;;State Key Laboratory of Geographic Information Engineering, Xi'an;;Xi'an, ;; 710054;;710054.

地址: 韦建成, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室;;中国电子科技集团公司第 20 研究所, ;;地理信息工程国家重点实验室;; 西安;;西安;;西安, ;;; 710054;;710054;;710054.

肖云, 地理信息工程国家重点实验室;;西安测绘研究所, 地理信息工程国家重点实验室;; 西安;;西安, ;; 710054;;710054.

王利, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室, ;;地理信息工程国家重点实验室, 西安;;西安, ;; 710054;;710054.

孟宁, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室, ;;地理信息工程国家重点实验室, 西安;;西安, ;; 710054;;710054.

邹嘉盛, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室, ;;地理信息工程国家重点实验室, 西安;;西安, ;; 710054;;710054.

电子邮件地址: 1205834766@qq.com

电子邮件地址: 1205834766@qq.com

使用次数 (最近 180 天): 0

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第 20 条, 共 95 条

作者: Bai Zhengwei; Zhang Qin; Huang Guanwen; Jing Ce; Wang Jiaying

作者: 白正伟; 张勤; 黄观文; 景策; 王家兴

标题: Real-time BeiDou landslide monitoring technology of light terminal plus industry cloud

标题: 轻终端+行业云的实时北斗滑坡监测技术

来源出版物: 测绘学报 卷: 48 期: 11 页: 1424-1429 出版年: 2019

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作者关键词: GNSS; landslide; GNSS; BeiDou; low cost; high-precision; monitoring and early warning

作者关键词: 滑坡; 北斗; 低成本; 高精度; 监测预警

摘要: Implementing the high-precision,real-time and three-dimensional deformation monitoring for the landslide area,which is the prerequisite for the accurate warning of landslide disasters.GNSS technology is currently the only way to directly obtain the three-dimensional vector deformation of landslide disaster surface,but GNSS has two problems of high-cost and low-reliability in large-scale landslide monitoring. The ideas of Internet of Things and the concept of cloud platform plus monitoring terminal are proposed in this article.Thus,we develop a real-time BeiDou/GNSS monitoring equipment with thousands RMB cost. The millimeter monitoring and warning cloud platform also are developed independently.This equipment successfully applied to real-time monitoring and early warning of Heifangtai landslide in Gansu Province. Cooperated with early warning system of the Chengdu University of Technology,we issued an accurate warning signal 40 minutes in advance to avoid casualties and property losses.The remote video surveillance installed on the landslide body recorded the whole process of landslide disaster for the first time.

摘要: 对滑坡区域进行地表高精度实时三维变形监测,是实现滑坡灾害精准预警的前提。GNSS 技术是目前唯一直接获取滑坡灾害实时地表三维矢量变形的手段,但 GNSS 应用于大范围滑坡监测存在成本高和计算能力差两大问题。本文采用物联网思维,以云+端的设计理念,自主研发了千元级小型化实时北斗/GNSS 监测技术装备,并研制了毫米级实时监测预警云平台,成果成功应用于甘肃黑方台滑坡实时监测预警。联合成都理工大学预警系统提前 40 min 发出了准确预警信号,避免了人员伤亡和财产损失。安装在滑坡体上的远程视频监控首次近距离记录了滑坡灾害发生的全过程。

入藏号: CSCD:6612213

地址: Bai Zhengwei, College of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Qin, College of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Huang Guanwen, College of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Jing Ce, College of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Jiaying, College of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 白正伟, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

张勤, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

黄观文, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

景策, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

王家兴, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: bzw0816@163.com; zhangqinle@263.net.cn

电子邮件地址: bzw0816@163.com; zhangqinle@263.net.cn

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作者: Zhang Zhenfei; Ni Wankui; Wang Xijun; Yuan Kangze; Pan Dengli; Liu Kui

作者: 张镇飞; 倪万魁; 王熙俊; 苑康泽; 潘登丽; 刘魁

标题: An experimental study of water infiltration and hydraulic conductivity of the compacted loess

标题: 压实黄土水分入渗规律及渗透性试验研究

来源出版物: 水文地质工程地质 卷: 46 期: 6 页: 97-104 出版年: 2019

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作者关键词: compacted loess; vertical infiltration; instantaneous profile method; soil-water characteristic curve; unsaturated hydraulic conductivity

作者关键词: 压实黄土; 垂直入渗; 瞬时剖面法; 土-水特征曲线; 非饱和渗透系数

摘要: In order to study the water vertical infiltration and the unsaturated hydraulic conductivity function of the compacted loess, two groups of infiltration tests are conducted on the unsaturated compacted loess columns in the laboratory. In the constant-water head infiltration tests, both the cumulative infiltration and the wetting front distance are in a good power function relationship with time. A linear correlation exists between the cumulative infiltration and the wetting front distance. The infiltration rate, which is inversely proportional to the wetting front distance, decreases rapidly with time after the initial infiltration and finally reaches a steady seepage. In the rainfall infiltration tests, the van Genuchten and Fredlund-Xing equations are used to model the soil-water characteristic curve (SWCC) for each soil. Both the models capture the curve reasonably well over the entire range of the measured suction. The unsaturated hydraulic conductivity calculated using the instantaneous profile method has an exponential relation to the volumetric water content. Meanwhile, the van Genuchten and the Fredlund statistical modeling formalism are used to predict the hydraulic conductivity function, respectively. By comparison, the predicted values of the van Genuchten hydraulic conductivity model are much closer to the experimental values.

摘要: 为了研究压实黄土中的水分垂直入渗规律和非饱和渗透系数函数,在实验室内利用一维土柱垂直入渗模型试验装置,对两组压实黄土土柱试样分别进行了常水头入渗和降雨入渗试验。得到主要结论如下:(1)常水头入渗试验中,累积入渗量和湿润锋前进距离都随入渗时间呈幂函数形式增长,累积入渗量和湿润锋前进距离之间存在线性关系。入渗率在入渗初期最大,之后随入渗时间而快速降低,并在土柱试样底部出水以后达到稳定,且与湿润锋前进距离呈反比关系。(2)降雨入渗试验中,得到两组试样入渗过程中土-水特征曲线数据,分别用 van

Genuchten 模型和 Fredlund-Xing 模型对两组试样进行了特征曲线拟合。并利用瞬时剖面法处理了入渗过程中水分和水势传感器的监测数据,得到两组试样的非饱和渗透系数,并拟合得到非饱和渗透系数与体积含水率之间的指数函数关系式。同时,采用 van Genuchten 和 Fredlund 等渗透系数模型分别对两组试样的非饱和渗透系数进行预测,通过对比模型预测结果和瞬时剖面法实测值,发现 van Genuchten 渗透系数模型预测结果更接近实测值。

入藏号: CSCD:6607341

地址: Zhang Zhenfei, School of Geology Engineering and Geomatics,Changan University, Xian, Shaanxi 710054, China.

Ni Wankui, School of Geology Engineering and Geomatics,Changan University, Xian, Shaanxi 710054, China.

Wang Xijun, School of Geology Engineering and Geomatics,Changan University, Xian, Shaanxi 710054, China.

Yuan Kangze, School of Geology Engineering and Geomatics,Changan University, Xian, Shaanxi 710054, China.

Pan Dengli, School of Geology Engineering and Geomatics,Changan University, Xian, Shaanxi 710054, China.

Liu Kui, China Electronic Research Institute of Engineering Investigations and Design, Xian, Shaanxi 710000, China.

地址: 张镇飞, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

倪万魁, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

王熙俊, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

苑康泽, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

潘登丽, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

刘魁, 信息产业部电子综合勘察研究院, 西安, 陕西 710000, 中国.

电子邮件地址: 1048431093@qq.com; nnwwkk@126.com

电子邮件地址: 1048431093@qq.com; nnwwkk@126.com

使用次数 (最近 180 天): 1

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作者: Gao Yang; Zhang Yongzhi; Yin Wenhao

作者: 高阳; 张永志; 尹文浩

标题: Viscosity of the Japan M_W 9.0 earthquake inferred from GRACE RL05 data

标题: 利用 GRACE 数据反演日本 M_W 9.0 地震区域黏滞性

来源出版物: 地球物理学进展 卷: 34 期: 5 页: 1750-1756 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: GRACE; Gravity Recovery and Climate Experiment(GRACE); Viscosity; Japan M_W 9.0 Earthquake; Gravity changes

作者关键词: 黏滞性; 日本 M_W 9.0 地震; 重力变化

摘要: Based on the RL05 monthly gravity field model released by CSR, the soil moisture and snow water is deducted from the global hydrological models GLDAS (Global Land Data Assimilation System) and CPC (Climate Prediction Center), the GIA (Global Isostatic Adjustment) effect is deducted from the glacier model as well, the co-seismic gravity change of the Japan M_W 9.0 earthquake is successfully obtained by using the method of least squares fitting with the strategy of P3M6 decorrelation filter 300 km fan filter. The time series of gravity change at two points on the hanging side and the heading side are analyzed as well by using the same method, respectively. The viscosity of the Japan M_W 9.0 earthquake is inferred by using PSGRN/PSCMP, the co-seismic and post-seismic gravity change in the study area is calculated as well. The results show that, the co-seismic gravity change in the study area is $-5.2 \times 10^{-8} \sim 2.9 \times 10^{-8} \text{ ms}^{-2}$ after deducting the effect of soil moisture and GIA; the gravity increase is obvious at the two characteristic points, the point on the hanging side located in the Pacific Ocean increase more significant; the difference of the viscosity is obvious on the heading side and the hanging side, when the viscosity of the hanging side and the heading side is $2.5 \times 10^{18} \text{ Pa}\cdot\text{s}$, $5.0 \times 10^{17} \text{ Pa}\cdot\text{s}$, respectively, the results agree well with which calculated from Gravity Recovery and Climate Experiment (GRACE) data, considering the post-seismic gravity change of the two sides, the regional viscosity coefficient is about $1.5 \times 10^{18} \text{ Pa}\cdot\text{s}$.

摘要: 利用 CSR(Center for Space Research)发布的 GRACE RL05 月重力场模型数据,通过水文模型 GLDAS (Global Land Data Assimilation System)和 CPC(Climate Prediction Center)扣除土壤水和雪水的影响,根据冰川模型扣除 GIA(Global Isostatic Adjustment)的影响,采用 P3M6 去相关滤波和 300 km 扇形滤波,基于最小二乘拟合的方法得到日本 M_W 9.0 地震的同震及断层上下盘两个特征点重力变化时间序列,利用 PSGRN/PSCMP 模型对日本 M_W 9.0 地震区域黏滞性进行了反演,并计算了同震及震后 5 年研究区域重力变化的空间分布.结果表明,扣除土壤水和冰川均衡调整因素的影响,同震重力变化为 $-5.2 \times 10^{-8} \sim 2.9 \times 10^{-8} \text{ ms}^{-2}$;两个特征点在震后 5 年重力均增加,下盘重力增加较大;日本 M_W 9.0 地震区域黏滞性横向差异较明显,断层上下盘的地幔黏滞系数分别为 $2.5 \times 10^{18} \text{ Pa}\cdot\text{s}$ 、 $5.0 \times 10^{17} \text{ Pa}\cdot\text{s}$ 时,与 GRACE 观测值较接近,综合考虑断层上下盘的震后重力变化,区域黏滞系数大约为 $1.5 \times 10^{18} \text{ Pa}\cdot\text{s}$.

入藏号: CSCD:6598942

地址: Gao Yang, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Yongzhi, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Yin Wenhao, Xi'an Institute of Surveying and Mapping, Xi'an, Shaanxi 710054, China.

地址: 高阳, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

张永志, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

尹文浩, 西安市勘察测绘院, 西安, 陕西 710054, 中国.

电子邮件地址: 184088137@qq.com; 971148291@qq.com

电子邮件地址: 184088137@qq.com; 971148291@qq.com

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作者: Cheng Mengzhen; Hui Wenhua; Li Yanjin; Wei Jiawang

作者: 程梦真; 惠文华; 李延金; 魏家旺

标题: Remote sensing change detection using image correlation analysis

标题: 利用影像相关分析的遥感变化检测

来源出版物: 测绘通报 期: 10 页: 67-71 出版年: 2019

文献号: 0494-0911(2019)10<67:LYYXXG>2.0.TX;2-#

来源出版物: Bulletin of Surveying and Mapping 期: 10 页: 67-71 出版年: 2019

文献号: 0494-0911(2019)10<67:LYYXXG>2.0.TX;2-#

语言: Chinese

文献类型: Article

作者关键词: image correlation; change detection; checkerboard segmentation; combined correlation coefficient; density slicing

作者关键词: 影像相关; 变化检测; 棋盘分割; 组合相关系数; 密度分割

摘要: Aiming at the problem that image correlation analysis using single spectral features is poor in remote sensing change detection applications, a correlation coefficient calculation model combining texture features and spectral features is proposed. Firstly, the multi-temporal image is segmented by the same scale, and the correlation coefficients in each corresponding segmentation window are calculated. Then the coordinates of the center point of the window and the correlation coefficient value are taken as a feature point, and the spatial distribution of the correlation coefficient of the whole region is obtained by interpolation in the three-dimensional space. Finally, the change information is extracted by density slicing. The paper carries out the change information extraction experiment with two GF-1 image data. The results show that the change detection result of the combined feature correlation coefficient is obviously better than the single spectral correlation coefficient change detection result. The application research of combined correlation coefficient provides a new idea for remote sensing change information extraction using correlation analysis method.

摘要: 针对利用单一光谱特征进行影像相关分析在遥感变化检测应用中效果较差的问题,提出了一种将纹理特征与光谱特征相结合的相关系数计算模型。应用中在对多时相影像进行相同尺度棋盘分割的基础上,先计算各对应分割窗口内的相关系数,再以其中心点的坐标和相关系数值作为一个特征点,在三维空间中进行插值处理得到整个区域的相关系数空间分布图;进一步通过密度分割处理提取变化信息。本文以两期 GF-1 影像数据进行了变化信息提取试验,

结果表明,采用组合特征相关系数的变化检测结果明显优于单一光谱相关系数的变化检测结果。组合相关系数的应用研究为利用影像相关分析方法从高分影像中提取变化信息提供了一种新的思路。

入藏号: CSCD:6601255

地址: Cheng Mengzhen, College of Geology Engineering and Surveying, Chang'an University, Xi'an, Shaanxi 710054, China.

Hui Wenhua, College of Geology Engineering and Surveying, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Yanjin, College of Geology Engineering and Surveying, Chang'an University, Xi'an, Shaanxi 710054, China.

Wei Jiawang, College of Geology Engineering and Surveying, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 程梦真, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

惠文华, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李延金, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

魏家旺, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: 1403486681@qq.com; 1052371924@qq.com

电子邮件地址: 1403486681@qq.com; 1052371924@qq.com

使用次数 (最近 180 天): 0

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作者: Liu Jinyang; Li Xi'an; Guo Zeze; Li Chengsheng; Ma Chiyang

作者: 刘锦阳; 李喜安; 郭泽泽; 黎澄生; 马驰洋

标题: Influence of water content on loess air permeability and its microcosmic mechanism

标题: 含水率对黄土渗气性影响及其微观机理

来源出版物: 中南大学学报. 自然科学版 卷: 50 期: 8 页: 1930-1940 出版年: 2019

文献号: 1672-7207(2019)50:8<1930:HSLDHT>2.0.TX;2-C

来源出版物: Journal of Central South University of Science and Technology 卷: 50 期: 8 页: 1930-1940 出版年: 2019

文献号: 1672-7207(2019)50:8<1930:HSLDHT>2.0.TX;2-C

语言: Chinese

文献类型: Article

作者关键词: air permeability; initial water content; wetting; drying; pore parameter; microscopic mechanism

作者关键词: 渗气率; 初始含水率; 增湿; 减湿; 孔隙参数; 微观机理

摘要: The air permeability tests were performed on the undisturbed and remolded loess samples by using the improved air permeameter. The impacts of initial water content, wetting and drying processes on the air permeability k_a were analyzed. The conceptual model, super depth of field microscope, and scanning electron microscope were applied on loess samples to investigate the microcosmic mechanism of air permeability. The results show that when water content $w < 18\%$, dry density $\rho_d \leq 1.6 \text{ g/cm}^3$, the air permeability of the remolded samples increases with the increase of the initial water content, whereas when $\rho_d > 1.6 \text{ g/cm}^3$, the air permeability decreases with the increase of initial water ratio. Due to the permeation of the air and water during the wetting processes of the undisturbed and remolded loess samples and the formation of micro cracks during the drying process, the k_a in the drying process is always greater than the k_a in the wetting process at the same water content. There is no significant relationship between the wetting stage and the air permeability for the remolded loess. When ρ_d is $1.4\text{-}1.7 \text{ g/cm}^3$, the water content and the k_a show an inverse Sshaped relationship in the wetting process. With the increase of water content, the average diameter of macropores and the areas of macropores and the total pores also increase, leading to a gradual increase in k_a .

摘要: 利用改进的渗气仪对风干原状土和重塑马兰黄土进行渗气性试验,分析初始含水率、增湿和减湿过程对渗气率 k_a 的影响,并结合概念模型、超景深显微镜和扫描电子显微镜揭示其微观机理。研究表明:当试验含水率 $w < 18\%$,干密度 $\rho_d \leq 1.6 \text{ g/cm}^3$ 时,由于团聚体的形成、颗粒软化和基质吸力阻滞作用,重塑试样的渗气率随着初始含水率的增大而增大;而当 $\rho_d > 1.6 \text{ g/cm}^3$ 时,渗气率开始随着初始含水率增大而减小。由于原状和重塑黄土增湿过程中水、气的渗透作用和烘干减湿过程中微小裂缝的形成,在相同含水率下,减湿过程渗气率始终大于增湿过程渗气率。重塑黄土的增湿级数与渗气率之间没有显著关系。当干密度为 $1.4\text{-}1.7 \text{ g/cm}^3$ 时,增湿过程中含水率与渗气率关系曲线呈反 S 型。随着含水率的增大,大孔的平均直径、大孔和总孔面积也呈现明显增大趋势,致使对应的渗气率也逐渐增大。

入藏号: CSCD:6595280

地址: Liu Jinyang, School of Geological Engineering and Geomatics, Chang'an University;;School of Civil Engineering, Chongqing University, ;; Xi'an;; ;;Chongqing 710054;;400045.

Li Xi'an, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Guo Zeze, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Ma Chiyang, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Chengsheng, Institute of Rock and Soil Mechanics, Chinese Academy of Sciences, Wuhan, Hubei 430071, China.

地址: 刘锦阳, 长安大学地质与测绘工程学院;;重庆大学土木工程学院, ;; 西安;; 陕西;;重庆 710054;;400045, 中国.

李喜安, 长安大学地质与测绘工程学院, 西安, 陕西 710054, 中国.

郭泽泽, 长安大学地质与测绘工程学院, 西安, 陕西 710054, 中国.

马驰洋, 长安大学地质与测绘工程学院, 西安, 陕西 710054, 中国.

黎澄生, 中国科学院武汉岩土力学研究所, 武汉, 湖北 430071, 中国.

电子邮件地址: dclixa@chd.edu.cn

电子邮件地址: dclixa@chd.edu.cn
使用次数 (最近 180 天): 0
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作者: Kang Chenyun; Wang Shaokai; He Ming

作者: 康尘云; 王少凯; 贺鸣

标题: Geometrical features of tectonic joints in loess of central Gansu and southern Ningxia

标题: 陇西黄土构造节理几何特征分析

来源出版物: 中国地质灾害与防治学报 卷: 30 期: 5 页: 131-138 出版年: 2019

文献号: 1003-8035(2019)30:5<131:LXHTGZ>2.0.TX;2-2

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文献类型: Article

作者关键词: loess; tectonic joints; geometrical features; dominant joint; connectivity rate

作者关键词: 陇西黄土; 构造节理; 几何特征; 优势节理组; 连通率

摘要: Joints affect the mechanical and seepage characteristics of rock-soil mass, which is considered as the geometric and mechanical boundary of slope in stability. Accurate analysis of the development features of loess tectonic joints in Longxi is a key step to understand the frequent slope disasters in this area. Based on field investigation, mathematical statistics and probability analysis, the geometry of joints in this area are systematically studied. The results show that: (1) Longxi region has dominant joint group with trend NWW, NNW and NE, which are controlled by regional strike-slip and reverse tilting faults; (2) the inclination angles of joints are mostly between 60° and 80° , and the inclination and inclination angles obey normal distribution; (3) the average spacing of joints obeys normal distribution, and increases from southwest to northeast with low continuity and moderate cracking; (4) joint connectivity rate is small. 92.5% joints have a connectivity rate of less than 0.4, which is difficult to occur through failure. The research results can provide basic data for researches of mastering the developmental law of tectonic joints, recovering the Neotectonic tectonic stress fields, as well as conducting regional stability assessment.

摘要: 节理影响岩土体的力学和渗流特性,是坡体失稳的几何和力学边界,准确分析陇西黄土构造节理发育特征,是理解该地区频发坡体灾害的关键性步骤。通过现场调查、结合数理统计、概率分析等方法,对该地区的节理几何特征进行系统研究。结果表明:(1)陇西地区发育走向为NWW、NNW和NE的优势节理,受区域走滑断裂和逆倾滑断裂控制;(2)节理倾角多在

60° ~ 80°, 倾向和倾角均服从正态分布; (3) 节理的平均间距服从正态分布, 从西南向东北整体上呈增加趋势, 延续性低, 中等开裂; (4) 节理连通率较小, 92.5% 的节理连通率小于 0.4, 不易发生贯通式破坏。研究结果可为掌握节理发育规律, 恢复新构造应力场, 乃至区域稳定性评价提供基础数据。

入藏号: CSCD:6593584

地址: Kang Chenyun, School of Geology Engineering and Surveying, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Shaokai, School of Geology Engineering and Surveying, Chang'an University, Xi'an, Shaanxi 710054, China.

He Ming, School of Geology Engineering and Surveying, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 康尘云, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

王少凯, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

贺鸣, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: kangchenyun@outlook.com; 543718972@163.com

电子邮件地址: kangchenyun@outlook.com; 543718972@163.com

使用次数 (最近 180 天): 0

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作者: Bao Qianzong; Xu Jie; Xu Mingrui

作者: 包乾宗; 许杰; 许明瑞

标题: Comparative Analysis of Time-Frequency Characteristics of Seismic Signal Induced by High-Speed Train

标题: 高铁地震信号时频特征对比分析

来源出版物: 北京大学学报. 自然科学版 卷: 55 期: 5 页: 805-812 出版年: 2019

文献号: 0479-8023(2019)55:5<805:GTDZXH>2.0.TX;2-Z

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文献号: 0479-8023(2019)55:5<805:GTDZXH>2.0.TX;2-Z

语言: Chinese

文献类型: Article

作者关键词: high-speed train seismology; time-frequency analysis; synchronous compression wavelet transform; equidistant spectral lines

作者关键词: 高铁地震; 时频分析; 同步挤压小波变换; 分立谱

摘要: The time-frequency spectrum analysis of high-speed train (HST) seismic signals measured

in Baoding, Hebei Province and Shenzhen, Guangdong Province is carried out by using synchrosqueezing wavelet transform. It is found that the seismic signals generated by HST passing through viaducts are more abundant in low-frequency information than those generated by running through tunnels and on the surface. Through the time-frequency spectrum characteristics of the HST seismic signal, the state of change of the running speed of HST can be determined.

摘要: 利用同步挤压小波变换方法,对河北保定和广东深圳地区实测的高铁地震信号进行时频谱分析。结果表明,高铁在经过高架桥时,在其附近产生的地震信号中低频信息比通过隧道和接触地表运行产生的地震信号丰富。利用高铁地震信号的时频谱特性,可以确定高铁运行速度的变化。

入藏号: CSCD:6597135

地址: Bao Qianzong, School of Geological Engineering and Geomatics, Chang'an University;;The Joint Research Group of High-Speed Rail Seismology, Xi'an;;Beijing 710054;;100029.

Xu Jie, School of Geological Engineering and Geomatics, Chang'an University;;The Joint Research Group of High-Speed Rail Seismology, Xi'an;;Beijing 710054;;100029.

Xu Mingrui, School of Geological Engineering and Geomatics, Chang'an University;;The Joint Research Group of High-Speed Rail Seismology, Xi'an;;Beijing 710054;;100029.

地址: 包乾宗, 长安大学地质工程与测绘学院;;高铁地震学联合研究组, 西安;;北京 710054;;100029.

许杰, 长安大学地质工程与测绘学院;;高铁地震学联合研究组, 西安;;北京 710054;;100029.

许明瑞, 长安大学地质工程与测绘学院;;高铁地震学联合研究组, 西安;;北京 710054;;100029.

电子邮件地址: qzbao@chd.edu.cn

电子邮件地址: qzbao@chd.edu.cn

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作者: Li Tonglu; Fan Jiangwen; Xi Yu; Xie Xiao; Hou Xiaokun

作者: 李同录; 范江文; 习羽; 谢潇; 侯晓坤

标题: ANALYSIS FOR EFFECT OF MICROSTRUCTURE ON SWCC OF COMPACTED LOESS

标题: 击实黄土孔隙结构对土水特征的影响分析

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作者关键词: Compaction water content; Unsaturated loess; MIP; PSD; SWCC

作者关键词: 击实含水率; 非饱和黄土; 压汞法; 孔隙分布曲线; 土水特征曲线

摘要: Soil water characteristic curve(SWCC) is a basic physical-mechanical relation of unsaturated soils and changes the physical index of water content to the mechanical index of forces among soil particles. Soil water characteristic curve is controlled by soil structures. To investigate the effect of soil structure on the SWCC,the compacted loess samples are made with three different moisture contents in the study. They are less than the optimum 8%, at the optimum 17%, and more than the optimum 19%. Mercury intrusion poroimetry (MIP) and scanning electronic method (SEM) as well as filter paper method are respectively used to explore the pore size distribution (PSD),the soil water characteristics (SWCC) and the microstructure of the compacted loess at difference water contents. It can be observed from the SWCCs and PSDs that compacted loess at different moisture contents have a significant impact on the microstructure and soil water characteristics. In low suction zone,the SWCCs of three compacted loess are significantly different. The SWCC of dry of optimum is the steepest. It tends to be the same in the high suction region. The PSD varies greatly in the macro-pores and is almost the same in the micro-pores, which is similar to the SWCC. By comparing the SWCC and PSD,it is found that the pore distribution of loess compacted with different moisture content is tightly related to SWCC. The larger the pore size density, the steeper slope of SWCC. SEM imagines also show the typical characters of the three compacted soils as follows: (1) the specimen with the less optimum moisture content is dominated with large inter-particle pores; (2)the specimen with more than the optimum moisture content is dominated with smaller inter-particle pores; and (3) the specimen at the optimum has a wide range of pore distribution.

摘要: 土水特征曲线是非饱和土的基本土物理-力学关系,即将含水率这一物理参数转化为土粒间力的作用,土水特征曲线受土的结构控制。为了探讨击实黄土孔隙结构对土水特征曲线的影响,本文在3种不同的初始含水率(小于最优含水率8%、最优含水率17%和大于最优含水率19%)下制备不同结构的击实黄土试样,分别用压汞试验测其孔隙分布曲线,用滤纸法测其土水特征曲线,并用扫描电镜获得其微观结构图像。对以上测试结果的分析表明,3种击实土样的孔隙分布曲线在相应的大孔径范围内相差较大,在小孔径范围内趋于一致;土水特征曲线在低吸力区差异较大,小于最优含水率的击实黄土土水特征曲线最陡;在高吸力区,3种击实土样的土水特征曲线趋于一致,这与孔隙分布特征一致。对比孔隙密度分布曲线与土水特征区曲线发现,土的土水特征受孔隙分布的控制,孔隙密度越大,土水特征曲线的斜率越陡。SEM图像也显示出3种击实土样的结构特点,小于最优含水率的土样有较多架空孔隙,优势孔径最大;高于最优含水率的土样,大孔隙减少,小孔隙增多,优势孔径最小。而最优含水率的击实黄土的孔隙分布较均匀,优势孔径覆盖范围大。

入藏号: CSCD:6587893

地址: Li Tonglu, School of Geological Engineering and Surveying,Chang'an University, X'an, 710054.

Fan Jiangwen, School of Geological Engineering and Surveying,Chang'an University, X'an, 710054.

Xi Yu, School of Geological Engineering and Surveying,Chang'an University, X'an, 710054.

Xie Xiao, School of Geological Engineering and Surveying, Chang'an University, X'an, 710054.
Hou Xiaokun, School of Geological Engineering and Surveying, Chang'an University;; Department of Civil Engineering, University of Ottawa, ;; X'an;; Canada, ;; 710054;;.
地址: 李同录, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.
范江文, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.
习羽, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.
谢潇, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.
侯晓坤, 长安大学地质工程与测绘学院;; 渥太华大学土木工程系, ;; 西安;; ;; 加拿大 710054;;.
电子邮件地址: dcdgx08@chd.edu.cn
电子邮件地址: dcdgx08@chd.edu.cn
使用次数 (最近 180 天): 0
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作者: Li Xi'an; Xue Quan; Pang Tao; Guo Zeze; Shi Jianfeng

作者: 李喜安; 薛泉; 庞涛; 郭泽泽; 师建锋

标题: A NEW IN-SITU TEST METHOD OF GAS PERMEABILITY AND IT'S UTILITY ON THE FIELD OF SUFFOSION LOESS

标题: 基于原位渗气试验的黄土潜蚀地层渗气率研究

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作者关键词: Malan loess; Gas permeability; In-situ gas permeability

作者关键词: 马兰黄土; 渗气率; 原位渗气率

摘要: The gas permeability values of in-situ and undisturbed Malan loess samples at different areas are measured with improved air permeameter. The reliability of the in-situ gas permeability test is verified by comparing the results of in-suit and indoor gas permeability. The effects of particle size, pore ratio and water content on the gas permeability are compared and analyzed with a method of combining the two kinds of gas permeability. The effects of collapsible cracks (fractures) and suffosion caves on the gas permeability of loess are analyzed with in-situ test. The results show that the indoor and the in-situ gas permeability are basically consistent, the in-situ gas

permeability test results are reliable. The in-situ gas permeability test removes the impact of transport disturbances and can be more accurate and reflect the real situation of loess. The indoor gas permeability test is only suitable for the uniform loess sample without obvious cracks. As the coarse particles of the Malan loess increase the gas permeability increases, otherwise the gas permeability decreases. As the loess depth increases, the void ratio decreases, the water content increases, and the gas permeability decreases. As the loess near the collapsible cracks (fractures) and suffusion caves, the gas permeability increases obviously. As the loess far from the collapsible cracks(fractures) and suffusion caves the gas permeability is tend to an average value. The in-situ gas permeability measurement process is fast and convenient. This method has broad application prospects in evaluating the permeability and structural defects in the loess.

摘要: 利用改进的渗气仪器对不同地区原位马兰黄土地层及原状马兰黄土试样的渗气率进行了测量。通过新研制的原位渗气率试验装置和已有成熟经验的室内原状黄土试样渗气率试验装置的渗气率测定结果进行对比,对原位渗气率试验结果的可靠性进行了验证;结合两种渗气率试验方法所得的结果综合分析了颗粒粒径、孔隙比、含水率等因素对马兰黄土渗气率的影响规律及其机理;通过原位渗气率试验分析了湿陷裂缝(隙)和潜蚀洞穴对黄土地层渗气率的影响规律及其机理。结果表明:原状黄土试样室内渗气试验与黄土地层原位渗气试验获得的结果基本一致,黄土地层原位渗气率试验结果是可靠的。原位试验因能够最大程度上避免试样取样、运输及室内制样等过程的扰动影响而结果更为精确,且能较好地反映黄土地层的真实情况,室内渗气率试验只适合均匀、无明显节理裂缝(隙)的黄土试样。两种渗气率试验结果均表明:马兰黄土粗颗粒愈多级配愈差渗气率愈大,反之渗气率则愈小;同一地点随深度增加、孔隙比减小、含水率增大,渗气率呈现减小的趋势。潜蚀黄土场地湿陷裂缝(隙)和潜蚀洞穴附近黄土地层因受裂缝(隙)和洞穴扰动,渗气率明显偏大,而远离湿陷裂缝(隙)和潜蚀洞穴的黄土地层渗气率基本接近于非洞穴裂缝(隙)分布区黄土渗气率平均值。原位渗气率测量结果精确,测量过程快速便捷,该方法在评价黄土地层渗透性乃至评价黄土地层结构缺陷(如隐伏节理裂隙、潜蚀洞穴的发育程度)等方面具有广阔的应用前景。

入藏号: CSCD:6587894

地址: Li Xi'an, School of Geological Engineering and Geomatics, Chang'an University;;Open Research Laboratory of Geotechnical Engineering,Ministry of Land and Resources, ;;Open Research Laboratory of Geotechnical Engineering,Ministry of Land and Resources, Xi'an;;Xi'an, ;;710054;;710054.

Xue Quan, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Pang Tao, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Shi Jianfeng, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Guo Zeze, School of Geological Engineering and Geomatics, Chang'an University;;Chengdu Surveying Geotechnical Research Institute Co.,Ltd. of MCC, ;; Xi'an;;Chengdu, ;;710054;;610023.

地址: 李喜安, 长安大学地质工程与测绘学院;;国土资源部岩土工程开放研究实验室,;;国土资源部岩土工程开放研究实验室, 西安;;西安,;;710054;;710054.

薛泉, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

庞涛, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

师建锋, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

郭泽泽, 长安大学地质工程与测绘学院;;中冶成都勘察研究总院有限公司, ;; 西安;;成都, ;; 710054;;610023.

电子邮件地址: delixa@chd.edu.cn; 457220453@qq.com

电子邮件地址: delixa@chd.edu.cn; 457220453@qq.com

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作者: Jia Yanjun; Zhuang Jianqi; Wang Ying; Zhao Yong; Niu Pengyao; Jia Kecheng

作者: 贾艳军; 庄建琦; 王颖; 赵勇; 牛鹏尧; 贾珂程

标题: EXPERIMENTAL STUDY FOR EFFECT OF SODIUM SULFATE'S CONCENTRATION ON SHEAR STRENGTH OF LOESS

标题: 硫酸钠浓度对黄土强度影响的试验研究

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作者关键词: 黄土; 强度; 硫酸钠; 浓度

摘要: The loess contains a large amount of Na^+ , Ca^{2+} , Cl^- , SO_4^{2-} , etc. When the water enters loess, it dissolves these ions in the water and carries mineral ions away. It affects the structure and strength of loess. In order to study the influence of mineral ions' concentration on the strength of loess, we used the TFB-1 type triaxial apparatus of stress and strain controlled for unsaturated soil and carried out the consolidation and undrained (CU) test with remolded sample from Heifangtai in Gansu Province. We did CU test with the samples of loess reconstituted with different concentration's solution of sodium sulfate under the confining pressures of 100 kPa, 200 kPa and 300 kPa, respectively. We discussed the effect of sodium sulfate's concentration on strength of loess. The test result shows that under the same confining pressure, the peak shear strength and residual shear strength of loess decrease first and then increase with the increase of sodium sulfate's concentration. Under the same dry density, with the increase of sodium sulfate's concentration, the total internal friction angle, effective internal friction angle and total cohesion of loess decreases first and then increases, while the effective cohesion of loess increases monotonously. The increase of sodium sulfate's concentration reduces thickness of clay's double

electric layer, which enhances the force between clay particles. So the aggregate of clay particles increases, which affects the strength of the loess.

摘要: 黄土中含有大量的 Na^+ 、 Ca^{2+} 、 Cl^- 、 SO_4^{2-} 等,水在进入黄土过程中这些离子会溶于水中被水带走,从而影响黄土的结构和强度,为了研究矿物离子浓度对黄土强度的影响,本文利用 TFB-1 型非饱和土应力-应变控制式三轴仪对甘肃黑方台重塑土样进行固结不排水(CU)试验。分别在 100kPa、200kPa、300kPa 围压下对不同浓度硫酸钠溶液重塑的黄土试样进行 CU 试验,探讨了硫酸钠浓度对黄土强度的影响。试验结果表明:同一围压下,随硫酸钠浓度的增大,黄土峰值剪切强度和残余剪切强度先减小再增大;在干密度相同条件下,随硫酸钠浓度的增大,黄土的总内摩擦角、有效内摩擦角、总黏聚力先减小再增大,而黄土的有效黏聚力单调增大;硫酸钠浓度的增大会减小黏粒的双电层厚度,使黏粒之间的力增强,从而黏粒的颗粒集合体增多,进而影响黄土的强度。

入藏号: CSCD:6587896

地址: Jia Yanjun, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Ying, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhao Yong, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Niu Pengyao, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Jia Kecheng, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhuang Jianqi, School of Geological Engineering and Geomatics, Chang'an University;;Chang'an University, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Xi'an;;Xi'an, ;; 710054;;710054.

地址: 贾艳军, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

王颖, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

赵勇, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

牛鹏尧, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

贾珂程, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

庄建琦, 长安大学地质工程与测绘学院;;长安大学, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, ;; 710054;;710054.

电子邮件地址: 1310255829@qq.com; rockfans09@163.com

电子邮件地址: 1310255829@qq.com; rockfans09@163.com

使用次数 (最近 180 天): 0

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作者: Cheng Xue; He Bingyan; Huang Yaohuan; Sun Zhigang; Li Ding; Zhu Wanxue

作者: 程雪; 贺炳彦; 黄耀欢; 孙志刚; 李鼎; 朱婉雪

标题: Estimation of Corn Leaf Area Index based on UAV Hyperspectral Image

标题: 基于无人机高光谱数据的玉米叶面积指数估算

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作者关键词: 无人机; 高光谱; 叶面积指数(LAI)

摘要: UAV hyperspectral remote sensing is a new means of low-cost,high-precision acquisition of finescale crop biophysical parameters and biochemical parameters,so that the rapid inversion of Leaf Area Index (LAI) has a crop growth assessment and yield prediction. Taking the corn of Shandong Yucheng as the research object,using the PROSAIL radiation transmission model to simulate the corn canopy reflectivity to obtain the LAI characteristic response band,combining correlation quantitative analysis to obtain the most sensitive band for LAI changes,and calculating the 6 vegetation index(VI). Inversion models were modeled on a single sensitive band and VI using six regression models to measure the accuracy of the model by LAI.Studies have shown that the spectral reflectance of 516nm,636nm,702nm,760nm,867nm are most sensitive to LAI changes,and the single-band inversion model established to predict LAI accuracy($R^2=0.44\sim 0.58$;RMSE= 0.16~0.18). The model established by 636nm($LAI=21.86\exp(-29.47R_{(636)})$)has higher prediction accuracy than other inversion models($R^2=0.58$,RMSE=0.16);The 6 vegetation indexes are closely related to LAI with correlation at a significant level($R^2=0.85\sim 0.86$). The accuracy of the established inversion model is improved compared with the single characteristic band inversion model($R^2=0.66\sim 0.72$,RMSE=0.12~0.14); The LAI estimation model($LAI=\exp(2.76\sim 1.77/mNDVI)$)constructed by mNDVI has the highest accuracy ($R^2=0.72$,RMSE=0.13). UAV hyperspectral remote sensing is an effective means for rapid and non-destructive monitoring of crop growth information,and provides a basis for guiding fine-scale crop management.

摘要: 无人机高光谱遥感是低成本、高精度获取精细尺度农作物生物物理参数和生物化学参数的新型手段,以此快速反演叶面积指数(Leaf Area Index,LAI)对作物长势评价、产量预测具有重要意义。以山东禹城市玉米为研究对象,利用 PROSAIL 辐射传输模型模拟玉米冠层反射率获取 LAI 特征响应波段结合相关性定量分析获取对 LAI 变化最为敏感的波段,并以此计算 6 种植被指数(Vegetation Index,VI),利用 6 种回归模型分别对单一特征波段和 VI 进行反演建模,以实测 LAI 评定模型精度。研究表明,光谱反射率中 516、636、702、760 和 867 nm 等波段对 LAI 变化最为敏感,以此建立的单一特征波段反演模型预测 LAI 精度 R^2 为 0.44~0.58;RMSE 为 0.16~0.18,其中 636 nm 建立的模型($LAI=21.86\exp(-29.47R_{(636)})$)相比其他反演模型预测精度较高($R^2=0.58$, RMSE=0.16);6 种植被指数与 LAI 高度相关,相关性系数 R^2 为 0.85~0.86,以此建立的反演模型相比单一特征波段反演模型精度有所提高, R^2 为

0.66~0.72, RMSE 为 0.12~0.14; 其中 mNDVI 构建的 LAI 估算模型($LAI = \exp(2.76 - 1.77/mNDVI)$) 精度最高($R^2 = 0.72, RMSE = 0.13$)。无人机高光谱遥感是快速、无损监测农作物生长信息的有效手段, 为指导精细化尺度作物管理提供依据。

入藏号: CSCD:6582779

地址: Cheng Xue, Chang 'an University Geological Engineering and Surveying Institute;; Institute of Geographical Science and Natural Resources Research, Chinese Academy of Sciences, ;; Xi'an;; ;; Beijing 710000;; 100101.

He Bingyan, Chang 'an University Geological Engineering and Surveying Institute, Xi'an, Shaanxi 710000, China.

Li Ding, Chang 'an University Geological Engineering and Surveying Institute, Xi'an, Shaanxi 710000, China.

Huang Yaohuan, Institute of Geographical Science and Natural Resources Research, Chinese Academy of Sciences, Beijing 100101, China.

Sun Zhigang, Institute of Geographical Science and Natural Resources Research, Chinese Academy of Sciences, Beijing 100101, China.

Zhu Wanxue, Institute of Geographical Science and Natural Resources Research, Chinese Academy of Sciences, Beijing 100101, China.

地址: 程雪, 长安大学地质工程与测绘学院;; 中国科学院地理科学与资源研究所, ;; 西安;; 陕西;; 北京 710000;; 100101, 中国.

贺炳彦, 长安大学地质工程与测绘学院, 西安, 陕西 710000, 中国.

李鼎, 长安大学地质工程与测绘学院, 西安, 陕西 710000, 中国.

黄耀欢, 中国科学院地理科学与资源研究所, 北京 100101, 中国.

孙志刚, 中国科学院地理科学与资源研究所, 北京 100101, 中国.

朱婉雪, 中国科学院地理科学与资源研究所, 北京 100101, 中国.

电子邮件地址: 1095111645@qq.com; huanyh@reis.ac.cn

电子邮件地址: 1095111645@qq.com; huanyh@reis.ac.cn

使用次数 (最近 180 天): 0

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作者: Hong Bo; Li XiAn; Wang Li; Li Lincui

作者: 洪勃; 李喜安; 王力; 李林翠

标题: Permeability Anisotropy and Microstructure of Yanan Q₃ Loess

标题: 延安 Q₃ 原状黄土渗透各向异性及微结构分析

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作者关键词: loess; permeability anisotropy; primary porosity; induced porosity; microstructure

作者关键词: 黄土; 渗透各向异性; 原生孔隙; 次生孔隙; 微观结构

摘要: In order to study the anisotropic permeability of undisturbed loess, Yanan Q₃ loess with obvious anisotropy was chosen as the research object. The vertical and horizontal permeability coefficients of different deep-buried undisturbed loess were measured by variable water head permeability tests in laboratory. The results showed that the vertical permeability coefficient of undisturbed loess was larger than the horizontal permeability coefficient of the same horizon. In addition, both vertical and horizontal permeability coefficients of undisturbed loess decreased with the increase of burial depth of loess, and the anisotropy of undisturbed loess was weakened as the burial depth increased, which indicates that anisotropic undisturbed loess gradually become isotropic with the increase of buried depth. Furthermore, in order to investigate the anisotropy of undisturbed loess from microstructure, the longitudinal and transversal sections of undisturbed loess in different buried depths were characterized by SEM (scanning electron microscopy). It was found that the contact and arrangement of soil particles are the fundamental factors resulting in the anisotropic loess.

摘要: 为研究原状马兰黄土的渗透各向异性,以延安削山造地重大工程开挖所揭露的完整黄土剖面中的马兰黄土层为研究对象,采用室内变水头渗透试验获取不同埋深不同渗流时长原状黄土垂直向和水平向的渗透系数,并对试验前后黄土试样垂直向和水平向 SEM(scanning electron microscope)电镜扫描结果进行分析,从微观结构上揭示原状马兰黄土结构各向异性的原因。结果表明:原状黄土垂直向和水平向饱和渗透系数具有显著各向异性,且垂直向和水平向渗透系数都随渗流时间的持续而减小,各向异性渗透性能在时间尺度上具有某种衰减关系;同时,原状黄土各向异渗透性能随埋深的增大而逐渐减弱;土颗粒结构的接触、排列方式是导致黄土原生各向异性的根本原因,也是导致渗流初始阶段渗透系数各向异性的原因,而渗流作用产生的次生结构各向异性则使渗透系数各向异性在时间尺度上表现得更为明显。

入藏号: CSCD:6578952

地址: Hong Bo, School of Geological Engineering and Geomatics, Changan University;; Key Laboratory of Mine Geological Hazards Mechanism and Control, Shaanxi Institute of Geological Survey, ;; Xian;; Xian, ;; 710054;; 710054.

Wang Li, School of Geological Engineering and Geomatics, Changan University;; Key Laboratory of Mine Geological Hazards Mechanism and Control, Shaanxi Institute of Geological Survey, ;; Xian;; Xian, ;; 710054;; 710054.

Li XiAn, School of Geological Engineering and Geomatics, Changan University, Xian, 710054.

Li Lincui, School of Geological Engineering and Geomatics, Changan University, Xian, 710054.

地址: 洪勃, 长安大学地质工程与测绘学院;; 陕西省地质调查院矿山地质灾害成灾机理与防控重点实验室, ;; 西安;; 西安, ;; 710054;; 710054.

王力, 长安大学地质工程与测绘学院;; 陕西省地质调查院矿山地质灾害成灾机理与防控重点实验室, ;; 西安;; 西安, ;; 710054;; 710054.

李喜安, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李林翠, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: hongbo@chd.edu.cn; dclixa@chd.edu.cn

电子邮件地址: hongbo@chd.edu.cn; dclixa@chd.edu.cn

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作者: Cheng Dong; Zhang Yongzhi; Wang Xiaohang; Han Ming

作者: 程冬; 张永志; 王晓航; 韩鸣

标题: Coseismic deformation and fault slip inversion of the 2017 M_W7.3 Halabjah, Iraq, earthquake based on Sentinel-1A data

标题: 基于 Sentinel-1A 数据的 2017 年伊拉克哈莱卜杰 M_W7.3 地震同震形变场分析及断层滑动分布反演

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作者关键词: Halabjah,Iraq,earthquake; Sentinel-1A data; coseismic deformation; slip distribution

作者关键词: 伊拉克哈莱卜杰地震; Sentinel-1A 雷达数据; 同震形变; 滑动分布

摘要: In this study, firstly, based on Sentinel-1A radar satellite images of Europe Space Agency, the coseismic deformation field covering the whole 2017 M_W7.3 Halabjah, Iraq, earthquake region was obtained by using two-pass interferometry technique. The result shows that the main deformation region caused by the Halabjah earthquake is about 60 km*70 km, which distributes along the Zagros main front fault. Uplift occurred in the southwestern part with 88 cm at most along the line of sight, while in the northeastern subsidence occurred with 37 cm at most along the line of sight, the displacement indicates that the seismogenic fault is characterized by thrusting movement. Then nonlinear multi-peak particle swarm optimization algorithm and linear steepest descent method with rectangular dislocation model in elastic halfspace are used to estimate the fault geometric parameters and coseismic slip distribution. The inversion results suggest that the seismogenic fault is dominated by thrust movement with a little right-lateral strike-slip component, and the maximum slip is about 3.34 m. The seismic moment from inversion is 1.68*10²⁰ N•m (M_W7.4), which is consistent with the result of seismology.

摘要: 本文首先利用二轨法对欧洲空间局 Sentinel-1A 雷达卫星影像进行差分干涉处理, 获取

了覆盖 2017 年伊拉克哈莱卜杰(Halabjah) $M_{W}7.3$ 地震震区的同震形变场,结果表明:哈莱卜杰地震造成的地表形变影响范围约为 $60\text{ km} \times 70\text{ km}$,形变场基本沿扎格斯主前缘断层展布;形变场的西南盘呈现隆升趋势,最大视线向形变值为 88 cm ,东北盘呈现下降趋势,最大视线向形变值为 37 cm ;隆升形变值远大于沉降值,反映出发震断层以逆冲运动为主的特征。然后基于弹性半平面空间矩形位错模型,分别采用多峰值粒子群算法和最速下降法确定了发震断层的几何参数和滑动分布结果。反演结果显示发震断层以逆冲运动为主,兼少量右旋走滑运动,最大滑动量为 3.34 m ,释放的地震矩为 $1.68 \times 10^{20}\text{ N} \cdot \text{m}(M_{W}7.4)$,与地震学的研究结果一致。

入藏号: CSCD:6575856

地址: Cheng Dong, School of Geology Engineering and Geomatics,Changan University, Xi'an, Shaanxi 710054, China.

Zhang Yongzhi, School of Geology Engineering and Geomatics,Changan University, Xi'an, Shaanxi 710054, China.

Han Ming, School of Geology Engineering and Geomatics,Changan University, Xi'an, Shaanxi 710054, China.

Wang Xiaohang, School of Geodesy and Geomatics,Wuhan University, Wuhan, Hubei 430079, China.

地址: 程冬, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

张永志, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

韩鸣, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

王晓航, 武汉大学测绘学院, 武汉, 湖北 430079, 中国.

电子邮件地址: cadxzyz@263.net

电子邮件地址: cadxzyz@263.net

使用次数 (最近 180 天): 0

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作者: Feng Wei; Tang Yaming; Zhao Fasuo; Chen Xinjian

作者: 冯卫; 唐亚明; 赵法锁; 陈新建

标题: Application of Newmark improved model considering matrix suction in earthquake landslide risk assessment

标题: 考虑基质吸力作用的 Newmark 改进模型在地震滑坡风险评价中的应用

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作者关键词: earthquake landslide; hazard zoning; susceptibility zoning; risk assessment; Newmark model; matrix suction

作者关键词: 地震滑坡; 危险性分区; 易发性分区; 风险评价; Newmark 模型; 基质吸力

摘要: The traditional Newmark model often neglects the partial shear strength provided by the negative pore water pressure above the groundwater level. This is reasonable for the main part of the sliding surface below the groundwater level. However, the calculation results are too conservative for slope with a deep groundwater level or considering shallow sliding. Therefore, the Newmark cumulative displacement model is extended to the field of unsaturated soil mechanics in this paper. Based on the consideration of matrix suction, the Newmark model calculation formula is improved. The Newmark traditional model and the improved Newmark model are used to classify the susceptibility zoning about the earthquake landslide of the Lixian county map of Gansu Province. On this basis, the hazard zoning and risk assessment of earthquake landslide under 10% probability in 50 years are carried out respectively. Finally, ROC curve is used to verify and compare the evaluation results. The results show that the calculated results of the susceptibility areas and the hazard areas obtained with the improved model are obviously better than those with the traditional model, and the calculated results of the risk areas obtained with the improved model are better than those with the traditional model although the improved results are not obvious. The improved Newmark model, which takes the effect of matrix suction into account, gives full play to the contribution of matrix suction and makes the calculation results more reasonable. The research results can provide a new reference for earthquake landslide susceptibility zoning, hazard analysis and risk assessment in relevant regions.

摘要: 传统的 Newmark 模型常对地下水位以上由负孔隙水压力提供的部分抗剪强度忽略不计, 这对于滑动面的主要部分处在地下水位以下时较为合理, 但对地下水位很深或考虑出现浅层滑动的坡体, 其计算结果过于保守。因此, 文章将 Newmark 累积位移模型扩展至非饱和土力学领域, 在考虑基质吸力作用的基础上, 改进了 Newmark 模型计算公式。分别利用 Newmark 传统模型和改进模型对甘肃礼县幅区域内的地震滑坡进行易发性分区, 并在此基础上分别开展 50 年超越概率 10% 情况下的地震滑坡危险性分区和风险评价, 最后利用 ROC 曲线对评价结果进行验证和比较。结果表明: 改进模型所得易发区和危险区的计算结果明显优于传统模型计算结果; 改进的模型所得风险区的计算结果虽然改进效果不明显, 但仍优于传统模型计算结果。由于考虑基质吸力作用的 Newmark 改进模型充分发挥了基质吸力的贡献, 使得计算结果更为合理, 研究成果可为相关地区开展地震滑坡易发性分区、危险性分析和风险评价提供新的参考。

入藏号: CSCD:6571493

地址: Feng Wei, School of Geological Engineering and Geomatics, Changan University;; Xi'an Center of Geology Survey, CGS, ;, ;, Xian;; Xian, Shaanxi;; Shaanxi 710064;; 710054.

Tang Yaming, Xi'an Center of Geology Survey, CGS, Xian, Shaanxi 710054, China.

Zhao Fasuo, School of Geological Engineering and Geomatics, Changan University, Xian, Shaanxi 710064, China.

Chen Xinjian, School of Geological Engineering and Geomatics, Changan University, Xian, Shaanxi 710064, China.

地址: 冯卫, 长安大学地质工程与测绘学院;; 中国地质调查局西安地质调查中心, ;, ;, 西安;; 西

安, 陕西;;陕西 710064;;710054, 中国.

唐亚明, 中国地质调查局西安地质调查中心, 西安, 陕西 710054, 中国.

赵法锁, 长安大学地质工程与测绘学院, 西安, 陕西 710064, 中国.

陈新建, 长安大学地质工程与测绘学院, 西安, 陕西 710064, 中国.

电子邮件地址: fengwei0510@qq.com; tangyaming73@sohu.com

电子邮件地址: fengwei0510@qq.com; tangyaming73@sohu.com

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作者: Cai Xiaojun; Yang Jianhua

作者: 蔡晓军; 杨建华

标题: Gross error detection and data interpolation for GNSS coordinates time series based on multichannel singular spectrum

标题: 基于多通道奇异谱的 GNSS 坐标序列粗差探测与数据插值

来源出版物: 测绘工程 卷: 28 期: 5 页: 20-28,34 出版年: 2019

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作者关键词: GNSS 时间序列; 数据插值; 粗差探测; 多通道奇异谱分析

摘要: Due to receiver failure, antenna replacement, and the influence of some unknown external environmental factors, the data loss and gross errors in the GPS time series are unavoidable. The missing data can cause various problems, thus obtaining a continuous, complete and unified time series, robust detection of gross errors and missing data interpolation are needed. Traditional methods may require different interpolation methods for different types of data and different lengths of data gaps, which makes interpolation of missing data more difficult. In view of the above problems, multichannel singular spectrum analysis (MSSA) is used in this paper to perform gross errors detection and missing data interpolation about time series, and to reconstruct a continuous reliable model of non-uniform sampling time series without any need for prior information of time series. In this method, the gross error detection is performed simultaneously with data interpolation. Both the simulated data and the measured GNSS time series data test results show

the effectiveness of the method.

摘要: 由于接收机故障、天线更换以及一些未知外界环境因素的影响,导致 GPS 时间序列中不可避免地存在数据缺失和粗差,数据缺失和粗差会产生各种问题,因此需要鲁棒探测粗差和缺失数据插值来获得连续完整统一的时间序列。传统方法可能需要针对不同类型的数据和不同长度的数据间隙研究不同的插值方法,这使得缺失数据的插值较为困难。针对上述问题,文中采用多通道奇异谱分析(Multichannel Singular Spectrum Analysis,MSSA)对时间序列进行粗差探测和缺失数据插值,重建非均匀采样时间序列的连续可靠模型,且不需要关于时间序列的任何先验信息。在该方法中,粗差探测与数据插值同时进行。模拟数据和实测 GNSS 时间序列数据测试结果都表明该方法的有效性。

入藏号: CSCD:6568713

地址: Cai Xiaojun, College of Geology Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Yang Jianhua, College of Geology Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 蔡晓军, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

杨建华, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

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作者: Wei Jiancheng; Xiao Yun; Wang Li; Meng Ning; Zou Jiasheng

作者: 韦建成; 肖云; 王利; 孟宁; 邹嘉盛

标题: Research on optimization of free - air correction for high - precision airborne gravimetry

标题: 高精度航空重力测量空间改正优化方法研究

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作者关键词: Airborne gravimetry; Gravity disturbance reduction; Free-air correction; Spherical harmonic coefficient method

作者关键词: 航空重力测量; 重力扰动归算; 空间改正; 球谐系数法

摘要: Airborne gravimetry accuracy gradually increase to 1 mGal or better, while in high altitude, large-scale regional latitude span,require free-air correction more accurate. At present, the free-air corrections is incomplete. Based on this fact, we propose spherical harmonic coefficient method,which is a one-step reduction method of gravity disturbance, and its correctness is verified

by the Somigliana formula. Then analyze the influence of different free-air correction formulas on gravity disturbance reduction with the reference of spherical harmonic coefficient method. The results show that NGS-improved third order free-air correction has the highest accuracy, H&M free-air correction takes the second place, and the second-order formula widely adopted by Chinese scholars has lower accuracy. Therefore, we recommend to use the spherical harmonic coefficient method or the NGS-improved third order formula to improve the accuracy of airborne gravimetry when at 1 mGal or better accuracy of airborne gravimetry or high-altitude surveying.

摘要: 航空重力测量精度逐步提高,达到 1 mGal 或更好,另外在高海拔地区、大范围区域纬度跨度很大,均要求空间改正项更精确。目前空间改正方法不完备,针对此问题,给出了重力扰动一步归算法-球谐系数法,用 Somigliana 公式对其正确性进行了验证,并以球谐系数法为参考,对比分析了不同空间改正公式对重力扰动归算的影响。结果表明,美国大地测量局(NGS)改进的三阶公式精度最高,H&M(Heiskanen 和 Moritz, 1967)二阶公式次之,我国学者广为采用的二阶公式精度较低。因此,在 1 mGal 或更好精度的航空重力测量,或者高海拔测量,建议采用球谐系数法或 NGS 改进的三阶公式进行归算,以提高航空重力测量成果精度。

入藏号: CSCD:6563062

地址: Wei Jiancheng, School of Geological Engineering and Geomatics, Chang'an University;; State Key Laboratory of Geographic Information Engineering;; National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, ;; State Key Laboratory of Geographic Information Engineering;; National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, Xi'an;; Xi'an;; Xi'an, ;;; 710054;; 710054;; 710054.

Wang Li, School of Geological Engineering and Geomatics, Chang'an University;; State Key Laboratory of Geographic Information Engineering;; National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, ;; State Key Laboratory of Geographic Information Engineering;; National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, Xi'an;; Xi'an;; Xi'an, ;;; 710054;; 710054;; 710054.

Xiao Yun, State Key Laboratory of Geographic Information Engineering;; Xi'an Research Institute of Surveying and Mapping, State Key Laboratory of Geographic Information Engineering;; Xi'an;; Xi'an, ; 710054;; 710054.

Meng Ning, School of Geological Engineering and Geomatics, Chang'an University;; State Key Laboratory of Geographic Information Engineering, ;; State Key Laboratory of Geographic Information Engineering, Xi'an;; Xi'an, ; 710054;; 710054.

Zou Jiasheng, School of Geological Engineering and Geomatics, Chang'an University;; State Key Laboratory of Geographic Information Engineering, ;; State Key Laboratory of Geographic Information Engineering, Xi'an;; Xi'an, ; 710054;; 710054.

地址: 韦建成, 长安大学地质工程与测绘学院;; 地理信息工程国家重点实验室;; 地理国情监测国家测绘地理信息局工程技术研究中心, ;; 地理信息工程国家重点实验室;; 地理国情监测国家测绘地理信息局工程技术研究中心, 西安;; 西安;; 西安, ;;; 710054;; 710054;; 710054.

王利, 长安大学地质工程与测绘学院;; 地理信息工程国家重点实验室;; 地理国情监测国家测绘地理信息局工程技术研究中心, ;; 地理信息工程国家重点实验室;; 地理国情监测国家测绘地理信息局工程技术研究中心, 西安;; 西安;; 西安, ;;; 710054;; 710054;; 710054.

肖云, 地理信息工程国家重点实验室;; 西安测绘研究所, 地理信息工程国家重点实验室;; 西

安;;西安,;; 710054;;710054.

孟宁, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室,;;地理信息工程国家重点实验室, 西安;;西安,;; 710054;;710054.

邹嘉盛, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室,;;地理信息工程国家重点实验室, 西安;;西安,;; 710054;;710054.

电子邮件地址: 1205834766@qq.com

电子邮件地址: 1205834766@qq.com

使用次数 (最近 180 天): 0

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作者: Zhang Yun; Bai Chaoying

作者: 张云; 白超英

标题: Simultaneous travelttime tomography in 2 - D undulated layered complex media: combination of modified FMM ray tracing method and subspace inversion solver

标题: 基于 MFMM 正演和 Subspace 反演下 2D 起伏层状介质中多震相走时同时反演成像

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作者关键词: Multistage MFMM; Subspace; Uneven grid upwind differential format; Double-grid; Simultaneous travelttime tomography; Multiple phase traveltimes

作者关键词: 分区多步快速行进法; 子空间; 不等距上行差分格式; 双重网格; 走时同时反演; 多震相走时

摘要: To conduct simultaneous travelttime tomography,we in this paper combine our newly developed multistage Modified Fast Marching Method (MFMM) and subspace inversion solver to formulate a simultaneous travelttime inversion method (referred as to MFMM_Subspace). We apply an uneven grid upwind differential format to calculate the travelttime near the interface to avoid of redoing the parameterization near the interface with triangular grid. Meanwhile, we adopt double grid strategy in the forwarding modeling and inversion to avoid of excessive unknown velocity parameters. To verify the computational efficiency and accuracy,we compare the proposed simultaneous inversion method with our previous developed method of ISPM + DMNCLS _ CG (ISPM: irregular shortest-path method; DMNCLS _CG: conjugate gradient method to solve the damped minimum norms and constrained least squares problem). The

synthetic inversion results of crosshole checkerboard test and deep seismic sounding show that the MFMM_Subspace is an effective simultaneous travelttime inversion method.

摘要: 结合分区多步快速行进法(Multistage FMM)正演算法和子空间(Subspace)反演算法,形成了一种新的多震相走时同时反演成像技术(简称: FMM + Subspace).为了避免不规则界面三角网格更新后,还需重新剖分的问题,正演算法中采用不等距上行差分公式进行界面上走时的计算;同时为了避免反演未知速度参数过多,导致反演效率低下等问题,文中采用双重网格策略进行正、反演.为了验证所提反演方法的有效性和正确性,文中与其他反演方法(正演:分区多步不规则最短路径算法;反演:共轭梯度求解带约束的阻尼最小二乘问题;简称: ISPM + DMNCLS_CG)进行了对比分析,验证了所提反演算法的正确性和有效性.井间检验板联合反演和深地震测深联合反演、同时反演数值模拟表明: FMM + Subspace 反演算法是一种行之有效的走时同时反演方法技术.

入藏号: CSCD:6563065

地址: Zhang Yun, Department of Geophysics, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Bai Chaoying, Department of Geophysics, School of Geology Engineering and Geomatics, Chang'an University;; Institute of Computational Geophysics, Chang'an University, ;; Xi'an;; Xi'an, ;; 710054;; 710054.

地址: 张云, 长安大学地质工程与测绘学院地球物理系, 西安, 陕西 710054, 中国.

白超英, 长安大学地质工程与测绘学院地球物理系;; 长安大学计算地球物理研究所, ;; 西安;; 西安, ;; 710054;; 710054.

电子邮件地址: yun_zhang1994@163.com; baicy@chd.edu.cn

电子邮件地址: yun_zhang1994@163.com; baicy@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Yang Longwei; Yang Mi; Men Yuming; Wang Peng; Li Jian

作者: 杨龙伟; 杨觅; 门玉明; 王鹏; 李坚

标题: Model Teston Dynamic Interaction among Ground Fissure, Tunnel, and Surrounding Rock

标题: 地裂缝- 隧道- 围岩动力相互作用模型试验研究

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文献类型: Article

作者关键词: ground fissure; hazard effect; model test; dynamic response; subway

作者关键词: 地裂缝; 灾害效应; 模型试验; 动力响应; 地铁

摘要: To study the site hazard effect induced by the dynamic interaction among ground fissure, metro tunnel, and surrounding rock under the load of subway vibration, the geological environment of the ground fissures in Xi'an and the actual engineering design of Xi'an Metro Line 2 were selected as the background. A physical model test with a similar scale of 1 : 5 was designed using the similarity theory. Then the shield tunnel, surrounding rock material, and ground fissures were reasonably designed. A vibrator was used in the model test to simulate the load of metro train vibration, and fixed-point excitation and moving-point excitation were both applied to analyze the dynamic response among ground fissure, metro tunnel, and surrounding rock under subway vibration load. The analysis results can provide a scientific basis for the safe running of subways.

摘要: 为了研究在地铁列车振动荷载情况下盾构隧道-地裂缝-围岩相互耦合作用下的场地灾害效应,从西安地裂缝地质环境和西安地铁 2 号线的实际工程背景出发,采用相似理论设计了相似比例尺为 1 : 5 的物理模型试验,对盾构隧道、围岩材料、地裂缝等进行了合理设计。基于偏心块的振动原理,课题组自主研发了列车激振器来模拟地铁列车荷载,激振方式采用移动荷载激振方式,分析在不同列车车速和激振频率下地裂缝两侧土体的加速度变化情况,以此来研究地铁隧道-地裂缝-围岩系统在地铁振动荷载作用下的动力响应规律。结果表明,列车振动向下传播时振动衰减的幅度要小于向上传播衰减的幅度,由此为实际工程中减少地铁振动灾害效应技术的发展提供了理论支撑。

入藏号: CSCD:6561733

地址: Yang Longwei, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Men Yuming, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Jian, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Yang Mi, Shaanxi Provincial Expressway Construction Group Company, Xi'an, Shaanxi 710065, China.

Wang Peng, Xi'an China Highway Geotechnical Engineering Co., Ltd., Xi'an, Shaanxi 710054, China.

地址: 杨龙伟, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

门玉明, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李坚, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

杨觅, 陕西省高速公路建设集团公司, 西安, 陕西 710065, 中国.

王鹏, 西安中交公路岩土工程有限责任公司, 西安, 陕西 710054, 中国.

电子邮件地址: Yang0504@chd.edu.cn

电子邮件地址: Yang0504@chd.edu.cn

使用次数 (最近 180 天): 1

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作者: Wang Yipeng; Zhang Yongzhi; Zhao Chaoying; Liu Xiaojie; Zhang Yingyun

作者: 王毅鹏; 张永志; 赵超英; 刘晓杰; 张颖云

标题: Design and analysis of cloud platform for landslide monitoring in Heifangtai, Gansu province based on GPS and InSAR data

标题: GPS 及 InSAR 数据支持下的甘肃黑方台滑坡监测云平台设计与分析

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作者关键词: Hadoop; ArcGIS; landslide monitoring; cloud computing; Hadoop; spatial analysis; ArcGIS

作者关键词: 滑坡监测; 云计算; 空间分析

摘要: In this paper, based on the deep research and thinking of the mainstream cloud computing platform technology, a landslide monitoring cloud platform using GPS and InSAR data is designed in view of the large amount and multiple data types of landslide disaster monitoring data. Taking the heifangtai landslide in Gansu province as an example, the risk assessment and analysis of the landslide are also conducted using ArcGIS. Due to the use of Hadoop technology, the platform can significantly improve the efficiency of massive data storage and processing in landslide monitoring, and make beneficial exploration for the further application of cloud computing technology in disaster monitoring.

摘要: 通过对主流云计算平台技术的深入研究和思考,针对滑坡灾害监测数据量大、数据类型多这一特点,设计了基于 GPS 及 InSAR 数据的滑坡监测云平台;并以甘肃黑方台滑坡为例,使用 ArcGIS 对该滑坡进行了风险评估和分析。Hadoop 技术的应用明显提高了滑坡监测中海量数据存储和处理的效率,为云计算技术在灾害监测方面的进一步应用进行了有益的探索。

入藏号: CSCD:6561022

地址: Wang Yipeng, School of Geological Engineering and Geomatics, Chang' an University, Xi' an, 710054.

Liu Xiaojie, School of Geological Engineering and Geomatics, Chang' an University, Xi' an, 710054.

Zhang Yingyun, School of Geological Engineering and Geomatics, Chang' an University, Xi' an, 710054.

Zhang Yongzhi, School of Geological Engineering and Geomatics, Chang' an University;; ;; Xi' an;;Xi'an, ;; 710054;;710054.

Zhao Chaoying, School of Geological Engineering and Geomatics, Chang' an University;; ;; Xi' an;;Xi'an, ;; 710054;;710054.

地址: 王毅鹏, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.
刘晓杰, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.
张颖云, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.
张永志, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室,;;地理信息工程国家重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
赵超英, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室,;;地理信息工程国家重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
电子邮件地址: yipeng66@sina.com; cadxyz@163.com
电子邮件地址: yipeng66@sina.com; cadxyz@163.com
使用次数 (最近 180 天): 1
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作者: Zhou Jingjing; Zhang Xiaomin; Zhao Fasuo; Li Hui; Liu Hainan

作者: 周静静; 张晓敏; 赵法锁; 李辉; 刘海南

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作者关键词: GIS; geological hazards; geographic information system (GIS); index factors; information; risk assessment; Qinling-Daba mountain area in south Shaanxi Province

作者关键词: 地质灾害; 指标因子; 信息量; 危险性评价; 陕南秦巴山区

摘要: Shaanxi Province is one of the provinces with the most serious geological disasters in China, especially the Qinling-Daba mountain area in south Shaanxi Province. Therefore, it is of great significance to conduct geological hazard assessment to guide disaster prevention and reduction. Taking Qinling-Daba mountain area as the study area, firstly based on GIS technology and the geological hazard data of the study area from 2001 to 2016, the sensitivity relationship between geological hazards and various index factors in the area is studied, and seven factors affecting the occurrence of geological hazards, such as elevation, type of rock and soil mass, fault structure and rainfall, are determined as the risk assessment indexes of regional geological hazards. Secondly, according to the number of geological disasters and the slope abrupt change of

cumulative frequency curves under each index,the assessment index factors are graded into different states. Finally,the grid data model is established to carry out regional geological hazards assessment by using information value model. The results show that the percentages of high-risk, relatively high-risk,and medium-risk areas in the study area are 10.52%,28.31% and 30.19%, respectively. The spatial distribution of geological hazards in the region is basically consistent with the hazard assessment results,and the prediction accuracy is 90.16%. This research combines empirical knowledge with data-driven analysis methods and applies to a wide range of geological hazard zoning. The conclusions provide reference for prevention and control of regional geological hazards.

摘要: 陕西省是中国地质灾害最严重的省份之一,而陕南秦巴山区地质灾害灾情尤为严峻,因此进行地质灾害危险性评价对指导防灾减灾工作意义重大。文章以陕南秦巴山区为研究区,基于 GIS 技术与 2001-2016 年研究区地质灾害灾情数据,分析研究了区内地质灾害与各指标因子之间的敏感性关系,并确定了高程、岩土体类型、断裂构造、降雨等 7 个影响地质灾害发生较大的因子作为区域地质灾害危险性评价指标。其次,以各指标条件下地质灾害数量和累计发生频次曲线斜率的突变为依据,对评价指标因子进行状态分级。最后,运用信息量法建立栅格数据模型展开区域地质灾害危险性评价。研究结果表明:高危险性、较高危险性、中危险性的地区占研究区总面积的百分比分别为 10.52%、28.31%、30.19%,区内地质灾害点的空间分布与地质灾害危险性评价结果基本一致,信息量模型的预测精度为 90.16%。文章将经验知识与数据驱动的分析方法相结合,应用于较大范围的地质灾害危险性区划,研究结果可为区域地质灾害防治工作提供参考依据。

入藏号: CSCD:6555065

地址: Zhou Jingjing, College of Geology Engineering and Surveying Engineering,Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Xiaomin, College of Geology Engineering and Surveying Engineering,Chang'an University, Xi'an, Shaanxi 710054, China.

Zhao Fasuo, College of Geology Engineering and Surveying Engineering,Chang'an University, Xi'an, Shaanxi 710054, China.

Li Hui, Key Laboratory of Mine Geological Hazards Mechanism and Control,Ministry of Land and Resources;;Shaanxi Institute of Geo-Environment Monitoring, Key Laboratory of Mine Geological Hazards Mechanism and Control,Ministry of Land and Resources;;, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Liu Hainan, Key Laboratory of Mine Geological Hazards Mechanism and Control,Ministry of Land and Resources;;Shaanxi Institute of Geo-Environment Monitoring, Key Laboratory of Mine Geological Hazards Mechanism and Control,Ministry of Land and Resources;;, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

地址: 周静静, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

张晓敏, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

赵法锁, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李辉, 国土资源部矿山地质灾害成灾机理与防控重点实验室;;陕西省地质环境监测总站, 国土资源部矿山地质灾害成灾机理与防控重点实验室;;, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

刘海南, 国土资源部矿山地质灾害成灾机理与防控重点实验室;;陕西省地质环境监测总站, 国土资源部矿山地质灾害成灾机理与防控重点实验室;;, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: 578685749@qq.com; 854168051@qq.com

电子邮件地址: 578685749@qq.com; 854168051@qq.com

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作者: Meng Jie; Li Xian; Zhao Xingkao; Liu Jinyang; Wang Jinxia

作者: 孟杰; 李喜安; 赵兴考; 刘锦阳; 王锦霞

标题: Uniformity of Remoulded Loess Samples Based on High Precision muCT Scanning

标题: 基于高精度 muCT 扫描的重塑黄土试样均匀性分析

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作者关键词: remolded loess; uniformity; muCT scanning test; 3D reconstruction; pore distribution; pressing; bumping

作者关键词: 重塑黄土; 均匀性; muCT 扫描试验; 3D 重构; 孔隙分布; 压实制样法; 分层击实法

摘要: The effect of preparing remoulded loess samples by different methods in laboratory is studied in this paper to provide accurate index parameters for geotechnical engineering. Triaxial remoulded loess samples prepared by pressing and bumping were scanned by high precision muCT to reconstruct the soil's microstructure in three dimensions by VG Studio MAX2.2 image processing software. The structure, 3D information of pores, and pore distribution of loess samples were quantified; the influences of pore uniformity and confining pressure on the ultimate strength of loess samples were examined by means of triaxial shear test. Results show that: (1) layered pressing is prone to result in severe damage to the internal structure of loess sample; layered bumping lead to the non-uniform distribution of pores. The pore size of main volume frequency of samples undergone one-time pressing is 40 μm smaller than that of bumped samples, and the difference of porosity in different zones is less than 3%. (2) The greater the gap between the soil porosity distribution, the smaller the ultimate strength. Conclusion was drawn as follows: the characteristics of loess is affected by the spatial distribution of porosity, and one-time bumping method is recommended for the preparation of remoulded loess sample.

摘要: 研究重塑黄土试样实验室内的制备效果, 为工程活动提供准确的指标参数。以压实与击

实 2 种制样方法所制备的三轴重塑黄土试样为对象,通过高精度 μ CT 扫描试验,借助 VG Studio MAX2.2 图像处理软件,实现了土样微结构的三维重建,量化分析试样结构、孔隙三维信息以及孔隙分布情况,并通过三轴剪切试验简要分析了孔隙均匀性和围压对极限强度的影响。结果表明: ①分层压实易造成重塑样内部结构的严重破坏,而不同工序下的分层击实试样孔隙分布极不均匀;一次压实试样较击实试样体积主频率孔径降低了 40 μm ,且不同区域的孔隙率差值 $<3\%$ 。②土体内孔隙率分布差距越大,其极限强度越小。重塑样孔隙空间分布影响测得的黄土特性,故宜采用一次压实法制重备塑黄土样。

入藏号: CSCD:6549740

地址: Meng Jie, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Liu Jinyang, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Xian, School of Geological Engineering and Geomatics, Chang'an University;; Open Research Laboratory of Geotechnical Engineering, Ministry of Land and Resources, ;; Open Research Laboratory of Geotechnical Engineering, Ministry of Land and Resources, Xi'an;; Xi'an, ;; 710054;; 710054.

Zhao Xingkao, No.1 Geology Team, Hebei Bureau of Geology and Mineral Resources Exploration, Handan, Hebei 056001, China.

Wang Jinxia, No.1 Geology Team, Hebei Bureau of Geology and Mineral Resources Exploration, Handan, Hebei 056001, China.

地址: 孟杰, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

刘锦阳, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李喜安, 长安大学地质工程与测绘学院;; 国土资源部岩土工程开放研究实验室, ;; 国土资源部岩土工程开放研究实验室, 西安;; 西安, ;; 710054;; 710054.

赵兴考, 河北省地矿局第一地质大队, 邯郸, 河北 056001, 中国.

王锦霞, 河北省地矿局第一地质大队, 邯郸, 河北 056001, 中国.

电子邮件地址: 260843911@qq.com; dclixa@chd.edu.cn

电子邮件地址: 260843911@qq.com; dclixa@chd.edu.cn

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作者: Du Changcheng; Zhu Yanbo; Miao Shuaisheng; Gao Mingming; Zhu Junhua; Zhao Fasuo

作者: 杜长城; 祝艳波; 苗帅升; 高明明; 祝俊华; 赵法锁

标题: The evolution of cracks in the dewatering shrinkage process of hipparion red soil

标题: 三趾马红土失水收缩裂缝演化规律研究

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作者关键词: hipparion red soil; digital image quantitative processing; crack evolution; self-healing mechanism

作者关键词: 三趾马红土; 数字图像定量处理; 裂缝演化; 自愈机制

摘要: The dewatering shrinkage cracking of clay has significant influence on human engineering activities. The dry dehumidification test was carried out on the remolded hipparion clay, and the dynamic quantitative data of cracks was obtained by digital image quantitative processing technology. It was found that the evolution law of cracks was different from the traditional law of cracks (the area and average width of cracks continuously increase during the drying process, and finally tend to be stable). For example, the crack of the sample shrunk during the middle of drying process, and the cracks showed the phenomenon of self-healing'. Subsequently, the split-block' theory was put forward to analyze the mechanism of this phenomenon, and the concept of healing degree was also introduced to study the healing effect of cracks under different initial water contents. The results show that the initial water content has a significant effect on the crack healing degree of the sample. The lower the initial water content is, the earlier the healing occurs and the greater the degree of final healing is. The final healing degree of the sample with a dry density of 1.7 g/cm³ is in a good linear relationship with the initial water content under a temperature of 40°C.

摘要: 黏性土失水收缩开裂对人类工程活动影响显著。通过设计室内试验监测装置,对重塑三趾马红土开展干燥脱湿试验,并运用数字图像定量处理技术获得其干缩裂缝演化的动态定量数据,发现其裂缝演化规律与传统规律(裂缝面积、平均宽度在干燥过程中始终增长,最终趋于稳定)有所不同,表现为试样裂缝在干燥中期出现收缩现象,呈现裂缝的自愈性。随后提出裂块理论深入分析了此现象的产生机制,并引入愈合度概念,研究了不同初始含水率下试样裂缝的愈合规律,结果表明:(1)初始含水率对试样裂缝愈合度影响显著,初始含水率越低,试样裂缝越早开始愈合且最终愈合度越大;(2)干密度 1.7 g/cm³ 的试样在 40°C 脱湿条件下,试样最终愈合度与初始含水率呈良好的线性关系。

入藏号: CSCD:6545449

地址: Du Changcheng, College of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhu Yanbo, College of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Miao Shuisheng, College of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Gao Mingming, College of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhu Junhua, College of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhao Fasuo, College of Geological Engineering and Geomatics, Chang'an University, Xi'an,

Shaanxi 710054, China.

地址: 杜长城, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

祝艳波, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

苗帅升, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

高明明, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

祝俊华, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

赵法锁, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: 1161422811@qq.com; 342948684@qq.com

电子邮件地址: 1161422811@qq.com; 342948684@qq.com

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作者: Guo Chunxi; Zhang Panpan; Ma Yange

作者: 郭春喜; 张盼盼; 马艳鸽

标题: Precision analysis of multi class gravity field model

标题: 多类重力场模型的精度分析

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作者关键词: gravity field model; internal and external accuracy; truncated order; combined gravity field model; order variance

作者关键词: 重力场模型; 内外符合精度; 截断阶次; 组合重力场模型; 阶方差

摘要: The internal accuracy of ultra-high order gravity field models EGM2008,GECO,EIGEN-6C4 and low order gravity field models GOCO03S,GO_CONS_GCF_2_DIR_R5 and GO_CONS_GCF_2_TIM_R5 is analyzed.The measured GNSS/level data is used to check the accuracy of each model.This paper analyzes the accuracy of the 6 models in different order combinations,and then selects a reliable truncation order to determine the combined gravity field model.The calculation result shows that the order variance of four gravitational field models of EGM2008,GECO,EIGEN-6C4 and DIR_R5 are all kept at mm level,while the accuracy of GOCO03S after 191 orders reaches dm level,and the accuracy of TIM_R5 model after 228 order reaches dm level;in the six gravity field models,the

cumulative order variance of the EIGEN-6C4 model is the least;the cross order difference of EGM2008 and GECO models shows a great difference in the high-frequency part,while the difference order variance in the two models of super high order shows good consistency.Compared with EGM2008 model,the corresponding combination of gravity field model of height anomaly optimum precision are respectively up to 0.063 m,corresponding to improve the accuracy rate-15%;Compared with GECO model,the corresponding combination of gravity field model of height anomaly optimum precision are respectively up to 0.060 m,corresponding to improve the accuracy rate-23%;Compared with EIGEN-6C4 model,the corresponding combination of gravity field model of height anomaly optimum precision are respectively up to 0.064 m,corresponding to improve the accuracy rate- 18%.Therefore,the combination of gravity field model can improve the gravity field model of precision.

摘要: 分析国际公布的 EGM2008、GECO 和 EIGEN-6C4 等超高阶重力场模型及 GOCO03S、GO_CONS_GCF_2_DIR_R5 和 GO_CONS_GCF_2_TIM_R5 等低阶重力场模型的内符合精度。利用实测的 GNSS/水准数据对各模型进行外符合精度的检核。分析 6 个模型在不同阶次组合的精度,进而选取可靠的截断阶次确定组合重力场模型。计算结果表明:EGM2008、GECO、EIGEN-6C4 及 DIR_R5 四个重力场模型的阶方差均保持在 mm 级,而 GOCO03S 在 191 阶之后的精度达到 dm 级,TIM_R5 模型在 228 阶之后的精度达到 dm 级;6 个重力场模型中,EIGEN-6C4 模型的累计阶方差最小;EGM2008、GECO 模型的互差阶方差在高频部分呈现差异,而在超高阶部分两种模型的互差阶方差符合性好;与 EGM2008 模型相比,其组合重力场模型高程异常精度最优可达 0.063 m,精度提升幅度为 15%,与 GECO 模型相比,其组合重力场模型高程异常精度最优可达 0.060 m,精度提升幅度为 23%,与 EIGEN-6C4 模型相比,其对应的组合重力场模型高程异常精度最优可达 0.064 m,精度提升幅度为 18%,因此,组合重力场模型能提高重力场模型高程异常的精度。

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地址: Guo Chunxi, School of Geology Engineering and Geomatics,Chang'an University;;Geodetic Data Processing Center,State Bureau of Surveying and Mapping, ;; Xi'an;;Xi'an, ;; 710064;;710054.

Zhang Panpan, School of Geology Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710064, China.

Ma Yange, School of Geology Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 郭春喜, 长安大学地质工程与测绘学院;;国家测绘地理信息局大地测量数据处理中心, ;; 西安;;西安, 陕西;;陕西 710064;;710054, 中国.

张盼盼, 长安大学地质工程与测绘学院, 西安, 陕西 710064, 中国.

马艳鸽, 长安大学地质工程与测绘学院, 西安, 陕西 710064, 中国.

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作者: Gao Xiao; Ku Xinbo; Bai Hao; Tang Xinzhuang

作者: 高晓; 库新勃; 白皓; 唐新庄

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作者关键词: GPS; BDS; Doppler; GPS; BDS; UAV; Doppler; kinematic positioning

作者关键词: 航测无人机; 动态定位

摘要: Position and orientation system(POS)can acquire the line and angle elements of the aerial photographs directly,which can reduce the workload of unmanned aerial vehicle photogrammetry and improve work efficiency,thus the UAV photogrammetry has become an important way of data acquisition in aerial photogrammetry.For the large quality of conventional RTK products,it is difficult to be applied in the UAV surveying.In this paper, Doppler smoothing algorithm has been adopted to refine code observables,and then the combined Doppler-smoothed code(DSC)and phase data have been used to realize UAV post processed kinematic positioning(PPK).The results of measured data have shown that,compared with single satellite system,the combined GPS/BDS system can meet the requirement of kinematic positioning for UAV photogrammetry,and the efficiency and reliability of PPK positioning can be improved based on the DSC and phase observables.

摘要: 由于定位定向系统(POS)可直接获取航摄像片线元素与角元素,减少航测内外业工作量,提高航测作业的效率,无人机摄影测量已成为航空摄影测量的重要方式.常规实时动态(RTK)产品重量较大,难以应用于荷载有限的微小型无人机的 POS 系统.本文基于 Doppler 值修正伪距观测量,并联合平滑伪距与相位观测量实现无人机动态后处理定位(PPK).实测数据结果表明,较之单系统,全球定位系统/北斗卫星导航系统(GPS/BDS)组合系统可充分满足无人机动态定位的精度需求,结合平滑伪距与相位观测量可改善 PPK 定位的精度与可靠性.

入藏号: CSCD:6532438

地址: Gao Xiao, College of Geology Engineering and Geomatics,Changan University;;Northwest Electric Power Design Institute Co.,LTD,China Power Engineering Consulting Group, ;; Xian;;Xian, ;; 710054;;710032.

Ku Xinbo, Northwest Electric Power Design Institute Co.,LTD,China Power Engineering Consulting Group, Xian, 710032.

Bai Hao, Northwest Electric Power Design Institute Co.,LTD,China Power Engineering Consulting Group, Xian, 710032.

Tang Xinzhuang, Northwest Electric Power Design Institute Co.,LTD,China Power Engineering Consulting Group, Xian, 710032.

地址: 高晓, 长安大学地质工程与测绘学院;;中国电力工程顾问集团西北电力设计院有限公司, ;; 西安;;西安, 陕西;;陕西 710054;;710032, 中国.

库新勃, 中国电力工程顾问集团西北电力设计院有限公司, 西安, 陕西 710032, 中国.
白皓, 中国电力工程顾问集团西北电力设计院有限公司, 西安, 陕西 710032, 中国.
唐新庄, 中国电力工程顾问集团西北电力设计院有限公司, 西安, 陕西 710032, 中国.

电子邮件地址: 834606637@qq.com

电子邮件地址: 834606637@qq.com

使用次数 (最近 180 天): 0

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作者: Li Peng; Liu Shijie; Guo Min; Xu Jiwei

作者: 李鹏; 刘世杰; 郭敏; 徐继维

标题: Dynamic Response Rule of Loess Stepped Slope Subjected to Vehicle Vibration

标题: 汽车振动作用下黄土阶状坡动力响应规律

来源出版物: 公路交通科技 卷: 36 期: 7 页: 53-62 出版年: 2019

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文献类型: Article

作者关键词: road engineering; dynamic response; vibration monitoring; loess stepped slope; vehicle vibration

作者关键词: 道路工程; 动力响应; 振动监测; 黄土阶状坡; 汽车振动

摘要: In order to provide theoretical support for the study of structural loess degradation damage and slope disaster mechanism under the automobile vibration, to research the dynamic response rule of loess stepped slope under the action of automobile vibration, taking a loess stepped slope located in Ansai-Zizhang highway as the research object, the failure modes and characteristics of loess stepped slope are summarized, the vehicle vibration signals of different types, speeds and positions on the loess stepped slope are obtained by field investigation and monitoring. Based on the statistical analysis of the monitoring signals, the vibration response rule and the spectrum characteristics of the slope are obtained. It is concluded as follows: (1) The vibration response of the slope increases with the increase of vehicle load. As the vehicle load increases, the area with strong vibration response gradually migrates from the second grade slope to the first grade slope. (2) The amplification effect of the vibration wave is obviously when the vehicle load is small, while the amplification effect of the vibration wave is weakened when the vehicle load is large, and the Z-direction wave appears as the vibration attenuation. (3) The X-direction wave's

frequency distribution is single peak, and the main frequency is concentrated in 17 - 65 Hz. Z-direction wave's frequency distribution is multi-peaked, and the main frequency is concentrated in 22 - 185 Hz. (4) The frequency variation of the vibration wave propagating in the slope is less relevant to the type, speed, and position of the vehicle. It is mainly determined by the slope itself. (5) The stress state of the loess stepped slope will change under the action of vehicle vibration. In the design of loess stepped slope, the gradient of the slope should not be too large, and the first and second grade slopes should not be too high. Meanwhile, the slope protection should be focused on the first and second grade slopes. This research result is benefit for revealing the dynamic response of loess stepped slope, which has certain theoretical and practical significance for protection of this type of slope.

摘要: 为了给汽车振动作用下结构性黄土劣化损伤及边坡致灾机理研究提供理论支撑,研究汽车振动作用下黄土阶状坡动力响应规律,以安子路(安塞至子长)某黄土公路阶状坡为研究对象,采用野外调查和现场监测的方法,总结了黄土阶状坡的变形破坏模式及特点,获取了不同车辆类型、速度和位置下边坡的汽车振动信号。在对监测信号进行统计分析的基础上,得到了边坡的振动响应规律和频谱特性,主要结论如下:(1)边坡的振动响应随汽车荷载的增加而增强;随着汽车荷载的增加,振动响应强烈区域由二级坡逐渐迁移到一级坡;(2)汽车荷载较小时,振动波放大效应明显,汽车荷载较大时,振动波放大效应减弱,且Z方向波表现为振动衰减;(3)X方向波的频谱分布为单峰状,主频集中在17~65 Hz;Z方向波的频谱分布为多峰状,主频集中在22~185 Hz;(4)振动波在坡体中传播时的频率变化与车辆的类型、速度和位置的相关性较小,主要是由坡体自身决定;(5)汽车振动作用会造成黄土阶状坡应力状态发生改变,在黄土阶状坡设计中,边坡坡度不宜太大,一级和二级坡不宜太高,同时应重点对一级坡和二级坡进行坡面防护。该问题的研究,对揭示黄土阶状坡的动力响应及该类型边坡的防护具有一定的理论和实际意义。

入藏号: CSCD:6530640

地址: Li Peng, School of Geological Engineering and Geomatics, Chang'an University;; Open Research Laboratory of Geotechnical Engineering, Ministry of Natural Resources;; Key Laboratory for Geo-hazards in Loess Area, Ministry of Natural Resources, ;; Open Research Laboratory of Geotechnical Engineering, Ministry of Natural Resources;; Key Laboratory for Geo-hazards in Loess Area, Ministry of Natural Resources, Xi'an;; Xi'an;; Xi'an, Shaanxi;; Shaanxi;; Shaanxi 710054;; 710054;; 710054.

Liu Shijie, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Guo Min, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Xu Jiwei, School of Geological Engineering and Geomatics, Chang'an University;; Key Laboratory for Geo-hazards in Loess Area, Ministry of Natural Resources, ;; Key Laboratory for Geo-hazards in Loess Area, Ministry of Natural Resources, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710054;; 710054.

地址: 李鹏, 长安大学地质工程与测绘学院;; 国土资源部岩土工程开放研究实验室;; 国土资源部黄土地质灾害重点实验室, ;; 国土资源部岩土工程开放研究实验室;; 国土资源部黄土地质灾害重点实验室, 西安;; 西安;; 西安, 陕西;; 陕西;; 陕西 710054;; 710054;; 710054, 中国.

刘世杰, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

郭敏, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

徐继维, 长安大学地质工程与测绘学院;; 国土资源部黄土地质灾害重点实验室, ;; 国土资源部黄土地质灾害重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

电子邮件地址: lipeng198782@163.com

电子邮件地址: lipeng198782@163.com

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Su Shengrui; Zhou Yang; Zhou Zehua; Ma Hongsheng

作者: 苏生瑞; 周阳; 周泽华; 马洪生

标题: HAZARD ASSESSMENT OF COLLAPSE USING EW-AHP AND UNASCERTAINED MEASURE THEORY

标题: 基于 EW-AHP 和未确知测度理论的崩塌危险性评价

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作者关键词: EW-AHP; Collapse; Hazard; EW-AHP; Unascertained measure theory

作者关键词: 崩塌; 危险性; 未确知测度理论

摘要: Hazard assessment and prediction are the important contents of prevention and control of disasters. This paper attempts to solve the shortcomings of the method for determining the weight of indicators in traditional hazard assessment and the uncertainty of influencing factors. It takes the collapses in Wenchuan-Lixian highway of G4217 line as an example. Twelve factors including slope and aspect are selected as indicators of collapse hazard assessment. Hazard grading standards are established according to its unique geological environment conditions. The entropy weight method and analytical hierarchy process are coupled to determine the weights of the factors affecting collapse. A comprehensive evaluation model is established using EW- AHP and unascertained measure theory. Hazard assessment is carried out for 20 collapses in the study area and compared with the results of the field survey and assessment results using EW. Results show that the assessment results of the model are more in line with the actual situation and assessment method is reasonable and effective. It can provide a new idea for the prediction of the hazard of collapse in the future.

摘要: 危险性评价和预测是崩塌灾害防治工作的重要内容。为了解决传统危险性评价中指标权重确定方法的不足以及影响因素的不确定性,本文以 G4217 线汶川理县段公路沿线发育的

崩塌为例,据其特有的地质环境条件,选取坡向、坡度等 12 项影响因子作为崩塌危险性评价指标,并建立了危险性分级标准。将熵权法(EW)和层次分析法(AHP)耦合在一起,确定了崩塌影响因子的权重,采用基于 EW-AHP 和未确知测度理论的综合评价模型,对研究区内 20 个崩塌进行危险性评价,并与现场调查结果和熵权法(EW)的评价结果进行对比分析。研究表明:该模型的评价结果更符合实际情况,评价方法合理有效,可为今后崩塌危险性预测提供新思路。

入藏号: CSCD:6531347

地址: Su Shengrui, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhou Yang, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhou Zehua, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Ma Hongsheng, Sichuan Provincial Transport Department Highway Planning, Survey, Design and Research Institute, Chengdu, Sichuan 610041, China.

地址: 苏生瑞, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

周阳, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

周泽华, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

马洪生, 四川省交通运输厅公路规划勘察设计研究院, 成都, 四川 610041, 中国.

电子邮件地址: shengruisu@163.com

电子邮件地址: shengruisu@163.com

使用次数 (最近 180 天): 0

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作者: Hao Jianbin; Wei Xingmei; Yao Jie; Zhang Zhenbei

作者: 郝建斌; 魏兴梅; 姚婕; 张振北

标题: Strength Characteristics and Mesostructure of Wheat Straw Reinforced Soil

标题: 麦秸秆加筋土的强度特性及细观结构分析

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作者关键词: wheat straw reinforced soil; triaxial test; computed tomography scanning; shear strength; failure mode; mesostructure

作者关键词: 麦秸秆加筋土; 三轴试验; 计算机断层扫描; 抗剪强度; 破坏形态; 细观结构

摘要: This study presents results of an laboratory triaxial experimental program with respect to study the effect of wheat straw reinforcement on the shear strength of soil. Three-axis shear tests were carried out under four reinforcement rates(0.1%,0.2%,0.3%,0.4%)and three reinforced lengths (5,10,15 mm).The mesostructure changes of reinforced soil and plain soil during loading are compared and analyzed by using computed tomography(CT) scan image.The results show that:the shear strength and deformation resistance of wheat straw reinforced soil are significantly improved than plain soil,and the reinforcement effect is better when the wheat straw length is 10mm.In this condition,the cohesive forces of reinforced soil are 1.1to 3.3 times that of unreinforced soil,the internal friction angle changes in the range of ± 2 degrees.Compared with plain soil,the macroscopic shear failure of reinforced soil during shearing is not obvious,and all of them are bulging failure.When the confining pressure is small,the effect of reinforcement is significant,and the effect on the stiffness of soil is fine.With the increase of confining pressure,the effect becomes weaker.CT scanning results show that wheat straw reinforcement can restrict soil deformation and crack growth.It is concluded from this study that wheat straws are a suitable reinforced material for cohesive soil.

摘要: 为了分析麦秸秆加筋对土体抗剪强度的影响,开展了4种加筋率(0.1%,0.2%,0.3%,0.4%)和3种加筋长度(5,10,15mm)下的三轴剪切试验.通过CT(计算机断层扫描)扫描图像,对比分析了加筋土和素土在加载过程中的细观结构变化.结果表明:麦秸秆加筋黏性土的抗剪强度和抗变形能力较素土都有显著提高,其中筋材长度为10mm时加筋效果较好.所研究加筋条件下,土体黏聚力较素土黏聚力增大0.1~2.3倍,内摩擦角变化在 $\pm 2^\circ$ 范围内.与素土相比,加筋土在剪切过程中无明显的宏观剪切破坏,均为鼓胀破坏.围压较小时,加筋作用明显,对土体的刚度影响较大,随着围压的增大,影响逐渐变小.CT扫描结果显示,麦秸秆加筋能够限制土体变形和裂纹扩展.因此,麦秸秆适宜作为黏性土的加筋材料.

入藏号: CSCD:6517555

地址: Hao Jianbin, School of Geology Engineering and Geomatics,Changan University;;Changan University, ;;Open Research Laboratory for Geotechnical Engineering Ministry of Land and Resources, Xian;;Xian, ;; 710054;;710054.

Wei Xingmei, School of Geology Engineering and Geomatics,Changan University, Xian, 710054.

Zhang Zhenbei, School of Geology Engineering and Geomatics,Changan University, Xian, 710054.

Yao Jie, School of Geology Engineering and Geomatics,Changan University;;State Grid Xinjiang Power Transmission and Substation Co.,Ltd., ;; Xian;;Urumchi, ;; 710054;;830011.

地址: 郝建斌, 长安大学地质工程与测绘学院;;长安大学, ;;国土资源部岩土工程开放研究实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

魏兴梅, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

张振北, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

姚婕, 长安大学地质工程与测绘学院;;新疆送变电有限公司, ;; 西安;;乌鲁木齐, 陕西;;新疆 710054;;830011, 中国.

电子邮件地址: haojb@chd.edu.cn

电子邮件地址: haojb@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Peng Jianbing; Huang Weiliang; Wang Feiyong; Liu Yang

作者: 彭建兵; 黄伟亮; 王飞永; 刘阳

标题: Geological structural classification of and geological survey method for urban underground space in China

标题: 中国城市地下空间地质结构分类与地质调查方法

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作者关键词: urban underground space; geostructure; underground structure; geological survey; underground space classification

作者关键词: 城市地下空间; 地质结构; 地下结构; 地质调查; 地下空间分类

摘要: The development and utilization of urban underground space are reasonable strategies conforming to the law of urban development, and China has seen rapid expansion of underground development in urban construction in recent years. China has a vast territory with various types of cities distributed in various geomorphological regions. Therefore, before large-scale development, the underground space of various cities should be classified according to geological conditions to ensure that a geostructural engineering classification system can be established to guide engineering practice. Here, we classified 49 cities according to geomorphologic location, regional tectonic and lithospheric structural characteristics, current seismic activity, basement and soil structure, underground water depth and so on. Choosing the geomorphologic location as the top division unit, we can classify the tectonic environment, crustal and mantle characteristics, basement structure and surface fault activity and potential seismic source zone, as well as soil type and solid structure of surface rocks, in the same division unit for various cities. Classification of urban underground space is based on fine exploration of underground space. We summarized here the current methods for underground geostructural investigation including ground surface mapping, exploratory drilling, geophysical survey and model building. However, new methods and theories are still needed for conducting fine exploration of all elements in a structural system in complex geological environment and in deep underground space development. Breakthroughs are also expected in construction theory and

descriptive method for different types of urban geostructural models. And the classification system and classification method for the geostructures of urban underground space also need to be further improved.

摘要: 城市地下空间开发和利用是顺应城市发展规律的合理抉择,也是我国近年来城市建设的热点区域。中国幅员辽阔,各类城市分布在不同的地貌区域内,具有不同地质背景和地质结构条件,在进行大规模城市地下空间开发和利用之前,要根据不同的地质地貌条件对各类城市地下空间结构进行初步分类,建立我国城市地下空间工程地质结构的分类体系,用于指导未来我国各类城市地下空间开发利用的工程实践。在考虑到不同城市所处地貌位置、区域构造特征、岩石圈深部结构特点、现今地震活动情况、地下岩土体结构、地下水埋深等多种参数,对未来中国可能进行大规模地下空间开发和利用的 49 座城市进行了分类。将地貌位置作为一级划分单元,对处在同一地貌部位各类城市所处大地构造环境、壳幔特征、基底结构、表层断层活动性以及潜在震级大小进行区分;同时对表层岩土体类型和岩土体立体结构进行分类。城市地下空间分类是基于对地下空间的精细化探测。本文还总结了现今对地下地质结构的调查方法,包括地面调查、钻探、地球物理勘探和建模方面的新技术和新方法,但对于在复杂地质环境下及深层地下空间开发中结构系统的全要素精细探测仍需要发展新的方法和理论,对不同类型城市地质结构模型的构建理论和描述方法也有待突破,城市地下空间地质结构分类体系和分类方法仍需进一步完善。

入藏号: CSCD:6520109

地址: Peng Jianbing, Chang'an University, Key Laboratory of Western Mineral Resources and Geological Engineering(Ministry of Education), Xi'an, Shaanxi 710054, China.

Huang Weiliang, Chang'an University, Key Laboratory of Western Mineral Resources and Geological Engineering(Ministry of Education), Xi'an, Shaanxi 710054, China.

Wang Feiyong, Chang'an University, Key Laboratory of Western Mineral Resources and Geological Engineering(Ministry of Education), Xi'an, Shaanxi 710054, China.

Liu Yang, Chang'an University, Key Laboratory of Western Mineral Resources and Geological Engineering(Ministry of Education), Xi'an, Shaanxi 710054, China.

地址: 彭建兵, 长安大学, 西部矿产资源与地质工程教育部重点实验室, 西安, 陕西 710054, 中国.

黄伟亮, 长安大学, 西部矿产资源与地质工程教育部重点实验室, 西安, 陕西 710054, 中国.

王飞永, 长安大学, 西部矿产资源与地质工程教育部重点实验室, 西安, 陕西 710054, 中国.

刘阳, 长安大学, 西部矿产资源与地质工程教育部重点实验室, 西安, 陕西 710054, 中国.

电子邮件地址: huangweiliang@chd.edu.cn;;dicexy_1@chd.edu.cn

电子邮件地址: huangweiliang@chd.edu.cn;;dicexy_1@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Huang Qiangbing; Peng Jianbing; Wang Feiyong; Liu Nina

作者: 黄强兵; 彭建兵; 王飞永; 刘妮娜

标题: Issues and challenges in the development of urban underground space in adverse geological environment

标题: 特殊地质城市地下空间开发利用面临的问题与挑战

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作者关键词: urban underground space; development and utilization; adverse geology; land subsidence; ground fissure; active fault; karst

作者关键词: 城市地下空间; 开发利用; 特殊地质; 地面沉降; 地裂缝; 活动断裂; 岩溶

摘要: The geological environment is complex and adverse geological conditions such as land subsidence, ground fissures, active faults and karst are common in China. And China is one of the countries most prone to serious geological disasters in the world, which brings unprecedented challenges to China's current largescale development of urban underground space, especially in the constructions of urban underground transient system and comprehensive pipe gallery. In this paper, we describe the distribution, developmental status and engineering hazards of the aforementioned adverse geological environments in China. We point out clearly the issues and challenges facing the underground space development and utilization in these hazardous environments, such as lack of systematic monitoring, lack of theoretical methods and technical support for evaluation and safe usage, unknown mechanism of interactions between adverse geological conditions and underground space, and lack of foresight based planning. We suggest that theories and methods should be developed as soon as possible for assessing the suitability of urban underground space development and utilization in adverse geological environments. Plan and design theory, detection and monitoring techniques, and key technologies for evaluation, safe usage and hazard prevention for urban underground space resources also need to be developed urgently. This study provides important scientific basis and technical guidance for the development, utilization and safe operation of underground space in the aforementioned adverse geological environments.

摘要: 我国地质环境十分复杂,地面沉降、地裂缝、活动断裂及岩溶等特殊地质现象十分发育,是世界上地质灾害最为严重的国家之一,这给我国目前大规模城市地下空间开发利用尤其是城市轨道交通和地下综合管廊的建设带来了前所未有的地质挑战。文中论述了我国城市地面沉降、地裂缝、活动断裂及岩溶等特殊地质现象的分布与发育状况及危害,明确指出了上述特殊地质环境下城市地下空间开发利用中面临的诸如监测缺乏系统性、缺少评价与安全利用理论方法和技术支撑、特殊地质与地下空间相互作用机制不明以及规划缺乏前瞻性等关键问题,建议尽快开展我国特殊地质城市地下空间开发利用的适宜性评价理论方法、规划设计理论、探测与监测技术方法以及城市地下空间资源评价、安全利用与防治关键技术等方面的研究,为我国地面沉降、地裂缝、活动断裂以及岩溶等特殊地质城市地下空间开发利用与安全运营提供重要科学依据与技术指导。

入藏号: CSCD:6520117

地址: Huang Qiangbing, Department of Geological Engineering, Chang'an University; Institute of Geotechnical and Underground Engineering, Chang'an University; Chang'an University, ;;; Key Laboratory of Western China's Mineral Resources and Geological Engineering (Ministry of Education), Xi'an; Xi'an; Xi'an, ;;; 710054; 710054; 710054.

Liu Nina, Department of Geological Engineering, Chang'an University; Institute of Geotechnical and Underground Engineering, Chang'an University; Chang'an University, ;;; Key Laboratory of Western China's Mineral Resources and Geological Engineering (Ministry of Education), Xi'an; Xi'an; Xi'an, ;;; 710054; 710054; 710054.

Peng Jianbing, Department of Geological Engineering, Chang'an University; Chang'an University, ;;; Key Laboratory of Western China's Mineral Resources and Geological Engineering (Ministry of Education), Xi'an; Xi'an, ; 710054; 710054.

Wang Feiyong, Department of Geological Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 黄强兵, 长安大学地质工程系;; 长安大学岩土与地下工程研究所;; 长安大学, ;;; 西部矿产资源与地质工程教育部重点实验室, 西安;; 西安;; 西安, 陕西;; 陕西;; 陕西 710054;; 710054;; 710054, 中国.

刘妮娜, 长安大学地质工程系;; 长安大学岩土与地下工程研究所;; 长安大学, ;;; 西部矿产资源与地质工程教育部重点实验室, 西安;; 西安;; 西安, 陕西;; 陕西;; 陕西 710054;; 710054;; 710054, 中国.

彭建兵, 长安大学地质工程系;; 长安大学, ;;; 西部矿产资源与地质工程教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

王飞永, 长安大学地质工程系, 西安, 陕西 710054, 中国.

电子邮件地址: dcdgx24@chd.edu.cn

电子邮件地址: dcdgx24@chd.edu.cn

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作者: Zhai Yue; Zong Yanyan; Hou Yanan; Liu Yi; Li Yubai

作者: 翟越; 宗燕燕; 侯亚楠; 刘艺; 李宇白

标题: Whole life-cycle risk analysis and construction of prevention and control system for urban underground space

标题: 城市地下空间全寿命风险分析与防控体系构建

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作者关键词: underground space; whole life-cycle; risk factor; comprehensive evaluation; prevention and control system

作者关键词: 地下空间; 全周期; 风险因素; 综合评价; 防控体系

摘要: Accidents occur frequently and can cause great harm during a course of urban underground space exploitation and development. In order to effectively reduce accident occurrences and losses, we identified the main risk factors in project planning and site selection, hydrogeological exploration, engineering design, construction, and late operation and maintenance during the whole life-cycle of the project, and analyzed the potential accidents. We demonstrated the common relationships among the risk factors in the aforementioned areas, established a safety evaluation index system, proposed a comprehensive multi-factor/multi-method safety evaluation model, and carried out feasibility verification through specific examples. On this basis, we developed a whole life-cycle, whole-system and whole-organization oriented risk prevention and control technology and management system. We provided in this paper the reasonable ideas and methods for ensuring successful implementation of urban underground space projects.

摘要: 城市地下空间开发利用过程中安全事故频发, 危害极大, 为了有效减少事故的发生并降低损失, 对其全寿命周期中的规划选址、水文地质勘察、工程设计、建设施工、运营维护等各个重要环节进行主要风险因素辨识及相应事故分析, 指出各因素之间存在的相互影响关系。建立了安全评价指标体系, 提出多因素、多方法的综合风险评价方法, 并通过具体实例进行可行性验证。在此基础上针对城市地下空间的开发利用, 构建全周期、全体系、全系统的风险防控技术和管理体系, 为保障城市地下空间项目的顺利实施提供科学合理的思路和方法。

入藏号: CSCD:6520118

地址: Zhai Yue, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zong Yanyan, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Hou Yanan, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Liu Yi, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Yubai, School of Geological Engineering and Geomatics, Chang'an University;; School of Earth Sciences and Resources, China University of Geosciences(Beijing), ;; Xi'an;; ;; Beijing 710054;; 100083.

地址: 翟越, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

宗燕燕, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

侯亚楠, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

刘艺, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李宇白, 长安大学地质工程与测绘学院;; 中国地质大学(北京)地球科学与资源学院, ;; 西安;; 陕西;; 北京 710054;; 100083, 中国.

电子邮件地址: zy@chd.edu.cn

电子邮件地址: zy@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Cong Ming; Duan Chenxi; Xu Miaozhong; Tao Yiting

作者: 丛铭; 段晨曦; 许妙忠; 陶翊婷

标题: Road Extraction from High Resolution Remote Sensing Image based on Shape Analysis with Gestalt Theory

标题: 基于格式塔形状分析的高分辨率遥感影像道路提取

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作者关键词: Road extraction; Gestalt theory; Image thinning; Shape recognition; High resolution remote sensing image

作者关键词: 道路提取; 格式塔原理; 图像细化; 形状认知; 高分辨遥感影像

摘要: Simulating the psychological experience of human vision,a road extraction model based on the format tower is proposed to extract the road in the high resolution remote sensing image from the perspective of morphology.Firstly,based on the spectral and texture information,the suspected road targets are extracted by using segmentation technology.Then these targets are classified according to their reliability and extract the road targets for each category.Finally,three types of identified road information are verified and merged,and the continuous smooth road extraction results are obtained.Experiments on real high resolution images show that the results are consistent with the visual perception of the human eye,and the overall classification accuracy is higher,indicating that the algorithm is effective and feasible and has good use value.

摘要: 针对高分辨率遥感影像道路网的复杂性,模拟人眼视觉的心理感受,提出一种基于格式塔的道路分离模型,从形状学的角度对高分辨率遥感影像中的道路进行提取。首先基于光谱和纹理信息,使用分割技术提取出疑似道路的目标;然后按照疑似目标的实心度将其分类,对每一类分别进行道路目标提取。最后对 3 类识别出的道路信息进行验证与合并,得到连续光滑的道路提取结果。在真实的高分影像上进行实验,发现结果与人眼视觉感受一致,且总体分类精度较高,说明算法有效可行,有良好的使用价值。

入藏号: CSCD:6519759

地址: Cong Ming, College of Geology Engineering and Geomatics, Chang'an University;; Wuhan University, ;; State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing, Xi'an;; Wuhan, ;; 710054;; 430079.

Duan Chenxi, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Xu Miaozhong, Wuhan University, State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing, Wuhan, Hubei 430079, China.

Tao Yiting, Wuhan University, State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing, Wuhan, Hubei 430079, China.

地址: 丛铭, 长安大学地质工程与测绘学院;; 武汉大学, ;; 测绘遥感信息工程国家重点实验室, 西安;; 武汉, 陕西;; 湖北 710054;; 430079, 中国.

段晨曦, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

许妙忠, 武汉大学, 测绘遥感信息工程国家重点实验室, 武汉, 湖北 430079, 中国.

陶翊婷, 武汉大学, 测绘遥感信息工程国家重点实验室, 武汉, 湖北 430079, 中国.

电子邮件地址: mingc@chd.edu.cn; 422736042@qq.com

电子邮件地址: mingc@chd.edu.cn; 422736042@qq.com

使用次数 (最近 180 天): 0

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作者: Lu Yan; Zhang Maosheng; Sun Pingping; Leng Yanqiu; Dong Ying; Liu Xuan; Ji Ziwei; Liang Chen

作者: 吕艳; 张茂省; 孙萍萍; 冷艳秋; 董英; 刘旋; 姬梓维; 梁晨

标题: Geological Relics Characteristics and Preliminary Idea for Constructing World Geo-park in Yan'an

标题: 延安地质遗迹特征及世界地质公园建设方案

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作者关键词: 黄土高原; 地质遗迹; 黄土景观; 世界地质公园

摘要: Yan'an area is located in the middle reaches of the Yellow River and the central region of the Loess Plateau, where developed various types of geological relics. On the basis of field

investigations and comprehensive analysis, the authors classify the geological heritage resources in Yan'an area (e.g., loess strata profile, loess landscapes, river bends of the Yellow River, the Great Waterfall of the Yellow River, the Loess Danxia and the first well of onshore petroleum, etc.) into 3 major groups, 7 types and 12 sub-types. These geological heritage resources are distributed in relatively intensive area, and they have great scientific research value and unique landscape aesthetic characteristics in Loess Plateau, even all over the world. Yan'an is also the cradle of Chinese civilization, with brilliant culture and magnificent folk customs. The wonderful geo-heritages of Yan'an have coexisted harmoniously with human resources and ecosystems. Based on the urgent need for the protection, development and utilization of geoheritage resources in Yan'an, it is of great significance to declare and construct Yan'an World Geopark. It is also noted that to constructing Yan'an World Geopark already has the necessary conditions, mature opportunities, far-reaching impact and remarkable effects. Finally, the application of Yan'an for a World Geopark should be started as soon as possible.

摘要: 延安地处黄土高原腹地,黄河中游,富集发育了类型多样的地质遗迹资源。在现场调查和综合研究的基础上,将延安地质遗迹划分为黄土层型剖面、黄土地貌景观、黄河蛇曲群、黄土丹霞等为典型代表的3大类7类12个亚类。这些地质遗迹资源分布相对集中,具有极高的科学研究价值和黄土高原独有的景观美学特征,在世界范围内具有独特性、典型性和对比意义。延安丰富的地质遗迹与革命圣地的厚重人文历史、自然生态系统三者和谐共生,相互辉映,全方位展示了黄土高原最为典型的自然和人文特色。经分析论证,认为延安建设世界地质公园条件具备,机遇成熟,影响深远,效应显著,并提出建设延安地质公园的构想和推荐方案,并希冀尽快启动相关申报和建园工作。

入藏号: CSCD:6515822

地址: Lu Yan, School of Geological and Surveying & Mapping Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Leng Yanqiu, School of Geological and Surveying & Mapping Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Liu Xuan, School of Geological and Surveying & Mapping Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Ji Ziwei, School of Geological and Surveying & Mapping Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Liang Chen, School of Geological and Surveying & Mapping Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Maosheng, Xi'an Center of China Geological Survey/Northwest China Center for Geoscience Innovation, Key Laboratory for Geo-hazards in Loess Area, MNR, Xi'an, Shaanxi 710054, China.

Sun Pingping, Xi'an Center of China Geological Survey/Northwest China Center for Geoscience Innovation, Key Laboratory for Geo-hazards in Loess Area, MNR, Xi'an, Shaanxi 710054, China.

Dong Ying, Xi'an Center of China Geological Survey/Northwest China Center for Geoscience Innovation, Key Laboratory for Geo-hazards in Loess Area, MNR, Xi'an, Shaanxi 710054, China.

地址: 吕艳, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

冷艳秋, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

刘旋, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

姬梓维, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

梁晨, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

张茂省, 中国地质调查局西安地质调查中心/西北地质科技创新中心, 自然资源部黄土地质灾害重点实验室, 西安, 陕西 710054, 中国.

孙萍萍, 中国地质调查局西安地质调查中心/西北地质科技创新中心, 自然资源部黄土地质灾害重点实验室, 西安, 陕西 710054, 中国.

董英, 中国地质调查局西安地质调查中心/西北地质科技创新中心, 自然资源部黄土地质灾害重点实验室, 西安, 陕西 710054, 中国.

电子邮件地址: 910361481@qq.com; xazms@126.com

电子邮件地址: 910361481@qq.com; xazms@126.com

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作者: Li Mianmian; Zhao Fasuo; Song Fei; Liu Feng

作者: 李绵绵; 赵法锁; 宋飞; 刘锋

标题: Force Characteristics of Double-row Anti-slide Pile in Liujiapo Landslide

标题: 双排抗滑桩的受力特性研究---以柳家坡 2 号滑坡治理工程为例

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作者关键词: landslide thrust; double-row anti-slide piles; force characteristics; landslide management; Liujiapo No.2landslide

作者关键词: 滑坡推力; 双排抗滑桩; 受力特性; 滑坡治理; 柳家坡 2 号滑坡

摘要: The Liujiapo No.2landslide in Langao County has large thrust and scale,so the single-row pile or general retaining structure cannot meet the demand of anti-sliding force when the thrust of the landslide achieves 2000KN/m.It is also difficult to accomplish the construction under the tough topographic conditions and limited land acquisition in the Liujiapo No.2landslide. But the double-row anti-slide pile has many benfits of large stiffness,wonderful stability and favorable stress,which is commendably fulfilled the demand of anti-sliding force.In order to study the magnitude of landslide thrust shared by two rows of anti-slide piles in Liujiapo 2landslide in Langao county,the each force of double-row anti-slide piles has been analyzed separately,and the calculation formula of pile body deformation thrust has been deduced for the elastic foundation beam.The Midas/GTS has been used to analyze the two-dimensional pile under the control of double-row piles,and then the line charts of shear force and the bending moment of landslide

anti-slide pile have been obtained. The study not only shows that the shearing force of anti-slide pile is greatest at sliding surface and middle of anchorage section, but also that the back piles bears more landslide thrust than the front ones, which provides reference for the calculation of the reinforcement of anti-slide piles on landslides.

摘要: 岚皋县柳家坡 2 号滑坡的推力和规模较大,单排桩或者一般的支挡结构已经无法满足抗滑力的要求。而双排抗滑桩在满足抗滑力的同时,更具有刚度大、稳定性高等特点。为了研究岚皋县柳家坡 2 号滑坡在治理过程中双排抗滑桩各排桩分担的滑坡推力的大小,通过对前后两排桩进行单独受力分析,推导出桩身变形推力的计算公式;通过对双排桩治理后的滑坡进行二维模拟,对滑坡的稳定性、应力与应变以及双排桩的弯矩与剪力进行深入的探究分析。研究表明,抗滑桩在滑面处及锚固段中部受到的剪力最大,且后排桩相较前排桩所承受的滑坡推力更大,这为抗滑桩的设计计算提供了参考意义。

入藏号: CSCD:6515838

地址: Li Mianmian, School of Geological and Surveying Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhao Fasuo, School of Geological and Surveying Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Song Fei, School of Geological and Surveying Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Liu Feng, Shaanxi Nuclear Industry Engineering Survey Institute Co., Ltd, Xi'an, Shaanxi 710054, China.

地址: 李绵绵, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

赵法锁, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

宋飞, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

刘锋, 陕西核工业工程勘察院有限公司, 西安, 陕西 710054, 中国.

电子邮件地址: 401200245@qq.com

电子邮件地址: 401200245@qq.com

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作者: Wu Aiqi; Song Fei; Min Yaozhen; Li Mianmian

作者: 吴艾祺; 宋飞; 闵瑶臻; 李绵绵

标题: Basic Characteristics and Evolution Mechanism of the Songjiayao Village Landslide in Qishan County

标题: 岐山县宋家尧村滑坡基本特征与演化机理分析

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作者关键词: Songjiayao village landslide; basic characteristics; evolution mechanism

作者关键词: 宋家尧村滑坡; 基本特征; 演化机理

摘要: In the field of landslide disaster prevention and control, its formation and evolution mechanism has been one of the hot issues. Previous scholars have not studied the Songjiayao Village landslide in Qishan County. This paper has analyzed the basic characteristics of the landslide, discussed its formation conditions, and finally analyzed the evolution mechanism of the landslide. The results show that the Songjiayao village landslide is located in the slope zone along the Northern Bank of Weihe River, which is formed on the basis of the revival of ancient landslides and consists of old landslides and new landslides. Both new and old landslides slide are developed along the ancient landslides, and the landslide body is mainly loess-like soil. The old landslides are caused by natural factors, while the new landslides are caused by the revival induced by human engineering activities, and these slides are formed by combined action of multifactor coupling. The basic characteristics and evolution mechanism of this landslide has a certain universality in the loess landslide along the Northern Bank of Weihe River, which can provide a certain reference value for the prevention design and early warning and prediction.

摘要: 在滑坡灾害防治研究方面,探讨其形成演化机理一直是热点问题之一。前人尚未对岐山县宋家尧村滑坡做过具体研究,笔者分析了该滑坡的基本特征,探讨了其形成条件,最后探讨了滑坡的演化机理。结果表明:宋家尧村滑坡处于渭河北岸斜坡带,在古滑坡复活的基础上形成,由老滑坡和新滑坡组成;新、老滑坡均沿古滑带滑动形成,滑坡体以黄土状土为主;老滑坡为自然诱发因素所致,而新滑坡由人类工程活动诱发复活所致,其滑动形成机理是多因素相互耦合综合作用的结果。此滑坡的基本特征与演化机理在渭河北岸地区的黄土滑坡中具有一定的普遍性,可为其防治设计和预警预报提供一定的参考价值。

入藏号: CSCD:6515839

地址: Wu Aiqi, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Song Fei, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Mianmian, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Min Yaozhen, Shaanxi Engineering Investigation and Research Institute Co.Ltd., Xi'an, Shaanxi 710054, China.

地址: 吴艾祺, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

宋飞, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李绵绵, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

闵瑶臻, 陕西工程勘察研究院有限公司, 西安, 陕西 710054, 中国.

电子邮件地址: 1448064296@qq.com

电子邮件地址: 1448064296@qq.com

使用次数 (最近 180 天): 0

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作者: Zhao Chaoying; Liu Xiaojie; Zhang Qin; Peng Jianbing; Xu Qiang

作者: 赵超英; 刘晓杰; 张勤; 彭建兵; 许强

标题: Research on Loess Landslide Identification, Monitoring and Failure Mode with InSAR Technique in Heifangtai, Gansu

标题: 甘肃黑方台黄土滑坡 InSAR 识别、监测与失稳模式研究

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作者关键词: Heifangtai; loess landslide; interferometric synthetic aperture radar(InSAR); landslide identification; deformation monitoring; failure mode

作者关键词: 黑方台; 黄土滑坡; 合成孔径雷达干涉测量; 滑坡识别; 形变监测; 失稳模式

摘要: The interferometric synthetic aperture radar(InSAR)technique is used over Heifangtai loess terrace,Gansu province of China to map the distribution of potential loess landslides,the evolution of landslide deformation and the failure mode.Firstly,the archived synthetic aperture radar (SAR)datasets with different spatial resolutions and wavelengths from December 2006to November 2017are used to identify the potential landslides.Tens potential landslide areas are identified from December 2006to March 2011and from January 2016to November 2016.Field investigation and optical remote sensing images validate the reliability and accuracy of the identified landslides.Then,the TerraSAR-X data with high spatial and temporal resolution are used to monitor the time series deformation of the typical unstable slopes.Results demonstrate that the landslides with the large accumulative deformation all occur in the following time,and the acceleration dates of failed landslides are successfully captured by InSAR time series results.Finally,two-dimensional deformation monitoring of loess landslide is conducted by combining with ascending and descending SAR datasets.The landslide failure mode are analyzed in depth according to the obtained two-dimensional deformation results,topographic map and remote sensing images.The accuracy of the obtained result is verified by field investigation.

摘要: 采用合成孔径雷达干涉测量(interferometric synthetic aperture radar,InSAR)技术对甘肃黑方台地区潜在的黄土滑坡开展了多时相编目、长时序监测以及失稳模式识别研究。首先,采用不同空间分辨率、不同波长的历史存档合成孔径雷达(synthetic aperture radar,SAR)数据

对黑方台地区 2006-12 至 2017-11 间的潜在滑坡开展了识别研究,在 2006-12 至 2011-03 和 2016-01 至 2016-11 两个时间段均识别出数 10 处不稳定坡体,实地调查和光学遥感影像验证了 InSAR 技术识别结果的可靠性与准确性。然后,对典型不稳定滑坡体采用高空间与高时间分辨率的 TerraSAR-X 数据开展了长时序监测,结果表明,在 InSAR 监测期间,累积形变最大的滑坡体在随后的时间里均发生了滑动,并成功地捕获到滑坡体形变加速的时间点。最后,利用升降轨 SAR 数据开展了黄土滑坡二维形变监测研究,基于滑坡的二维形变特征并结合地形图以及光学遥感影像进一步研究了滑坡的失稳模式,现场调查结果验证了所获得滑坡失稳模式的准确性。

入藏号: CSCD:6510905

地址: Zhao Chaoying, School of Geology Engineering and Geomatics,Changan University;;State Key Laboratory of Geo-information Engineering, ;;State Key Laboratory of Geo-information Engineering, Xian;;Xian, ;; 710054;;710054.

Zhang Qin, School of Geology Engineering and Geomatics,Changan University;;State Key Laboratory of Geo-information Engineering, ;;State Key Laboratory of Geo-information Engineering, Xian;;Xian, ;; 710054;;710054.

Liu Xiaojie, School of Geology Engineering and Geomatics,Changan University, Xian, 710054.

Peng Jianbing, School of Geology Engineering and Geomatics,Changan University, Xian, 710054.

Xu Qiang, Chengdu University of Technology, State Key Laboratory of Geohazard Prevention and Geoenvironment Protection, Chengdu, Sichuan 610059, China.

地址: 赵超英, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室, ;;地理信息工程国家重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

张勤, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室, ;;地理信息工程国家重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

刘晓杰, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

彭建兵, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

许强, 成都理工大学, 地质灾害与地质环境保护国家重点实验室, 成都, 四川 610059, 中国.

电子邮件地址: zhaochaoying@163.com

电子邮件地址: zhaochaoying@163.com

使用次数 (最近 180 天): 0

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作者: Wang Feiyong; Peng Jianbing; Lu Quanzhong; Huang Qiangbing; Meng Zhenjiang; Qiao Jianwei

作者: 王飞永; 彭建兵; 卢全中; 黄强兵; 孟振江; 乔建伟

标题: The study on the syngenetic mechanism of ground fissures: a case from the Weihe Basin

标题: 渭河盆地地裂缝同生机制研究

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作者关键词: 地裂缝; 渭河盆地; 同生机制; 同生特征

摘要: Weihe Basin is one of the areas where modern tectonic activity is very strong in China. Active faults crisscross and cut each other, and there are nearly 212 ground fissures. In order to summarize the syngenetic mechanism of ground fissures in the Weihe Basin, this paper studies and analyzes the syngenetic conditions and characteristics of ground fissures in the basin by means of surveying, mapping, trenching, drilling and geophysical prospecting. The main results are as follows: (1) The ground fissures in the Weihe Basin have obvious syngenetic conditions. They are in the same tectonic frame and are driven by the same tectonic stress system, thus forming a similar surface fracture system. (2) The syngenetic characteristics of ground fissures in the Weihe basin include the orientation of plane distribution, the similarity of section structure, the general correlation with faults and the synchronization of activity. (3) The syngenetic mechanism of ground fissures in the Weihe basin includes the uplift of upper mantle, the flow extending of middle and upper crust, the differential motion of fault blocks, and the stretching creep of faults. The ground fissures in the Weihe Basin are controlled by the above-mentioned tectonic dynamic mechanisms, which are interrelated, interdependent and inseparable. The study on the syngenetic mechanism of ground fissures in the Weihe basin is of great value to the macro understanding of the formation mechanism of ground fissures and it has great practical significance for regional disaster prevention and mitigation.

摘要: 渭河盆地是我国现代构造活动十分强烈的地区之一,活断层纵横交错、相互切割,发育地裂缝近 212 条。为了研究渭河盆地地裂缝的同生机制,通过地面调查、测绘、探槽、钻探和物探等地质勘探手段,分析渭河盆地地裂缝发育的同生条件和同生特征,总结提出该盆地地裂缝的同生机制。主要结果有:(1)渭河盆地地裂缝具有较为明显的同生条件,它们处于同一盆地构造框架内,受同一构造应力系统驱动,从而形成了相似的地表破裂系统;(2)渭河盆地地裂缝的同生特征有平面展布的方向性、剖面结构的相似性、与断裂的普遍关联性和活动时间的同步性;(3)渭河盆地地裂缝形成的同生机制包含了四个层次的内容,分别是上地幔隆升的穹拱机制、中上地壳流展的拉伸机制、断块差异运动的牵动机制和断裂伸展蠕滑的破裂机制。渭河盆地地裂缝破裂系统受控于上述的四个构造动力机制,它们之间相互联系,相互依托,密不可分。研究渭河盆地地裂缝的同生机制,对于地裂缝生成机理的宏观认识具有着重要的价值,对于地裂缝区域性的防灾减灾具有重大的现实意义。

入藏号: CSCD:6507210

地址: Wang Feiyong, Department of Geological Engineering, Chang'an University;; Key Laboratory of Western China Mineral Resources and Geological Engineering, Ministry of Education of the Peoples's Republic of China, ;; Key Laboratory of Western China Mineral Resources and Geological Engineering, Ministry of Education of the Peoples's Republic of China, Xi'an;; Xi'an, ;; 710054;; 710054.

Peng Jianbing, Department of Geological Engineering,Chang'an University;;Key Laboratory of Western China Mineral Resources and Geological Engineering,Ministry of Education of the Peoples's Republic of China, ;;Key Laboratory of Western China Mineral Resources and Geological Engineering,Ministry of Education of the Peoples's Republic of China, Xi'an;;Xi'an, ;; 710054;;710054.

Lu Quanzhong, Department of Geological Engineering,Chang'an University;;Key Laboratory of Western China Mineral Resources and Geological Engineering,Ministry of Education of the Peoples's Republic of China, ;;Key Laboratory of Western China Mineral Resources and Geological Engineering,Ministry of Education of the Peoples's Republic of China, Xi'an;;Xi'an, ;; 710054;;710054.

Huang Qiangbing, Department of Geological Engineering,Chang'an University;;Key Laboratory of Western China Mineral Resources and Geological Engineering,Ministry of Education of the Peoples's Republic of China, ;;Key Laboratory of Western China Mineral Resources and Geological Engineering,Ministry of Education of the Peoples's Republic of China, Xi'an;;Xi'an, ;; 710054;;710054.

Meng Zhenjiang, Department of Geological Engineering,Chang'an University;;Key Laboratory of Western China Mineral Resources and Geological Engineering,Ministry of Education of the Peoples's Republic of China, ;;Key Laboratory of Western China Mineral Resources and Geological Engineering,Ministry of Education of the Peoples's Republic of China, Xi'an;;Xi'an, ;; 710054;;710054.

Qiao Jianwei, China JK Institute of Engineering and Design;;Shaanxi Key Laboratory for the Property and Treatment of Special Soil and Rock, ;;Shaanxi Key Laboratory for the Property and Treatment of Special Soil and Rock, Xi'an;;Xi'an, ;; 710043;;710043.

地址: 王飞永, 长安大学地质工程与测绘学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, ;; 710054;;710054.

彭建兵, 长安大学地质工程与测绘学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, ;; 710054;;710054.

卢全中, 长安大学地质工程与测绘学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, ;; 710054;;710054.

黄强兵, 长安大学地质工程与测绘学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, ;; 710054;;710054.

孟振江, 长安大学地质工程与测绘学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, ;; 710054;;710054.

乔建伟, 机械工业勘察设计研究院有限公司;;陕西省特殊岩土性质与处理重点实验室, ;;陕西省特殊岩土性质与处理重点实验室, 西安;;西安, ;; 710043;;710043.

电子邮件地址: dicexy_1@126.com

电子邮件地址: dicexy_1@126.com

使用次数 (最近 180 天): 0

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作者: Guo Tiansong; Zhang Juqing; Han Yu; Zhong Yanling; Tan Jinrong; Wei Jiancheng

作者: 郭天颂; 张菊清; 韩煜; 钟炎伶; 谭锦蓉; 韦建成

标题: Evaluation of Landslide Susceptibility in Yanchang County Based on Particle Swarm Optimization-Based Support Vector Machine

标题: 基于粒子群优化支持向量机的延长县滑坡易发性评价

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作者关键词: landslide; slope unit; particle swarm optimization; support vector machine; susceptibility evaluation

作者关键词: 滑坡; 斜坡单元; 粒子群算法; 支持向量机; 易发性评价

摘要: The parameter optimization directly affects the prediction accuracy and generalization of SVM. The particle swarm optimization algorithm has global optimal search ability. Therefore, optimizing the support vector machine parameters by particle swarm optimization can effectively improve the prediction accuracy. Based on the historical landslide data of Yanchang County, this paper explores and analyzes the hazard factors of landslides, and uses ArcGIS platform to extract and analyze the relationship between lithology, landform, loess thickness, slope, slope direction, slope height and landslide distribution, and to use landslide density to normalize each qualitative or quantitative factor. On the basis of this, the PSOSVM algorithm was used to evaluate the susceptibility of Yanchang County landslide through the area 16 300 divided by the slope unit as the evaluation unit. From the perspective of landslide density index, the number of historical landslides in the high-prone and ultra-high-prone areas account for 72.19%, validated by landslide percentage (LAR) and other indicators. Both show good susceptibility evaluation results.

摘要: 参数优化问题直接影响着支持向量机的预测精度和泛化能力, 粒子群优化算法具有全局最优搜索能力, 因此通过粒子群算法优化支持向量机参数可以有效提高预测精度。以延长县历史滑坡数据为基础, 分析了岩性、地貌类型、土壤厚度、坡度、坡向、坡高与滑坡分布的关系, 并利用滑坡密度值对各定性或定量因子进行了归一化处理; 在此基础上, 通过区域内所划分的 16 300 个斜坡单元作为评价单元, 采用粒子群优化支持向量机 (PSO-SVM) 算法完成了延长县滑坡的易发性评价。从滑坡密度指标角度来看, 评价结果中高易发区和极高易发区的历史滑坡数占比 72.19%, 通过滑坡面积百分比 (LAR) 等指标进行了有效的验证, 均显示出对滑坡易发性评价效果良好。

入藏号: CSCD:6504625

地址: Guo Tiansong, School of Geological Engineering and Geomatics, Chang'an University, ; Chang'an University, ; State Key Laboratory of Geographic Information Engineering,

Xi'an;;Xi'an, ;; 710054;;710054.

Zhang Juqing, School of Geological Engineering and Geomatics,Chang'an University;;Chang'an University, ;;State Key Laboratory of Geographic Information Engineering, Xi'an;;Xi'an, ;; 710054;;710054.

Han Yu, School of Geological Engineering and Geomatics,Chang'an University;;Chang'an University, ;;State Key Laboratory of Geographic Information Engineering, Xi'an;;Xi'an, ;; 710054;;710054.

Zhong Yanling, School of Geological Engineering and Geomatics,Chang'an University;;Chang'an University, ;;State Key Laboratory of Geographic Information Engineering, Xi'an;;Xi'an, ;; 710054;;710054.

Tan Jinrong, School of Geological Engineering and Geomatics,Chang'an University;;Chang'an University, ;;State Key Laboratory of Geographic Information Engineering, Xi'an;;Xi'an, ;; 710054;;710054.

Wei Jiancheng, School of Geological Engineering and Geomatics,Chang'an University;;Chang'an University, ;;State Key Laboratory of Geographic Information Engineering, Xi'an;;Xi'an, ;; 710054;;710054.

地址: 郭天颂, 长安大学地质工程与测绘学院;;长安大学, ;;地理信息工程国家重点实验室, 西安;;西安, ;; 710054;;710054.

张菊清, 长安大学地质工程与测绘学院;;长安大学, ;;地理信息工程国家重点实验室, 西安;;西安, ;; 710054;;710054.

韩煜, 长安大学地质工程与测绘学院;;长安大学, ;;地理信息工程国家重点实验室, 西安;;西安, ;; 710054;;710054.

钟炎伶, 长安大学地质工程与测绘学院;;长安大学, ;;地理信息工程国家重点实验室, 西安;;西安, ;; 710054;;710054.

谭锦蓉, 长安大学地质工程与测绘学院;;长安大学, ;;地理信息工程国家重点实验室, 西安;;西安, ;; 710054;;710054.

韦建成, 长安大学地质工程与测绘学院;;长安大学, ;;地理信息工程国家重点实验室, 西安;;西安, ;; 710054;;710054.

电子邮件地址: 1945272262@qq.com; 932944389@qq.com

电子邮件地址: 1945272262@qq.com; 932944389@qq.com

使用次数 (最近 180 天): 0

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作者: Jiang Gang; Li Ju; Chen Meng; Zhou Jiawei

作者: 姜刚; 李举; 陈盟; 周佳薇

标题: Prediction of settlement and deformation of underground based on gray-distributed wavelet neural network model

标题: 灰色-小波神经网络支持下对地铁工程沉降变形的预测

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作者关键词: deformation monitoring; GM(1,1) gray model; wavelet neural network; deformation prediction; subway settlement

作者关键词: 变形监测; GM(1,1)灰色模型; 小波神经网络; 变形预测; 地铁沉降

摘要: Deformation monitoring is an important part of the safety engineering construction and management, and it runs through the design, construction and operation of the project. It is of great practical significance to process the monitored settlement data, predict the settlement amount, and make early warning of the safety of the project. Based on the GM (1,1) grey model, wavelet analysis and neural network combination of related theories, using Matlab programming, this paper establishes a gray-wavelet neural network deformation prediction network model. Combined with engineering examples, the established deformation prediction network model is applied to the accumulated settlement observation data. The results show that the combined model has a very stable forecasting effect and is more accurate than the single GM(1,1) gray model. The more training samples, the better the fitting effect and the prediction is more in line with the actual situation.

摘要: 变形监测是安全化工程施工和管理的重要内容,贯穿于项目的设计、施工和运行,对监测的沉降数据进行处理,并预测沉降量,提前对工程作出安全预警,有很重要的实际意义。本文基于 GM(1,1)灰色模型、小波分析和神经网络结合的相关理论,借助 Matlab 软件编程,建立了灰色-小波神经网络变形预测网络模型。结合工程实例,将建立的变形预测网络模型应用于累积沉降量观测数据,结果表明组合模型具有很稳定的预测效果,比单独的 GM(1,1)灰色模型预测准确度高,且训练样本越多,预测越符合实际情况。

入藏号: CSCD:6498857

地址: Jiang Gang, Institute of geological engineering and surveying, Chang'an University;; Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, ;; Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;; Xi'an, ;; 710064;; 710064.

Li Ju, Institute of geological engineering and surveying, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Meng, Institute of geological engineering and surveying, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhou Jiawei, College of Geomatics, Xi'an University of Science and Technology, Xi'an, Shaanxi 710054, China.

地址: 姜刚, 长安大学地质工程与测绘学院;; 西部矿产资源与地质工程教育部重点实验室, ;; 西部矿产资源与地质工程教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710064;; 710064, 中国.

李举, 长安大学地质工程与测绘学院, 西安, 陕西 710064, 中国.

陈盟, 长安大学地质工程与测绘学院, 西安, 陕西 710064, 中国.

周佳薇, 西安科技大学测绘科学与技术学院, 西安, 陕西 710054, 中国.

电子邮件地址: 479189336@qq.com

电子邮件地址: 479189336@qq.com

使用次数 (最近 180 天): 1

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作者: Wei Jiancheng; Xiao Yun; Wang Li; Meng Ning; Zou Jiasheng

作者: 韦建成; 肖云; 王利; 孟宁; 邹嘉盛

标题: An optimized intersection algorithm of airborne gravity survey

标题: 一种优化的航空重力测量测线交叉点算法

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作者关键词: intersection discrepancy; determinant method; projection method; area method; sliding window solve method

作者关键词: 交叉点不符值; 行列式法; 投影法; 面积法; 滑动窗口求解法

摘要: Aiming at the shortcomings such as slow search speed, low correct rate and poor applicability of the conventional search methods in airborne gravity measurement data processing, a sliding window solve method was proposed that the main line point was regarded as the search center, the main and sub line points were searched in a certain size of search box, the adjacent measuring points detected in the main and auxiliary lines formed a line segment, and the intersection and discrepancy were determined using the determinant method, projection method and area method. Through practical examples, the sliding window solve method was discussed and analyzed from the aspects of search time and accuracy. The results showed that the proposed method was simple and efficient, where the searching efficiency of crosspoint was improved and the workload was reduced significantly.

摘要: 针对目前航空重力测量数据处理中常规搜索方法存在搜索速度慢、正确率低、适用范围窄的不足, 该文提出一种滑动窗口求解法。该方法以主测线点为搜索中心, 采用一定大小的搜索半径对主副测线点进行搜索, 将搜索到的主副测线上相邻两点组成线段序列, 运用行列式法、投影法、面积法 3 种判断准则精确求取交叉点及不符值。通过实际算例, 从搜索时间和

正确率两方面对滑动窗口求解算法进行了讨论分析。结果表明,该文所提方法简单有效,能明显提高测线交叉点搜索效率,减少工作量。

入藏号: CSCD:6492363

地址: Wei Jiancheng, School of Geology Engineering and Geomatics, Chang'an University;; State Key Laboratory of Geo-information Engineering;; National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, ;; State Key Laboratory of Geo-information Engineering;; National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, Xi'an;; Xi'an;; Xi'an, ;;; 710054;; 710054;; 710054.

Wang Li, School of Geology Engineering and Geomatics, Chang'an University;; State Key Laboratory of Geo-information Engineering;; National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, ;; State Key Laboratory of Geo-information Engineering;; National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, Xi'an;; Xi'an;; Xi'an, ;;; 710054;; 710054;; 710054.

Xiao Yun, State Key Laboratory of Geo-information Engineering;; Xi'an Research Institute of Surveying and Mapping, State Key Laboratory of Geo-information Engineering;; Xi'an;; Xi'an, ;; 710054;; 710054.

Meng Ning, School of Geology Engineering and Geomatics, Chang'an University;; State Key Laboratory of Geo-information Engineering, ;; State Key Laboratory of Geo-information Engineering, Xi'an;; Xi'an, ;; 710054;; 710054.

Zou Jiasheng, School of Geology Engineering and Geomatics, Chang'an University;; State Key Laboratory of Geo-information Engineering, ;; State Key Laboratory of Geo-information Engineering, Xi'an;; Xi'an, ;; 710054;; 710054.

地址: 韦建成, 长安大学地质工程与测绘学院;; 地理信息工程国家重点实验室;; 地理国情监测国家测绘地理信息局工程技术研究中心, ;; 地理信息工程国家重点实验室;; 地理国情监测国家测绘地理信息局工程技术研究中心, 西安;; 西安;; 西安, ;;; 710054;; 710054;; 710054.

王利, 长安大学地质工程与测绘学院;; 地理信息工程国家重点实验室;; 地理国情监测国家测绘地理信息局工程技术研究中心, ;; 地理信息工程国家重点实验室;; 地理国情监测国家测绘地理信息局工程技术研究中心, 西安;; 西安;; 西安, ;;; 710054;; 710054;; 710054.

肖云, 地理信息工程国家重点实验室;; 西安测绘研究所, 地理信息工程国家重点实验室;; 西安;; 西安, ;; 710054;; 710054.

孟宁, 长安大学地质工程与测绘学院;; 地理信息工程国家重点实验室, ;; 地理信息工程国家重点实验室, 西安;; 西安, ;; 710054;; 710054.

邹嘉盛, 长安大学地质工程与测绘学院;; 地理信息工程国家重点实验室, ;; 地理信息工程国家重点实验室, 西安;; 西安, ;; 710054;; 710054.

电子邮件地址: 1205834766@qq.com; powaterssg@163.com

电子邮件地址: 1205834766@qq.com; powaterssg@163.com

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作者: Zhu Wenfeng; Zhao Chaoying; Zhang Qin; Kang Ya

作者: 朱文峰; 赵超英; 张勤; 康亚

标题: Identification and monitoring of Heifangtai loess landslide with InSAR

标题: 利用 InSAR 识别与监测黑方台黄土滑坡

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作者关键词: Heifangtai; InSAR; loess landslide; landslide investigation; monitoring

作者关键词: 黑方台; 合成孔径雷达干涉测量; 黄土滑坡; 滑坡调查; 监测

摘要: Landslide in the Heifangtai area of Yongjing County, Gansu Province, had been posed a serious threat to the safety of the people and property of local residents. TerraSAR data, two resolution DEM data including three-meter UAV DEM and thirty-meter SRTM DEM were chosen to analyze the surface deformation in Heifangtai area, finally 14 unstable landslides were identified from stacking InSAR and time-series deformation results over one typical landslide were retrieved by using SBAS-InSAR technology based on ascending and descending TerraSAR data. The results from InSAR were projected to the landslide direction and compared with the existing GPS results. The maximum difference was 6mm, and the maximum root mean square error (RMSE) was 3mm. The conclusion showed that InSAR technology was convenient and reliable for identifying and monitoring loess landslides, and had high precision.

摘要: 针对甘肃永靖县的黑方台地区滑坡不断对当地居民人身及财产安全构成重大威胁的现状, 该文选取高分辨率的升降轨 TerraSAR 数据、3m 分辨率的 DEM 数据和 30m 分辨率的 SRTM DEM 数据, 利用 InSAR 技术对该地区的地表形变进行监测, 主要结果如下: 用 Stacking 技术获取了黑方台的形变速率图, 识别出 14 处不稳定滑坡体; 用 SBAS-InSAR 技术对典型滑坡体进行时间序列监测, 将 InSAR 结果投影到滑坡方向与已有的 GPS 结果进行比较, 最大较差为 6mm, 最大中误差为 3mm。结果表明, InSAR 技术用来识别与监测黄土滑坡方便可靠, 并且精度较高。

入藏号: CSCD:6492370

地址: Zhu Wenfeng, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Kang Ya, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhao Chaoying, School of Geology Engineering and Geomatics, Chang'an University;; National Administration of Surveying, Mapping and Geoinformation, Engineering Research Center of National Geographic Conditions Monitoring, ;; National Administration of Surveying, Mapping

and Geoinformation,Engineering Research Center of National Geographic Conditions Monitoring, Xi'an;;Xi'an, ;; 710054;;710054.

Zhang Qin, School of Geology Engineering and Geomatics,Chang'an University;;Key Laboratory of Western Mineral Resources and Geological Engineering,Ministry of Education, ;;Key Laboratory of Western Mineral Resources and Geological Engineering,Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

地址: 朱文峰, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

康亚, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

赵超英, 长安大学地质工程与测绘学院;;地理国情监测国家测绘地理信息局工程技术研究中心, ;;地理国情监测国家测绘地理信息局工程技术研究中心, 西安;;西安, ;; 710054;;710054.

张勤, 长安大学地质工程与测绘学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, ;; 710054;;710054.

电子邮件地址: wenfeng_zhu@163.com; zhaochaoying@163.com

电子邮件地址: wenfeng_zhu@163.com; zhaochaoying@163.com

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作者: Guo Jian; Shen Wei; Li Tonglu; Shen Yueqiang; Lei Yulu

作者: 郭剑; 沈伟; 李同录; 沈月强; 雷雨露

标题: Establishment of dynamic model of a flow-like landslide-induced surge

标题: 一种流动性滑坡涌浪动力学模型

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作者关键词: landslide-induced surge; flow-like landslides; numerical simulation; finite difference method

作者关键词: 滑坡涌浪; 流动性滑坡; 数值模拟; 有限差分法

摘要: Landslide-induced surge is a kind of secondary disasters triggered by waterside landslides. Generally, the endangering range in a landslide-induced surge far exceeds the motion area of the landslide, and accurately predicting spatial evolution of landslide-induced surge is of significant importance for disaster prevention. However, the existing models usually simplify landslides as rigid bodies, which is obviously against the fact that many landslides propagate in a

flow-like way. Therefore, a numerical model was put forward in this paper to provide more reliable prediction results for landslide-induced surges. By treating slip masses as flow-like materials, the governing equations of landslide-water coupling motion were derived. Next, the governing equations were solved by the finite difference method, and the dynamic model that can simulate the evolutionary process of flow-like landslide-induced surge was established. Finally, the evolutionary process of Gongjiafang landslide located at the Three Gorges of the Yangtze River was simulated by the model and the simulated maximum wave heights in the longitudinal section (i.e., the flow direction) of the river were compared with the measured data. Results show that the maximum wave height in this section appears in the main sliding direction of the landslide, and the maximum wave heights on both two sides decrease quickly. The simulated results agree well with the measured values. The established model can provide more adequate prediction of the influence range of landslide-induced surge.

摘要: 滑坡涌浪是入水滑坡引起的一种次生灾害,其致灾范围远大于滑坡的运动区域,准确预测其演化过程是防治这类灾害的关键。现有预测模型多将滑体简化为刚体,而实际滑坡多表现出流态运动的特征。为更合理地描述滑体和涌浪的耦合运动,将滑体视为流态物质,在此基础上推导了滑坡与水体耦合运动的控制方程,利用有限差分法对控制方程求解,建立了一种可模拟流动性滑坡涌浪演化过程的动力学模型。使用该模型对三峡库区的龚家方滑坡涌浪的演化过程进行模拟,将模拟所得河道纵截面处的最大浪高值与实测值进行对比,结果表明最大浪高值出现在滑坡的主滑动方向,且最大浪高沿纵截面两侧快速衰减,模拟结果与实测吻合。

入藏号: CSCD:6490457

地址: Shen Wei, University of Bologna, Department of Biological, Geological and Environmental Science, Bologna, Emilia-Romagna 40121, Italy.

Guo Jian, Chang'an University, Department of Geological Engineering, Xi'an, Shaanxi 710054, China.

Li Tonglu, Chang'an University, Department of Geological Engineering, Xi'an, Shaanxi 710054, China.

Shen Yueqiang, Chang'an University, Department of Geological Engineering, Xi'an, Shaanxi 710054, China.

Lei Yulu, Chang'an University, Department of Geological Engineering, Xi'an, Shaanxi 710054, China.

地址: 郭剑, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李同录, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

沈月强, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

雷雨露, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

沈伟, University of Bologna, Department of Biological, Geological and Environmental Science, Bologna, Emilia-Romagna 40121, Italy.

电子邮件地址: chdguojian@163.com; dcdgx08@chd.edu.cn

电子邮件地址: chdguojian@163.com; dcdgx08@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Nie Yongpeng; Ni Wankui; Liu Kui; Zhao Yang; Li Kang

作者: 聂永鹏; 倪万魁; 刘魁; 赵阳; 李康

标题: Damage mechanism of buildings on an old landslide in Yan'an City

标题: 陕西延安某老滑坡场地上建筑物破坏机理分析

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作者关键词: old landslide; building; failure mechanism; numerical simulation

作者关键词: 老滑坡; 建筑物; 变形破坏机理; 数值模拟

摘要: Land resources is scarce in the north of Shaanxi Province. Due to the increase of urban population and the urbanization, it is a trend to construct buildings and structures on the old landslides in order to furthest utilize land resources. However, the landslides may cause the damage of the buildings and structures, and threaten the safety of people's lives and property. This paper studied on the deformation and failure mechanism of buildings based on the investigation of the deformation damage phenomenon on an old landslide in Yan'an city. The stress and deformation of the old landslide and foundation soil under the additional load of the building were analyzed by the FLAC3D numerical simulation method in order to obtain the stability of the old landslide and the deformation mechanism of the buildings. The results revealed that the old landslide is basically stable when the buildings were built. The cracks in the buildings is caused by the differential settlement of the foundation on the old landslide. In addition, the reasons for the walls of the buildings moving forward are due to the additional load of the back buildings on the old landslide.

摘要: 陕北地区土地资源匮乏。随着城市人口数量增加及城镇化进程的加快,在老滑坡上修建各种建筑物与构筑物以求合理利用土地资源已成趋势,但此举导致的建筑物与构筑物的变形破坏现象,对人民生命与财产安全造成重大威胁。本文针对延安某处大型老滑坡体上民用建筑群墙面开裂及墙体前鼓病害,在现场调查基础上,开展建筑物变形破坏机理分析;采用FLAC3D数值模拟方法,分析了在建筑物附加荷载下老滑坡以及地基土体的应力应变发展规律,揭示了建筑加载下老滑坡稳定性的变化趋势和建筑物变形破坏机理。研究结果表明,修建建筑物后老滑坡基本处于稳定状态,并未发生整体复活现象;老滑坡场地上的不均匀地基在建筑物附加荷载下产生较大差异沉降是造成建筑物墙面出现裂缝的主要原因;老滑坡场地内第四级台阶的加载变形引起了临近台阶边缘建筑物的墙体前鼓。

入藏号: CSCD:6485172

地址: Nie Yongpeng, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Ni Wankui, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhao Yang, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Kang, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Liu Kui, Research Institute of Electronic Comprehensive Survey of the Ministry of Information Industry, Xi'an, Shaanxi 710054, China.

地址: 聂永鹏, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

倪万魁, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

赵阳, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李康, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

刘魁, 信息产业部电子综合勘察研究院, 西安, 陕西 710054, 中国.

电子邮件地址: nieyongpeng1994@163.com; nnwwkk@126.com

电子邮件地址: nieyongpeng1994@163.com; nnwwkk@126.com

使用次数 (最近 180 天): 0

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作者: Yu Wencai; Yang Yalei; Lu Quanzhong; Han Wenqing

作者: 于文才; 杨亚磊; 卢全中; 韩文卿

标题: Comparative study on physical model test of concealed ground fissure rupture propagation under different activity rates

标题: 不同活动速率下隐伏地裂缝的模型试验研究

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文献类型: Article

作者关键词: ground fissure; rupture propagation; activity rate; physical model test

作者关键词: 地裂缝; 破裂扩展; 活动速率; 物理模型试验

摘要: At present, most of the identified ground fissures at home and abroad are those that can be seen directly on the surface. However, the number of hidden ground fissures buried under the surface which are not easily detected by human beings is more numerous, and the hidden ground

fissures may cause different degrees of geological disasters due to different rates of activity,thus affecting human engineering construction activities in varying degrees. In order to study the development characteristics of buried ground fissures with different activity rates,a set of physical model contrast experiments were carried out. The results show that when the buried ground fissures move at different rates,the morphological characteristics of the anti-dip fissures and vertical fissures,the displacement of the surface soil and the absorption of the deep subsidence of the soil are obviously different. In addition,when the buried ground fissures move slowly during a period of activity,the displacement of the surface soil will appear three typical stable stages with the movement of the deep floor.

摘要: 目前国内外已查明的地裂缝大都是在地表能直接看到的地裂缝,然而埋藏在地表之下不易被人类所察觉的隐伏地裂缝发育数量更为众多,并且隐伏地裂缝因活动速率的不同可能招致不同程度的地质灾害,进而不同程度地影响人类的工程建设活动。为了研究活动速率不一样的隐伏地裂缝之间有什么发育特征上的不同,进行一组物理模型对比试验。结果显示当隐伏地裂缝以不同速率活动时,其所形成的反倾裂缝和直立裂缝的形态特征、地表土体位错量以及土体对深部沉降的吸收作用均有明显的不同。并且当隐伏地裂缝慢速活动的一个活动周期内,其地表土体位错量随深部底板的的活动过程会出现典型的三次稳定阶段。

入藏号: CSCD:6485179

地址: Yu Wencai, School of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Yang Yalei, School of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Han Wenqing, School of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Lu Quanzhong, School of Geological Engineering and Geomatics,Chang'an University;;;;Key Laboratory of Western Mineral Resources and Geological Engineering,Ministry of Education of China, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

地址: 于文才, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

杨亚磊, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

韩文卿, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

卢全中, 长安大学地质工程与测绘学院;;长安大学, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: 2016126089@chd.edu.cn; lqz_19711@163.com

电子邮件地址: 2016126089@chd.edu.cn; lqz_19711@163.com

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作者: Yan Hao; Song Yanhui; Chen Ziyu; Shi Shucheng; Rong Juan

作者: 严豪; 宋彦辉; 陈子玉; 师述橙; 戎娟

标题: Estimation of structure surface roughness coefficient JRC based on multivariate fitting equation

标题: 基于多元拟合方程的结构面粗糙度系数 JRC 估算

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作者关键词: rock mass structure surface; shear strength; joint roughness coefficient; analytical equation

作者关键词: 岩体结构面; 抗剪强度; 节理粗糙度系数; 解析方程

摘要: This paper takes the standard roughness profile of Barton as the research object. Assuming the shear direction is from left to right, the length of the profile curve (L), the dip angle (α) of the climb slope and high difference (hi) correspond to the dip angle, the area (S) were measured. By combining different factors, MATLAB was used to fit the data and acquire analytic equation, the equation was then used to estimate the roughness coefficient of the structural plane, which is not depends on the length of the structure. The results show that ratio of the length of the profile curve and area ratio combination of fitting equation is poorer; ratio of the length of the profile curve, area ratio and high difference combination equation is better; ratio of the length of the profile curve, dip angle and high difference, the combination of the three indicators of the fitting equation is best, can well reflect the structure surface roughness, the fitting degree is 97.1%.

摘要: 本文以 BARTON 的标准粗糙度剖面为研究对象, 假定剪切方向为从左向右, 量取剖面曲线长 L 以及爬坡时的倾角 α 和与倾角相对应高差 hi、面积 S, 把不同的因素组合在一起, 用 MATLAB 对测得的数据进行拟合, 得到用来估算结构面粗糙度系数且不依赖于结构面长度的解析方程。结果表明: 剖面长度比和面积比组合得到的拟合方程较差, 剖面长度比、面积比和爬坡高组合得到的方程较好; 剖面长度比、倾角 α 和高差 hi 三个指标的组合拟合方程最好, 可很好地反映结构面粗糙度, 拟合优度达 97.1%。

入藏号: CSCD:6485181

地址: Yan Hao, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Chen Ziyu, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Shi Shucheng, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Rong Juan, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Song Yanhui, College of Geology Engineering and Geomatics, Chang'an University;; Key Laboratory of Western Mineral Resources and Geological Engineering Ministry of Education, ;; Key Laboratory of Western Mineral Resources and Geological Engineering Ministry

of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

地址: 严豪, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

陈子玉, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

师述橙, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

戎娟, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

宋彦辉, 长安大学地质工程与测绘学院;;西部矿产资源与地质工程教育部重点实验室,;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: 2274774219@qq.com

电子邮件地址: 2274774219@qq.com

使用次数 (最近 180 天): 0

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作者: Zhai Dongliang; Ma Penghui

作者: 翟栋梁; 马鹏辉

标题: Analysis on residual strength of typical loess: A case study at South Jingyang platform

标题: 典型黄土残余强度变化规律分析以陕西泾阳南塬黄土为例

来源出版物: 中国地质灾害与防治学报 卷: 30 期: 2 页: 120-127 出版年: 2019

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文献类型: Article

作者关键词: unsaturated loess; residual strength; shear rate; normal stress; water content

作者关键词: 非饱和黄土; 残余强度; 剪切速率; 法向应力; 含水率

摘要: Since the water diversion in 1976,the loess landslide in South Jingyang platform,Shaanxi Province has occurred frequently,and it has become a typical high-incidence area of loess landslide in Shaanxi. The test results show that: (1) at a certain shear rate (0. 1 ~ 10 mm·min⁻¹),the shear rate has a great influence on the final stable residual strength of the sample at the same moisture content. Small,its intensity varies between 1% and 5%. (2) The value of residual strength has a significant linear relationship with the normal stress and increases with the increase of the current normal stress. (3) Under the same normal stress,the residual strength decreases with increasing water content. The residual cohesive force increases first and then decreases with the increase of water content,and the residual internal friction angle decreases with the increase of water content. It is hoped that these conclusions can provide a scientific reference for the study of the South Jingyang platform landslide.

摘要: 自1976年引水灌溉以来,陕西泾阳南塬黄土滑坡频繁发生,已经成为了陕西典型的黄土滑坡高发区。本文利用环剪仪对不同剪切速率、法向应力和含水率下的研究区重塑黄土强度特性进行了研究。试验结果表明:(1)在一定剪切速率下(0.1~10 mm·min⁻¹),对于在同一含水率的试样而言,剪切速率对其最终稳定残余强度影响很小,其强度变化范围在1%~5%。(2)残余强度的取值与法向应力呈明显的线性关系,并随当前法向应力的增加而增大。(3)相同法向应力下,残余强度随含水率的增大而减小。其残余黏聚力随含水率的增大先增加后减小,残余内摩擦角随含水率的增大而减小。希望这些结论可以为泾阳南塬滑坡的研究提供科学参考。

入藏号: CSCD:6485182

地址: Zhai Dongliang, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi, 710054, China; Key Laboratory of Western China's Mineral Resources and Geological Engineering, Xi'an, Shaanxi, 710054, China.

Ma Penghui, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi, 710054, China; Key Laboratory of Western China's Mineral Resources and Geological Engineering, Xi'an, Shaanxi, 710054, China.

地址: 翟栋梁, 长安大学地质工程系, 长安大学, 西部矿产资源与地质工程教育部重点实验室, 西安, 陕西, 710054, 中国。

马鹏辉, 长安大学地质工程系, 长安大学, 西部矿产资源与地质工程教育部重点实验室, 西安, 陕西, 710054, 中国。

电子邮件地址: 247763193@qq.com; spawnkobe@163.com

电子邮件地址: 247763193@qq.com; spawnkobe@163.com

使用次数 (最近 180 天): 0

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作者: Zhu Fengji; Nan Jingjing; Wei Yingqi; Bai Lan

作者: 朱凤基; 南静静; 魏颖琪; 白兰

标题: Mathematical statistical analysis on factors affecting collapsible coefficient of loess

标题: 黄土湿陷系数影响因素的相关性分析

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作者关键词: loess collapsibility; collapse coefficient; factor analysis method; correlation

作者关键词: 黄土湿陷; 湿陷系数; 因子分析法; 相关性

摘要: Collapsibility is an important engineering property of loess, and collapse coefficient is an important index for evaluating the collapsibility of loess. In this paper, mathematical statistics method is used to establish their internal relationship various factors influencing the collapse coefficient of loess. The collapsibility of loess is influenced by many factors, and these factors are not completely independent. Therefore, based on the overall selection of indexes, factor analysis theory is applied to analyze porosity ratio, dry density, initial moisture content, saturation, plastic limit, liquid limit, plasticity index and compression modulus to eliminate the influence of collinearity on fitting. These eight indexes are divided into four classes, and one factor that has the greatest correlation with the coefficient of collapsibility is selected to participate in the linear regression analysis from each class, and the linear regression equation of the loess collapse coefficient and the influencing factors is established. Finally, the accuracy of the model is verified by the test data from a well in this region. It turns out that the predicted results of collapse coefficient are close to the test data, which has a certain practical and reference value for predicting the loess collapsible coefficient and evaluating the loess collapsibility quickly and accurately.

摘要: 湿陷性是黄土重要的工程性质, 而湿陷系数则是评价黄土湿陷等级的重要指标, 本文从工程地质角度学出发分析了各土性指标对湿陷系数的影响, 利用数理统计方法建立其内在关系。由于黄土湿陷是众多影响因子共同作用下造成的, 且各因素之间并非是完全独立, 基于全面选取指标的考虑, 采用因子分析理论对孔隙比、干密度、初始含水率、饱和度、塑限、液限、塑性指数、压缩模量八个常见指标进行分析, 消除共线性对拟合的影响。将八个指标分为四大类, 并从每一大类中选取一个与湿陷系数相关程度最大的因子进行线性回归分析, 建立黄土湿陷系数与各影响因子的回归方程。最后, 利用甘肃庆阳地区一探井实测数据验证该模型的精确度, 结果显示湿陷系数预测结果与实测结果较为接近, 对快速、准确预测黄土湿陷系数和评价黄土地区场地湿陷等级具有一定的工程实践和参考价值。

入藏号: CSCD:6485183

地址: Zhu Fengji, College of Geology Engineering and Geomatics, Department of Geology Engineering Chang'an University, Xi'an, Shaanxi 710054, China.

Nan Jingjing, College of Geology Engineering and Geomatics, Department of Geology Engineering Chang'an University, Xi'an, Shaanxi 710054, China.

Wei Yingqi, Xi'an Changqing Technology Engineering Co., Ltd, Xi'an, Shaanxi 710018, China.

Bai Lan, Xi'an Changqing Technology Engineering Co., Ltd, Xi'an, Shaanxi 710018, China.

地址: 朱凤基, 长安大学地质工程与测绘学院地质工程系, 西安, 陕西 710054, 中国.

南静静, 长安大学地质工程与测绘学院地质工程系, 西安, 陕西 710054, 中国.

魏颖琪, 西安长庆科技工程有限责任公司, 西安, 陕西 710018, 中国.

白兰, 西安长庆科技工程有限责任公司, 西安, 陕西 710018, 中国.

电子邮件地址: 415798947@qq.com

电子邮件地址: 415798947@qq.com

使用次数 (最近 180 天): 0

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作者: Fan Yanan; Li Xiu; Qi Zhipeng; Sun Dali

作者: 樊亚楠; 李貅; 戚志鹏; 孙大利

标题: Study on Born approximation algorithm of TEM pseudo wave-field

标题: 瞬变电磁虚拟波场 Born 近似算法研究

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作者关键词: Transient Electromagnet (TEM); Pseudo wave-field; Born approximation algorithm

作者关键词: 瞬变电磁; 虚拟波场; Born 近似算法

摘要: According to the mathematical relation between the diffusion equation satisfied by the transient electromagnetic field and the wave equation satisfied by the wave field, the technology of sweep time and correlation superposition is introduced to obtain the stable pseudo wave-field. Based on the pseudo wavefield, the technique of Born approximate inverse scattering in seismic exploration is used to image the electrical interface. In the theoretical derivation, the expression of velocity perturbation of scattering field is obtained by Green's theorem and Green function of uniform half-space. In the process of numerical solution, the first class of Fredholm integral equation is solved by singular value decomposition. Through the calculation of the theoretical model and practical application, it is shown that the Born approximation algorithm of Transient Electromagnet (TEM) pseudo wave-field has a good resolution capability for the underground electrical interface.

摘要: 根据瞬变电磁场所满足的扩散方程与波动场所满足的波动方程之间的数学关系,运用扫时波场变换技术,得到稳定的虚拟波场.在虚拟波场的基础上,借用地震勘探中的 Born 近似逆散射技术实现对电性界面进行成像的目的.在理论推导中,直接从时间域波动方程出发,运用格林定理、引入均匀半空间的 Green 函数建立散射场关于速度扰动量的表达式;在数值求解中,运用奇异值分解的方法实现对第一类 Fredholm 积分方程的求解.通过对理论模型的计算以及实例应用,均表明瞬变电磁虚拟波场 Born 近似算法对地下电性界面具有良好的分辨能力.

入藏号: CSCD:6485296

地址: Fan Yanan, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Xiu, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Qi Zhipeng, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Sun Dali, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi

710054, China.

地址: 樊亚楠, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李貅, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

戚志鹏, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

孙大利, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: 1143948867@qq.com; lixiu@chd.edu.cn

电子邮件地址: 1143948867@qq.com; lixiu@chd.edu.cn

使用次数 (最近 180 天): 0

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引用的参考文献数: 18

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作者: Lu Yanxiang; Bai Chaoying

作者: 鲁雁翔; 白超英

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标题: 起伏层状介质中曲线交错网格有限差分弹性波逆时偏移成像

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作者关键词: Curvilinear-grid finite difference method; Reverse-time migration; Wavefield extrapolation; Imaging conditions; Curvilinear-grid finite difference scheme

作者关键词: 曲线网格有限差分法; 波场逆时偏移; 波场外推; 成像条件; 曲线网格有限差分格式

摘要: When describing complex and undulating terrain (or irregular wave impedance interface) by using curvilinear-grid finite difference method,the forward wavefield simulation can avoid of false scattering caused by the ladder approximation. Therefore,the reverse time migration can accurately image the undulating subsurface structure. We in this article solve a one-order velocitystress equation based on the theory of elastic wave reverse time migration,and deduce the curvilinear-grid finite difference scheme of elastic wave forward modeling and reverse time migration,using perfect match layer absorbing boundary, apply cross-correlation imaging conditions, and finally realize wavefield reverse time migration in the presentation of the undulating layer medium. The results of the undulated three-layer,interface merger model and the undulated part of salt mode show that the curvilinear-grid finite difference method is an efficient and accurate reverse time migration method.

摘要: 采用曲线网格有限差分法描述复杂起伏地形(或不规则波阻抗界面)时,波场正演中可以避免因阶梯近似导致的虚假散射,进而波场逆时偏移可对起伏地表模型进行准确成像.文中以弹性波逆时偏移理论为基础,求解一阶速度-应力方程,推导出了弹性波正向传播和逆时传播的曲线网格差分格式,使用完全匹配吸收边界压制边界反射,采用互相关成像条件,实现了起伏层状介质中的波场逆时偏移.三层起伏、尖灭模型,以及起伏地表条件下的部分盐丘模型结果表明:曲线网格有限差分法逆时偏移法是一种高效、准确的逆时偏移法.

入藏号: CSCD:6485306

地址: Lu Yanxiang, Department of Geophysics, School of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Bai Chaoying, Department of Geophysics, School of Geology Engineering and Geomatics, Chang'an University;; Institute of Computational Geophysics, Chang'an University, ;; Xi'an;; Xi'an, ;; 710054;; 710054.

地址: 鲁雁翔, 长安大学地质工程与测绘学院地球物理系, 西安, 陕西 710054, 中国.

白超英, 长安大学地质工程与测绘学院地球物理系;; 长安大学计算地球物理研究所, ;; 西安;; 西安, ;; 710054;; 710054.

电子邮件地址: luyanxiang518@outlook.com; baicy@chd.edu.cn

电子邮件地址: luyanxiang518@outlook.com; baicy@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Wang Jin; Yang Yuanxi; Zhang Qin; Huang Guanwen; Han Junqiang

作者: 王进; 杨元喜; 张勤; 黄观文; 韩军强

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标题: 多模 gnss 融合 PPP 系统间偏差特性分析

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作者关键词: 多模融合 PPP

摘要: A multi-GNSS precise point positioning (PPP) algorithm considering the inter-system bias (ISB) is adopted to process the multi-GNSS data obtained from 7 stations of the multi-GNSS

experiment (MGEX). Using the proposed algorithm, the ISBs values can be achieved between Galileo, GLONASS, BDS (BeiDou Navigation Satellite System) and GPS (Global Positioning System). The results of static multi-GNSS PPP solutions show that RMS (root mean squares) values are 8.9 mm, 5.3 mm and 10.9 mm for the east, north and up directions respectively. One-day stabilities of ISBs described by STD (standard deviation) values are better than 0.12 ns for different systems, and especially Galileo is the best one. From the sequence of multi-day ISBs, significantly irregular ISB jumps can be found where the change range can reach nearly 20 ns. There are some differences on ISB values for different types of receivers, and the ISB values are similar for same types of receivers. On the whole, the ISB for Galileo is the most stable and optimal, and the results of BDS and GLONASS are almost equivalent.

摘要: 多模全球导航卫星系统(Global Navigation Satellite System, GNSS)精密单点定位(precise point positioning, PPP)存在系统间偏差(inter-system bias, ISB),构建了顾及系统间偏差的多模GNSS融合PPP算法,对多星座实验(the multi-GNSS experiment, MGEX)监测网中的7个测站观测数据进行静态解算,获得Galileo、GLO-NASS、北斗与全球定位系统之间的ISB值。分析结果表明,四系统PPP融合定位在水平分量和高程分量的精度分别为8.9 mm、5.3 mm和10.9 mm,体现出较高的融合定位精度。不同系统ISB值在单天内的稳定性较好,均优于0.12 ns。从多天ISB序列看,ISB存在不规律跳变,变化幅度可达近20 ns。不同类型接收机ISB存在一定差异,同一类型接收机结果相近。综合来看,Galileo ISB值最稳定且结果最优,北斗与GLONASS结果相当。

入藏号: CSCD:6486565

地址: Wang Jin, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Qin, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710064, China.

Huang Guanwen, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710064, China.

Han Junqiang, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710064, China.

Yang Yuanxi, Xi'an Research Institute of Surveying and Mapping;;China National Administration of GNSS and Application, National Key Laboratory of Geo-Information Engineering;;, Xi'an;; ;;Beijing 710054;;100088.

地址: 王进, 长安大学地质工程与测绘学院, 西安, 陕西 710064, 中国.

张勤, 长安大学地质工程与测绘学院, 西安, 陕西 710064, 中国.

黄观文, 长安大学地质工程与测绘学院, 西安, 陕西 710064, 中国.

韩军强, 长安大学地质工程与测绘学院, 西安, 陕西 710064, 中国.

杨元喜, 西安测绘研究所;;中国卫星导航定位与应用管理中心, 地理空间信息国家重点实验室;;, 西安;;, 陕西;;北京 710054;;100088, 中国.

电子邮件地址: jwang1989@163.com; yuanxi_yang@163.com

电子邮件地址: jwang1989@163.com; yuanxi_yang@163.com

使用次数 (最近 180 天): 0

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作者: Zhang Weiqi; Wang Li; Qu Xuanyu

作者: 张伟琪; 王利; 曲轩宇

标题: Deformation monitoring and result analysis of loess landslide based on geo-robot

标题: 基于测量机器人的黄土滑坡变形监测及结果分析

来源出版物: 测绘工程 卷: 28 期: 3 页: 66-69,75 出版年: 2019

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来源出版物: Engineering of Surveying and Mapping 卷: 28 期: 3 页: 66-69,75 出版年: 2019

文献号: 1006-7949(2019)28:3<66:JYCLJQ>2.0.TX;2-4

语言: Chinese

文献类型: Article

作者关键词: geo-robot; loess landslide; accuracy analysis; deformation monitoring

作者关键词: 测量机器人; 黄土滑坡; 精度分析; 变形监测

摘要: In order to study the accuracy and reliability of geo-robot applied in loess landslide monitoring, the movable semi-automatic monitoring operation is adopted in the Miaodian loess landslide. Then the observed data are processed and analyzed. The statistical results indicate that the average mean square error (MSE) of horizontal direction is 4.0 mm and the average MSE in the vertical direction is 2.4 mm. The average MSE in both horizontal and vertical directions is within the tolerance. In the meantime, the results obtained from geo-robot and displacement meter are carefully compared as well. The monitoring results of the two methods have good consistency. Therefore, geo-robot can be completely used to the high-precision monitoring of landslide disasters due to its high accuracy and reliability.

摘要: 研究测量机器人应用于黄土滑坡地质灾害监测时的精度和可靠性等问题, 结合泾河南塬庙店黄土滑坡监测实例, 采用移动式半自动变形监测作业方式进行外业观测, 对实测数据进行计算, 并将测量机器人的监测成果同位移计的结果对比。结果表明, 测量机器人的实测平均平面点位中误差为 4.0 mm, 垂直方向的平均高程中误差为 2.4 mm, 满足工程测量规范设计要求, 并且两种监测结果具有很好的一致性。基于测量机器人对黄土滑坡变形监测的成果精度高、可靠性强, 完全可应用于高精度滑坡地质灾害监测。

入藏号: CSCD:6485884

地址: Zhang Weiqi, School of Geological Engineering and Geomatics, Chang'an University;; State Key Laboratory of Geographic Information Engineering;; National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, ;; State Key Laboratory of Geographic Information Engineering;; National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, Xi'an;; Xi'an;; Xi'an, ;;;; 710054;; 710054;; 710054.

Wang Li, School of Geological Engineering and Geomatics, Chang'an University;; State Key

Laboratory of Geographic Information Engineering;;National Administration of Surveying,Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, ;;State Key Laboratory of Geographic Information Engineering;;National Administration of Surveying,Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, Xi'an;;Xi'an;;Xi'an, ;;; 710054;;710054;;710054.

Qu Xuanyu, School of Geological Engineering and Geomatics,Chang'an University;;State Key Laboratory of Geographic Information Engineering;;National Administration of Surveying,Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, ;;State Key Laboratory of Geographic Information Engineering;;National Administration of Surveying,Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, Xi'an;;Xi'an;;Xi'an, ;;; 710054;;710054;;710054.

地址: 张伟琪, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室;;地理国情监测国家测绘地理信息局工程技术研究中心, ;;地理信息工程国家重点实验室;;地理国情监测国家测绘地理信息局工程技术研究中心, 西安;;西安;;西安, 陕西;;陕西;;陕西 710054;;710054;;710054, 中国.

王利, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室;;地理国情监测国家测绘地理信息局工程技术研究中心, ;;地理信息工程国家重点实验室;;地理国情监测国家测绘地理信息局工程技术研究中心, 西安;;西安;;西安, 陕西;;陕西;;陕西 710054;;710054;;710054, 中国.

曲轩宇, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室;;地理国情监测国家测绘地理信息局工程技术研究中心, ;;地理信息工程国家重点实验室;;地理国情监测国家测绘地理信息局工程技术研究中心, 西安;;西安;;西安, 陕西;;陕西;;陕西 710054;;710054;;710054, 中国.

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作者: Zhou Jingjing; Zhao Fasuo; Li Hui; Liu Hainan; Zhang Xiaomin; Zhu Yanbo

作者: 周静静; 赵法锁; 李辉; 刘海南; 张晓敏; 祝艳波

标题: Correlational Research Between Geological Hazards and impact Factors in Shaanxi Province

标题: 陕西省地质灾害与影响因素相关性研究

来源出版物: 灾害学 卷: 34 期: 2 页: 228-234 出版年: 2019

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来源出版物: Journal of Catastrophology 卷: 34 期: 2 页: 228-234 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: geological hazards; Shaanxi Province; impact factors; correlation

作者关键词: 地质灾害; 影响因素; 相关性; 陕西省

摘要: According to the detailed investigation results of geological hazards in Shaanxi Province, GIS technology is used to establish a spatial distribution database of geological hazards and a database of seven influencing factors such as geology, topography, hydrology and so on. The author converts the database elements into 50 * 50m raster data, and reclassified the grids of geological hazards among various factors, and calculates the correlation coefficient between impact factors and the distribution of geological hazards. The results show that the geological hazards are most intensely developed in the geomorphic units of the Qinling-Daba Mountains in southern Shaanxi province. The Ordovician has the greatest correlation with the distribution of geological hazards among the Stratigraphic lithology. The sunny slope with the elevation is 400 ~ 800 m, and the slope is 20° ~ 30°, absolute slope curvature greater than 1 and the annual average rainfall greater than 700 mm are geological hazard-prone areas. Along the fault zone, rivers and traffic lines, geological hazards distribution appear as bands, the correlation coefficient decreases along the direction away from the fault zone (river, traffic line). The research results provide a basis for the geological hazards prevention and mitigation work in Shaanxi Province.

摘要: 基于陕西省各市县级地质灾害详细调查成果资料,利用 GIS 技术建立了地质灾害空间分布和地形地貌、地层岩性等 5 个影响因素的数据库,将数据库要素转换为 50 * 50 m 的栅格数据,重分类后统计各因素中发生地质灾害的栅格数目,计算其与地质灾害分布的相关性系数。结果显示:陕西省地质灾害在陕南秦巴山区地貌单元中最为发育;各地层岩性中,奥陶系对地质灾害的影响最大;高程为 400 ~ 800 m,坡度为 20° ~ 30°,以及坡型曲率绝对值大于 1 的阳坡和年平均降雨量大于 700 mm 区域均为地质灾害易发区域;沿着断裂带、河流和交通线路,地质灾害呈现出带状分布,相关性系数沿着远离断裂带(河流、交通线路)的方向减小。研究结果对陕西省地质灾害的预防和治理提供依据。

入藏号: CSCD:6482307

地址: Zhou Jingjing, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhao Fasuo, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Xiaomin, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhu Yanbo, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Hui, Key Laboratory of Mine Geological Hazards Mechanism and Control, Ministry of Land and Resources;; Shaanxi Institute of Geo-Environment Monitoring, Key Laboratory of Mine Geological Hazards Mechanism and Control, Ministry of Land and Resources;; Xi'an;; Xi'an, ;; 710054;; 710054.

Liu Hainan, Key Laboratory of Mine Geological Hazards Mechanism and Control, Ministry of Land and Resources;; Shaanxi Institute of Geo-Environment Monitoring, Key Laboratory of Mine Geological Hazards Mechanism and Control, Ministry of Land and Resources;; Xi'an;; Xi'an, ;; 710054;; 710054.

地址: 周静静, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

赵法锁, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

张晓敏, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

祝艳波, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李辉, 国土资源部矿山地质灾害成灾机理与防控重点实验室;;陕西省地质环境监测总站, 国土资源部矿山地质灾害成灾机理与防控重点实验室;;, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

刘海南, 国土资源部矿山地质灾害成灾机理与防控重点实验室;;陕西省地质环境监测总站, 国土资源部矿山地质灾害成灾机理与防控重点实验室;;, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: 578685749@qq.com

电子邮件地址: 578685749@qq.com

使用次数 (最近 180 天): 0

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作者: Li Xin

作者: 李昕

标题: Algorithm study with GPS/BDS and PL high precise RTK positioning

标题: GPS/BDS 及 PL 高精度 RTK 定位算法研究

来源出版物: 测绘学报 卷: 48 期: 4 页: 534-534 出版年: 2019

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文献类型: Article

作者关键词: GPS/BDS

作者关键词: PL 高精度; RTK 定位

摘要: 本文旨在研究 GPS/BDS 常规 RTK 和中长距离 RTK,以及室内伪卫星 RTK 高精度定位算法,主要涉及定位数学模型的建立、误差源的处理方法、载波相位观测值的整周模糊度求解及质量控制等领域,在现存算法的基础上,针对其局部局限性,深入分析其原因并对部分算法作出相应的改进和创新,以满足更多环境下的高精度 RTK 定位需求,为拓宽 RTK 应用领域提供可行性基础。本文的主要工作和贡献如下。

入藏号: CSCD:6479946

地址: Li Xin, School of Geological and Surveying & Mapping Engineering, Chang'an University,

Xi'an, Shaanxi 710054, China.

地址: 李昕, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: lixin2017@chd.edu

电子邮件地址: lixin2017@chd.edu

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Liu Xiaojie; Zhao Chaoying; Kang Ya; Zhang Qin

作者: 刘晓杰; 赵超英; 康亚; 张勤

标题: Analysis of Maoxian landslide deformation by using Sentinel-1 data

标题: 茂县滑坡形变的 Sentinel-1 数据分析

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语言: Chinese

文献类型: Article

作者关键词: Sentinel-1; Maoxian landslide; Sentinel-1; IPTA; deformation monitoring

作者关键词: 茂县滑坡; 点目标干涉技术; 形变监测

摘要: An extraordinary landslide occurred in Maoxian, Sichuan province on June 24th, 2017. In order to obtain the pre-slide deformation and induce the trigger factor of this landslide, 40 scenes Sentinel-1 data from October 9th, 2014 to June 19th, 2017 were involved. And deformation velocity and pre-slide deformation time series were achieved with synthetic aperture radar interferometric point target analysis (IPTA) technique, which was compared with the pre-slide rainfall data. According to the problems of the heavy vegetation coverage in landslide area, persistent scatterer candidates (PSC) were identified based on the fact that strong scatterers are less sensitive to the window size and oversampling factor in the coregistration procedure. Analytical results indicated that the landslide had obvious deformation in two years before this landslide event. The maximum deformation rate reached $4(\text{cm}\cdot\text{a}^{-1})$. Moreover, an abrupt increase deformation was monitored in half a month before this landslide event, which can be inferred that the continuous heavy rainfall before landslide event was the main trigger factor of the landslide.

摘要: 为了获取 2017 年 6 月 24 日四川省茂县特大滑坡滑前的形变信息并分析其诱发因素, 该文利用覆盖滑坡区域滑前 40 景 Sentinel-1 数据, 采用合成孔径雷达干涉点目标分析 (IPTA)

技术,解算出该滑坡滑前 2014 年 10 月 9 日至 2017 年 6 月 19 日期间形变的年速率及形变的时间序列,并与降雨数据进行了对比分析。对于滑坡区植被覆盖严重的问题,该文利用永久散射体目标(PSC)对影像配准窗口大小及过采样因子不敏感的特性来识别 PS 点。分析结果表明,茂县滑坡在滑动前两年多时间内具有明显的形变,最大形变速率达到 $4(\text{cm}\cdot\text{a}^{-1})$,而且在滑坡发生前半个月内形变有突然增大的现象,推测该滑坡滑前持续的强降雨是导致滑坡失稳的主要诱因。

入藏号: CSCD:6477245

地址: Liu Xiaojie, School of Geology Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Kang Ya, School of Geology Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Zhao Chaoying, School of Geology Engineering and Geomatics,Chang'an University;;National Administration of Surveying,Mapping and Geoinformation,Engineering Research Center of National Geographic Conditions Monitoring, ;;National Administration of Surveying,Mapping and Geoinformation,Engineering Research Center of National Geographic Conditions Monitoring, Xi'an;;Xi'an, ;; 710054;;710054.

Zhang Qin, School of Geology Engineering and Geomatics,Chang'an University;;Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

地址: 刘晓杰, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

康亚, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

赵超英, 长安大学地质工程与测绘学院;;地理国情监测国家测绘地理信息局工程技术研究中心, ;;地理国情监测国家测绘地理信息局工程技术研究中心, 西安;;西安, ;; 710054;;710054.

张勤, 长安大学地质工程与测绘学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, ;; 710054;;710054.

电子邮件地址: Xiaojie_Liu_cd@163.com; zhaochaoying@163.com

电子邮件地址: Xiaojie_Liu_cd@163.com; zhaochaoying@163.com

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作者: Han Ming; Zhang Yongzhi; Cheng Dong; Yin Peng

作者: 韩鸣; 张永志; 程冬; 尹鹏

标题: Calculation three-dimensional co-seismic deformation of the 2017 Iran-Iraq earthquake by multi-angle InSAR data

标题: 多视角 InSAR 数据解算 2017 两伊地震三维同震形变场

来源出版物: 测绘通报 期: 4 页: 75-78,129 出版年: 2019

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文献类型: Article

作者关键词: DInSAR; Sentinel-1A; Mw 7.3 Iran-Iraq earthquake; DInSAR; three-dimensional coseismic deformation; Sentinel-1A; Zagros piedmont fault

作者关键词: Mw7.3 两伊地震; 三维同震形变; 扎格罗斯山前断层

摘要: The 2017 Iran-Iraq earthquake is the largest earthquake in zagros mountains since 1900. In order to study the coseismic deformation field caused by the earthquake,two-pass differential DInSAR processing is carried out using three pairs of Sentinel-1A elevation track data covering the same area,and the three-dimensional coseismic deformation field of the study area is reconstructed by direct solution algorithm. The experiment shows that the elevation track line of sight of the three perspectives is basically consistent with the settlement trend. The reconstruction of 3D deformation field can be realized by combining the observation results from multiple perspectives. According to the characteristics of surface line of sight and three-dimensional coseismic deformation and geological structure background,it is speculated that the seismogenic fault is likely to be Zagros piedmont fault.

摘要: 2017 两伊地震是自 1900 年以来发生在扎格罗斯山脉的最大地震,为了研究此次地震引起的同震形变场,利用覆盖同一地区的 3 对 Sentinel-1A 升降轨数据分别进行两通差分 DInSAR 处理,得到了研究区 3 个视线向的地表同震形变场,通过直接解算法重建了研究区的三维同震形变场。试验表明: 3 种视角的升降轨视线向上升与沉降总体趋势基本一致;联合多个视角的观测结果可以实现三维形变场的重建;根据地表视线向和三维同震形变的特征以及地质构造背景推测了发震断层很有可能为扎格罗斯山前断层。

入藏号: CSCD:6478761

地址: Han Ming, School of Geodsy and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Yongzhi, School of Geodsy and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Cheng Dong, School of Geodsy and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Yin Peng, School of Geodsy and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 韩鸣, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

张永志, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

程冬, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

尹鹏, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: 353764563@qq.com; cadxyz@263.net

电子邮件地址: 353764563@qq.com; cadxyz@263.net

使用次数 (最近 180 天): 0

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作者: Liu Xin; Yang Jun; Zhang Ning

作者: 刘鑫; 杨峻; 张宁

标题: Experimental Study on Shear Wave Velocity of Silty Sand Using Bender Element

标题: 粉质砂土剪切波速测定的弯曲元试验

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语言: Chinese

文献类型: Article

作者关键词: fines content; shear wave velocity; bender element; critical state

作者关键词: 含粉量; 剪切波速; 弯曲元; 临界状态

摘要: Natural sands are not clean but contain some fines of silt or clay size. In this study, a series of bender element tests has been carried out on mixtures of clean quartz sand and crushed silica fines of different mass contents, covering a range of confining stresses and void ratios. Discussions were made with focus on the influences of excitation frequency and fines content on the output signals. A reliable measure of the first arrival time of shear wave was achieved. It is found that (1) at low excitation frequency the near field effect is prominent for silty sand. On the other hand, the first-kind P wave appears at high excitation frequency, whose amplification is of great dependence on the fines content. Accordingly, the shear wave velocity can be calculated using the first arrival in the time domain; (2) when the fines content increases from 0 to 30%, the shear wave velocity decreases progressively under otherwise similar conditions; (3) a unified model based on critical state soil mechanics is superior to the conventional method in characterizing the influence of various factors.

摘要: 在天然状态下砂土中常含有粉粒或黏粒。采用人工配比砂土与硅粉的方法,进行了不同密实度和不同围压下的弯曲元试验,通过对比剪切波输出信号,重点分析了激振频率以及含粉量对波形特征的影响,获得了可靠的剪切波传播时间确定方法。研究表明:(1)在低频激振条件下,粉质砂土输出波近场效应明显;在高频条件下,第一类P波出现,其振幅与试样的含粉量相关,综合分析实验结果,发现采用初达波方法判断剪切波的传播时间比较可靠;(2)在相同的孔隙比和围压下,随着含粉量由0增加到30%,试样的剪切波速逐渐减小;(3)基于临界状态土力学理论,提出了计算粉质砂土剪切波速的多参数归一化模型,与传统方法相比,模型中各拟合参数不受含粉量影响,计算过程更简便。

入藏号: CSCD:6477656

地址: Liu Xin, Chang'an University, College of the Geology Engineering and Geomatics;; The University of Hong Kong, Department of Civil Engineering, ;; Xi'an;; ;; Hong Kong 710054;;

Yang Jun, The University of Hong Kong, Department of Civil Engineering, Hong Kong.
Zhang Ning, Chang'an University, College of the Geology Engineering and Geomatics, Xi'an, Shaanxi 710054, China.
地址: 刘鑫, 长安大学地质工程与测绘学院;; 香港大学土木工程系, ;; 西安;; 陕西;; 香港 710054;; 中国.
杨峻, 香港大学土木工程系, 香港.
张宁, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.
电子邮件地址: liuxinsunny08@126.com
电子邮件地址: liuxinsunny08@126.com
使用次数 (最近 180 天): 0
使用次数 (2013 年至今): 0
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作者: Du Changcheng; Zhu Yanbo; Miao Shuaisheng; Gao Mingming; Zhu Junhua; Zhao Fasuo
作者: 杜长城; 祝艳波; 苗帅升; 高明明; 祝俊华; 赵法锁
标题: Effect of Initial Moisture Content on the Shrinkage Characteristics of the Red Soil of Hipparion
标题: 初始含水率对三趾马红土失水收缩特性影响
来源出版物: 水土保持研究 卷: 26 期: 1 页: 227-233 出版年: 2019
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文献类型: Article
作者关键词: red soil of Hipparion; dehumidification; dry shrinkage deformation; moisture content; digital image quantitative processing
作者关键词: 三趾马红土; 脱湿; 干缩变形; 含水率; 数字图像定量处理
摘要: The swelling and shrinkage characteristics of red soil of Hipparion were obvious, and the water shrinkage cracking had significant effect on the stability of natural slope and engineering slope. We used the designed test monitoring devices to carry out different initial moisture state hipparion red clay reshape sample drying dehumidifying test, and used digital image processing technology to obtain quantitative sample drying shrinkage deformation of dynamic quantitative data, and get the following conclusions. (1) The hipparion red soil specimen water loss curve presents obvious three stages: rapid water loss, slow water loss, and residual water loss, and water loss curve is significantly influenced by the initial moisture content, the greater the initial moisture

content is,the faster the sample water loss rate is,and more intense filtration process is;(2)The hipparion red soil specimen contraction curve presents obvious four stages:rapid shrinkage phase,slow contraction phase and residual phase and zero contraction phase,and a significant contraction curve is influenced by the initial moisture content,the greater the initial moisture content is,the more intense the shrinkage process is,and the greater eventual radial shrinkage strain is;(3)The ultimate shrinkage strain and initial moisture content of the tri-toe horse red soil sample has the significantly linear relation.

摘要: 三趾马红土胀缩特性明显,其失水收缩开裂对天然斜坡和工程边坡稳定性影响显著。利用设计的试验监测装置,开展不同初始含水状态三趾马红土重塑样的干燥脱湿试验,并运用数字图像定量处理技术获得试样干缩变形的动态定量数据,得到以下结论:(1)三趾马红土试样失水曲线呈现明显的3个阶段:快速失水期、减速失水期和残余失水期,且失水曲线受初始含水率影响显著,初始含水率越大,试样失水速率相对越快,失水过程越剧烈;(2)三趾马红土试样收缩曲线呈现明显的4个阶段:快速收缩阶段、减速收缩阶段、残余收缩阶段和零收缩阶段,且收缩曲线受初始含水率影响显著,初始含水率越大,收缩过程越剧烈,最终径向收缩应变越大;(3)三趾马红土试样的最终收缩应变与初始含水率呈良好线性关系。

入藏号: CSCD:6463745

地址: Du Changcheng, College of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Zhu Yanbo, College of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Miao Shuasheng, College of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Gao Mingming, College of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Zhu Junhua, College of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Zhao Fasuo, College of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 杜长城, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

祝艳波, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

苗帅升, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

高明明, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

祝俊华, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

赵法锁, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: 1161422811@qq.com; 342948684@qq.com

电子邮件地址: 1161422811@qq.com; 342948684@qq.com

使用次数 (最近 180 天): 1

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作者: Wang Lixia; Yu Dongyang; Liu Zhao; Zhang Shuangcheng; Yang Yun

作者: 王丽霞; 余东洋; 刘招; 张双成; 杨耘

标题: Study on Tempo-spatial Variations of NDVI and Climatic Factors and Their Correlation in the Weihe Watershed

标题: 渭河流域 NDVI 与气候因子时空变化及相关性研究

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作者关键词: NDVI; Weihe Watershed; NDVI; climatic factors; tempo-spatial change; correlation

作者关键词: 渭河流域; 气候因子; 时空变化; 相关性

摘要: The tempo-spatial changes of NDVI can reflect the evolution of regional ecological environment. On the basis of pixel scale, trend analysis method can simulate the trend of each grid cell in the study area, reflecting the detailed information of NDVI changes. Based on monthly data of MODIS NDVI from 2000 to 2015 and meteorological data of the same period, trend analysis method and correlation analysis method were used to study the tempo-spatial variation characteristics and correlation of NDVI, temperature and precipitation in the Weihe Watershed. The results showed that: (1) in the past 16 years, the average NDVI of the Weihe Watershed had increased, the rate of change was about 0.088/decade, and the vegetation coverage had increased; during the 16 years, the area of increasing NDVI accounted for 97.77% of the total watershed, these areas mainly distributed in the west and north of the watershed; (2) in the time series, the correlation coefficient between NDVI and temperature was 0.865, the partial correlation coefficient was 0.664; the correlation coefficient between NDVI and precipitation was 0.776, and the partial correlation coefficient was 0.346; it indicated that the seasonal variation of temperature and precipitation had a remarkable impact on vegetation growth, and the effect of temperature was more significant; (3) on the pixel scale, the area where NDVI was positively correlated with temperature accounted for 51.21%; the area in which NDVI was positively correlated with precipitation accounts for 96.67%. It indicated that there were spatial differences and uncertainty in the effects of temperature on vegetation growth, and the increase of precipitation mainly promoted the growth of vegetation.

摘要: NDVI 的时空变化可以反映区域生态环境的演变, 基于像元尺度的趋势分析法能模拟研究区栅格单元的变化趋势, 从而反映 NDVI 时空分布的变化细节。基于 2000-2015 年 MODIS NDVI 月时序数据, 结合同期气象资料, 利用趋势分析和相关分析的方法研究了渭河流域 NDVI、气温和降水的时空变化特征及其相关性。结果表明: (1) 近 16 年来, 渭河流域平均 NDVI 呈增大的趋势, 变化率约为 0.088/10a, 植被覆盖度有所增加; NDVI 增大的区域占流域总面积的 97.77%, 主要分布在流域西部和北部。 (2) 时间尺度上, NDVI 与气温的相关系数为 0.865, 偏相关系数为 0.664; NDVI 与降水的相关系数为 0.776, 偏相关系数为 0.346, 表明气温和降水的季节

变化对植被生长都具有重要影响,且气温的影响更为显著。(3)空间尺度上,NDVI 与气温呈正相关的像元数占像元总数的 51.21%,NDVI 与降水呈正相关的像元数占像元总数的 96.67%,表明就渭河流域而言,气温的变化对植被生长的影响具有空间差异性和不确定性,而降水的增加会促进植被的生长。

入藏号: CSCD:6463804

地址: Wang Lixia, College of Geology Engineering and Geomatics,Chang'an University;;Key Laboratory of Degraded and Unused Land Consolidation Engineering,Ministry of Land and Resources, ;;Key Laboratory of Degraded and Unused Land Consolidation Engineering,Ministry of Land and Resources, Xi'an;;Xi'an, ;; 710054;;710075.

Yu Dongyang, School of Earth Science and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Liu Zhao, School of Environmental Science and Engineering,Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Shuangcheng, College of Geology Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Yang Yun, College of Geology Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 王丽霞, 长安大学地质工程与测绘学院;;国土资源部退化及未利用土地整治工程重点实验室, ;;国土资源部退化及未利用土地整治工程重点实验室, 西安;;西安, ;; 710054;;710075.

余东洋, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

刘招, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

张双成, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

杨耘, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: zylxwang@chd.edu.cn

电子邮件地址: zylxwang@chd.edu.cn

使用次数 (最近 180 天): 1

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作者: Wan Yang; Ma Runyong; Wang Linqing; Chang Jiang; Wang Zhihao; Sun Changming; Shang Hexin

作者: 万阳; 马润勇; 王林清; 常江; 王志浩; 孙长明; 尚合欣

标题: Analysis of building failure characteristics across ground fissure in Longyao County of Hebei Province

标题: 河北隆尧跨地裂缝建筑物破坏特征分析

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作者关键词: ground-fissure; numerical simulation; destruction method; deformation characteristics

作者关键词: 地裂缝; 数值模拟; 破坏方式; 变形特征

摘要: According to the field investigation, the Longyan ground fissure has the characteristics of positive and negative tensile and left-handed displacement, and causes serious damage to the buildings with transground cracks. Based on the nonlinear finite element method, a three-dimensional numerical model is established, and the deformation characteristics and failure modes of the wall when the ground fissure passes through the building at different angles are studied. The results show that when the ground fissures cross the building at different angles, the damage pattern and characteristics of the front and rear walls of the building are different. The concrete damage is greater than the front wall, but its deformation damage lags behind the front wall. Along with the continuous activity of the ground fissure, different degrees of deformation and damage will occur at the toe of the side wall and lag behind the main wall. With the increase of the angle between the ground fissure and the building, the deformation and damage degree of the side wall gradually decreases, and the deformation and damage of the main wall are more and more concentrated on the intersection of the two.

摘要: 根据野外调查,隆尧地裂缝具有正断拉张,左旋错动的特征,且造成跨地裂缝建筑物的严重破坏。本文基于非线性有限元法建立三维数值模型,在总结墙体破坏力学机理的基础上,探究地裂缝以不同角度穿越建筑物时墙体的变形特征以及破坏方式。结果表明:当地裂缝以不同角度穿越建筑物时,建筑物前后墙体的破坏方式与特征有所不同,具体表现为后墙的破坏范围大于前墙,但其变形破坏滞后于前墙;伴随地裂缝的持续活动,侧墙墙趾处也会出现不同程度的变形影响破坏,且滞后于主墙。随着地裂缝与建筑物夹角的增大,侧墙的变形破坏程度逐渐减小,而主墙的变形破坏越来越集中于二者相交位置。

入藏号: CSCD:6445032

地址: Wan Yang, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Ma Runyong, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Linqing, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Chang Jiang, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Zhihao, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Sun Changming, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Shang Hexin, College of Geology Engineering and Geomatics, Chang'an University, Xi'an,

Shaanxi 710054, China.

地址: 万阳, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

马润勇, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

王林清, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

常江, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

王志浩, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

孙长明, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

尚合欣, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: m18302903589@163.com; 13572091368@163.com

电子邮件地址: m18302903589@163.com; 13572091368@163.com

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作者: Li Lincui; Li Xi'an; Hong Bo; Wang Li

作者: 李林翠; 李喜安; 洪勃; 王力

标题: Experiment on Pore Structures of Malan Loess at Different Buried Depth

标题: 不同埋深马兰黄土孔隙结构试验

来源出版物: 吉林大学学报. 地球科学版 卷: 49 期: 2 页: 493-503 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: Malan loess; scanning electron microscope; pore classification; pore size distribution; pore shape distribution

作者关键词: 马兰黄土; 扫描电子显微镜; 孔隙分类; 孔隙大小分布; 孔隙形状分布

摘要: Loess samples were prepared using pore-filling method to observe and analyze their microstructures. The pore structures and the change with depth increase were analyzed by scanning electron microscope and digital image analysis system. The five samples belong to porous soil according to the void ratio or pore area ratio. The results indicate that the connectivity of loess pore decreased with depth increase gradually, the pore structure changed from unstable overhead macro pores or mesopores into stable small or micro mosaic pores, and quantitatively, the area of macro pores and mesopores decreased by 63.04%, while the area of small pores and micro pores increased by 40.57% and 22.47% respectively. By analyzing pore shapes, the area change of micro

pores,small pores,mesopores and macro pores mentioned above was resulted from the area change of elongated or irregular pores.From the area point of view,in the micro pores,small pores,mesopores and macro pores,the elongated pores were dominant,and the number of all these four kinds of pores decreased in turn significantly.This is mainly determined by the number of round pores,indicating that the round pores are small.

摘要: 本文采用注胶法制得用以观察分析和定量研究的黄土微观结构试样,借助扫描电子显微镜和数字化图像分析系统,观察并讨论黄土孔隙结构特征及其随黄土埋深增加的变化规律。结果表明,不同埋深马兰黄土依据孔隙率或孔隙面积率分类均属于疏松多孔性土。黄土孔隙连通性随埋深增加逐渐减弱;埋深由小到大,马兰黄土孔隙的主要结构特征由相对不稳定的大、中架空孔隙,过渡为相对稳定的微、小镶嵌孔隙,定量表现为大、中孔隙面积率之和随黄土埋深的增加减小约 63.04%,而小孔隙面积率增加约 40.57%,微孔隙面积率增加约 22.47%。通过对孔隙形状分布的分析,上述不同类型孔隙面积率的增加或减少主要源于细长形和不规则形孔隙面积的改变。此外,不同埋深马兰黄土中细长孔隙的面积在微、小、中、大孔隙的面积中均占主导地位。就孔隙数量而言,马兰黄土中微、小、中、大孔隙的数量随深度增加依次急剧减少,此现象主要由 4 种孔隙中圆孔数量的显著差异引起,表明圆孔的孔径多偏小。

入藏号: CSCD:6451392

地址: Li Lincui, College of Geology Engineering & Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Hong Bo, College of Geology Engineering & Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Li, College of Geology Engineering & Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Xi'an, College of Geology Engineering & Geomatics, Chang'an University;; Open Research Laboratory of Geotechnical Engineering, Ministry of Land and Resources, ;; Open Research Laboratory of Geotechnical Engineering, Ministry of Land and Resources, Xi'an;; Xi'an, ;; 710054;; 710054.

地址: 李林翠, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

洪勃, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

王力, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李喜安, 长安大学地质工程与测绘学院;; 国土资源部岩土工程开放研究实验室, ;; 国土资源部岩土工程开放研究实验室, 西安;; 西安, ;; 710054;; 710054.

电子邮件地址: 2017026026@chd.edu.cn;; llc934157098@163.com; dclixa@chd.edu.cn

电子邮件地址: 2017026026@chd.edu.cn;; llc934157098@163.com; dclixa@chd.edu.cn

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作者: Zhou Yang; Su Shengrui; Li Peng; Ma Hongsheng; Zhang Xiaodong

作者: 周阳; 苏生瑞; 李鹏; 马洪生; 张晓东

标题: Microstructure and Mechanical Properties of Broken Phyllite

标题: 板裂千枚岩微观结构与力学性质

来源出版物: 吉林大学学报. 地球科学版 卷: 49 期: 2 页: 504-513 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: broken phyllite; microstructure; mechanical properties; anisotropy; failure modes

作者关键词: 板裂千枚岩; 微观结构; 力学性质; 各向异性; 破裂模式

摘要: In order to study microstructure and mechanical properties of broken phyllite, the typical broken phyllite along the Wenchuan-Maerkang expressway was taken as the research object. X-ray powder diffraction, thin slice identification, uniaxial and triaxial compression tests were carried out. The results show that: 1) The microstructure and mineral components are very complex. Most of the rocks have obvious brittle, plastic deformations and fractures with poor structural stability. 2) Significant anisotropy of broken phyllite was observed. Some mechanical parameters increased after the first decrease, such as the elastic modulus, compressive strength, cohesion and friction angle. These mechanical parameters showed a V-shape when the angle varied from 0° to 90°. 3) The failure modes of broken phyllite are closely related to angles and the confining pressure, which can be summed up in five types: tensile splitting along structural plane, shearing slip failure structural plane, Y type tensile-shear compound failure, compound shear failure across and along structural plane, and shear failure cross structural plane. 4) With the increasing of confining pressure, the strength, deformation parameters and failure modes of rock samples gradually weakened. 5) The combination of the maximum principal stress and the structural plane controls the failure mode and mechanism of rock, and it is the fundamental reason for the anisotropy of broken phyllite.

摘要: 为了研究板裂千枚岩的微观结构及力学性质,以汶川-马尔康高速公路沿线典型的板裂千枚岩为研究对象,进行了X衍射,薄片鉴定和单轴、三轴压缩试验。结果表明:1)板裂千枚岩微观结构和矿物成分比较复杂,具有明显的脆、塑性变形和裂隙,结构稳定性差;2)板裂千枚岩的各向异性明显,结构面夹角从0°到90°,板裂千枚岩的弹性模量、抗压强度、黏聚力和内摩擦角先减小后增大,呈V型分布规律;3)板裂千枚岩的破裂模式与结构面夹角和围压的大小密切相关,其破裂模式共有顺结构面的张拉劈裂破坏、顺结构面的剪切滑移破坏、Y型张拉-剪切复合破坏、顺结构面和贯穿结构面的复合张剪破坏、贯穿结构面的剪切破坏5种类型;4)随着围压的增大,不同结构面夹角试样的强度、变形参数和破裂模式的各向异性逐渐减弱;5)最大主应力与结构面的组合方式控制着岩石的破裂模式和力学性质,这是板裂板裂千枚岩显示各向异性的根本原因。

入藏号: CSCD:6451393

地址: Zhou Yang, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Su Shengrui, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Peng, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Xiaodong, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Ma Hongsheng, Sichuan Provincial Transport Department Highway Planning, Survey, Design and Research Institute, Chengdu, Sichuan 610041, China.

地址: 周阳, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

苏生瑞, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李鹏, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

张晓东, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

马洪生, 四川省交通运输厅公路规划勘察设计研究院, 成都, 四川 610041, 中国.

电子邮件地址: zhou11020@126.com

电子邮件地址: zhou11020@126.com

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作者: Xu Qiang; Zheng Shansuo; Fan Yujiang

作者: 徐强; 郑山锁; 樊禹江

标题: Experimental study on seismic damage of steel frame joints under large displacement and cyclic loading

标题: 大位移往复加载下钢框架节点地震损伤试验研究

来源出版物: 哈尔滨工程大学学报 卷: 40 期: 2 页: 292-297 出版年: 2019

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作者关键词: steel frame joints; experimental study; large displacement loading; cumulative energy consumption; damage evolution; failure mode

作者关键词: 钢框架节点; 试验研究; 大位移加载; 累积耗能; 损伤演化; 破坏模式

摘要: When a structure is close to collapse state, its structural members inevitably exhibit large deformation. In a steel frame structure, the welding of beam and column in the joint area is the

weak link that is prone to brittle failure. In this study, three different large displacement loading systems are designed for low-cycle reciprocating loading of steel frame joints, and the failure process and characteristics are investigated. The effects of different large displacement loading methods on the load - displacement hysteresis curve, hysteretic energy dissipation, damage evolution, and other mechanical properties of steel frame joints are studied. Results show that the loading system plays a controlling role in the failure modes of the members. The specimen under variable amplitude loading and equal amplitude 60 mm cyclic loading shows brittle failure, while the specimen under equal amplitude 90 mm cyclic loading shows ductile failure. The energy dissipation capacity was taken as the index to evaluate the seismic performance of the joints, the beam end of which was the key part of seismic energy dissipation of the structure. A simple and general cumulative damage model was established, which was easy to evaluate the damage degree of the joints under earthquake.

摘要: 结构临近倒塌状态时,构件不可避免发生较大变形。节点区梁柱焊接处是钢框架结构薄弱环节,易发生脆性破坏,本文设计了3个不同的大位移加载制度对钢框架节点构件进行低周往复加载,考察其破坏过程与特征,研究了不同大位移加载方式对钢框架节点的荷载-位移滞回曲线、滞回耗能、损伤演化等力学性能的影响。结果表明:加载制度对构件的破坏形态起控制作用,变幅加载与等幅60 mm循环加载下试件为脆性破坏,等幅90 mm循环加载下试件为延性破坏。钢框架节点梁端作为结构抗震耗能的关键部位,将耗能能力作为评价其抗震性能的指标,建立起简单通用的累积破坏损伤模型,该损伤模型易于评价节点在地震作用下的损伤程度。

入藏号: CSCD:6415103

地址: Xu Qiang, Geological Engineering and Surveying Engineering College, Chang'an University;; School of Civil Engineering, Xi'an University of Architecture and Technology, ;; Xi'an;; Xi' an, ;; 710054;; 710055.

Zheng Shansuo, School of Civil Engineering, Xi'an University of Architecture and Technology, Xi' an, 710055.

Fan Yujiang, School of Architecture, Chang' an University, Xi'an, Shaanxi 710061, China.

地址: 徐强, 长安大学地质工程与测绘工程学院;; 西安建筑科技大学土木工程学院, ;; 西安;; 西安, 陕西;; 陕西 710054;; 710055, 中国.

郑山锁, 西安建筑科技大学土木工程学院, 西安, 陕西 710055, 中国.

樊禹江, 长安大学建筑学院, 西安, 陕西 710061, 中国.

电子邮件地址: 538270385@163.com

电子邮件地址: 538270385@163.com

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作者: Li Yulei; Zhang Yongzhi; Yin Peng; Wang Yipeng; Kang Chaohu

作者: 李宇磊; 张永志; 尹鹏; 王毅鹏; 康朝虎

标题: Application and analysis of spherical dislocation theory and visco-elastic spherical dislocation theory in the Nepal M_S 8.1 earthquake

标题: 球体和黏弹性球体位错理论在尼泊尔 M_S 8.1 地震中的应用与分析

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作者关键词: Spherical dislocation theory; Visco-elastic spherical dislocation theory; Fault slip model; Co-seismic displacement; Viscosity

作者关键词: 球体位错理论; 黏弹性球体位错理论; 断层滑动模型; 同震位移; 黏滞性

摘要: Based on spherical dislocation theory, visco-elastic spherical dislocation theory and USGS released the Nepal earthquake fault slip model to calculate surface horizontal and vertical co-seismic displacements caused by the Nepal earthquake, the results show that the calculation results of two kinds of dislocation theory coincide highly, which shows reliability and practicability of the two dislocations theory. Compared with the measured GPS data, it is found that the theoretical values of the two models have good consistency with the measured data in spatial distribution and magnitude. In order to compare and analyze the two models better, using the two kinds of dislocation model that simulate the co-seismic displacement caused by the Nepal earthquake respectively, two sets of simulation results confirm that the Nepal earthquake is mainly thrusting slide, the horizontal displacement caused by this earthquake is large, and the horizontal displacement in the north-south direction caused by the earthquake is most prominent and concentrated in the vicinity of Kathmandu; but there are also differences in the simulation results, the difference of the co-seismic horizontal displacement and vertical displacement calculated by the two kinds of model accounts for less than 3% of the co-seismic signal in the near field and the difference of the co-seismic horizontal displacement of the two groups is about 5% ~ 9% in the far field, while the difference of co-seismic vertical displacement calculated by the two models is more than 10% in the far field. It is found that the viscoelasticity of the earth has a smaller influence on the horizontal and vertical co-seismic displacement in the near field area, has a limited influence on the horizontal co-seismic displacement in the far field area, and has great influence on the vertical co-seismic displacement in the far field area. Therefore, the influence of the viscoelasticity of the earth should be considered in the calculation of the co-seismic displacement of the far field.

摘要: 本文利用球体位错理论和黏弹性球体位错理论, 基于 USGS 发布的尼泊尔地震断层滑动模型, 分别计算该地震造成的同震水平和垂直位移场, 两种位错理论计算结果高度吻合, 且都与实测 GPS 同震位移在空间分布和量级上具有较好的一致性, 表明了两种位错理论的可靠性和实用性。为了更好的比较和分析这两种位错模型, 分别模拟尼泊尔地震同震水平和垂直位移场, 两种位错模型模拟结果均验证了尼泊尔地震主要以逆冲滑动为主, 该次地震造成的水平位移较大, 地震造成的南北方向上的水平位移最突出, 且集中在加德满都附近区域; 但模拟结果也存在差异, 在近场两组结果水平位移和垂直位移差异占同震信号的不足 3%, 在远场两组

结果的水平位移差异占信号的 5%~9%左右,而垂直位移差异占信号的比例普遍在 10%以上,显示出地球的黏滞性对近场水平同震位移和垂直同震位移影响较小,对远场水平位移影响有限,但是对垂直位移影响较大,即表明在计算远场同震位移时应该考虑地球黏滞性的影响.

入藏号: CSCD:6439632

地址: Li Yulei, School of Geology Engineering and Geomatics,Changan University, Xian, 710054.

Zhang Yongzhi, School of Geology Engineering and Geomatics,Changan University, Xian, 710054.

Yin Peng, School of Geology Engineering and Geomatics,Changan University, Xian, 710054.

Wang Yipeng, School of Geology Engineering and Geomatics,Changan University, Xian, 710054.

Kang Chaohu, School of Geology Engineering and Geomatics,Changan University, Xian, 710054.

地址: 李宇磊, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

张永志, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

尹鹏, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

王毅鹏, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

康朝虎, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: 1501685980@qq.com; cadxyz@263.net

电子邮件地址: 1501685980@qq.com; cadxyz@263.net

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作者: Ji Guofeng; Yang Zhiqiang; Jia Xiaolin

作者: 计国锋; 杨志强; 贾小林

标题: Precise Orbit and Clock Products for Multi-GNSS System from MGEX and iGMAS

标题: MGEX 和 iGMAS 的多系统轨道和钟差产品精度分析

来源出版物: 大地测量与地球动力学 卷: 39 期: 1 页: 13-19 出版年: 2019

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作者关键词: MGEX; iGMAS; multi-GNSS; MGEX; iGMAS; orbit and clock; Allan deviation

作者关键词: 多 GNSS; 轨道和钟差; 阿伦方差

摘要: Precise orbit and clock products for GPS, GLONASS, Galileo and Beidou from IGS MGEX

and iGMAS are evaluated in this paper. Comparison among individual analysis centers (ACs), SLR validations, clock polynomial fitting and Allan deviation are utilized to analyze the characteristics of precise orbit and clock products from each ACs. The results show that: the orbit accuracy of GPS and GLONASS is about 1.0~1.3 cm and 2.0~3.6 cm, respectively; the GPS and GLONASS orbit products from iGMAS are better than other ACs. For the Galileo system, the orbit agreement is about 10~17 cm in general; use of ECOM2 or a prior model can improve orbit quality. For the BDS system, the orbit agreement is about 21~40 cm for IGSOs, 11~18 cm for MEOs, and the radial accuracy is better than 10 cm and 5 cm respectively. However, GEO orbits have the worst agreements, having a few meters differences and radial errors of about 25 cm. Clock agreement is 0.2~0.4 ns for Galileo, 0.35~0.46 ns for BDS GEOs, 0.25~0.33 ns for BDS IGSOs, and 0.11~0.21 ns for BDS MEOs. The BDS IGSOs and MEO clock products from CODE are markedly influenced by the yaw-attitude mode.

摘要: 采用分析中心间互比、SLR 残差检核、卫星钟差拟合以及阿伦方差等方法对 MGEX 和 iGMAS 提供的多系统轨道和钟差产品精度进行综合分析。结果表明, GPS 和 GLONASS 卫星的轨道精度分别在 1.0~1.3 cm 和 2.0~3.6 cm, 其中 iGMAS 提供的轨道产品较优。Galileo 卫星的轨道一致性在 10~17 cm, 采用 ECODE2 模型或附加先验模型可有效提高轨道精度。BDS GEO 卫星的轨道一致性在数 m 级, 径向精度约为 25 cm; IGSO 和 MEO 卫星的轨道一致性分别在 21~40 cm 和 11~18 cm 左右, 且径向精度分别优于 10 cm 和 5 cm。MGEX 和 iGMAS 提供的 GPS 和 GLONASS 卫星的钟差精度较好, 但稳定性和可靠性仍有待提升。Galileo 卫星的钟差一致性约为 0.2~0.4 ns, 且钟差产品中吸收了未被模型化的轨道误差。BDS GEO、IGSO 和 MEO 卫星的钟差一致性分别在 0.35~0.46 ns、0.25~0.33 ns 和 0.11~0.21 ns, 其中 CODE 提供的 BDS IGSO/MEO 卫星的钟差产品受偏航姿态模式影响较大。

入藏号: CSCD:6415638

地址: Ji Guofeng, College of Geology Engineering and Geomatics, Changan University, Xian, 710054.

Yang Zhiqiang, College of Geology Engineering and Geomatics, Changan University, Xian, 710054.

Jia Xiaolin, State Key Laboratory of Geo-Information Engineering;; Xian Research Institute of Surveying and Mapping, State Key Laboratory of Geo-Information Engineering;;, Xian;; Xian, ;; 710054;; 710054.

地址: 计国锋, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

杨志强, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

贾小林, 地理信息工程国家重点实验室;; 西安测绘研究所, 地理信息工程国家重点实验室;;, 西安;; 西安, ;; 710054;; 710054.

电子邮件地址: changan_4440@163.com; yang_gps@chd.edu.cn

电子邮件地址: changan_4440@163.com; yang_gps@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Xu Qiang; Zheng Shansuo; Shang Xiaoyu

作者: 徐强; 郑山锁; 商校瑀

标题: TIME-VARYING SEISMIC DAMAGE OF STEEL FRAME JOINTS CONSIDERING ATMOSPHERIC ENVIRONMENT

标题: 近海大气环境作用下钢框架节点时变地震损伤研究

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作者关键词: offshore atmospheric environment; steel frame joints; corrosion; seismic behavior; damage evolution

作者关键词: 近海大气环境; 钢框架节点; 锈蚀; 抗震性能; 损伤演化

摘要: Due to environmental effects, mechanical properties of structures deteriorate with time. Based on low cycle tests of 12 steel frames with varying degrees of corrosion, the deterioration of mechanical properties of steel frame joints was analyzed. Considering that the deformation of steel frame joints is less than the deformation limit, it is not suitable to evaluate the degree of damage of the steel frame. The stiffness index can reflect two performance indexes of the bearing capacity and the deformation of the member, and the deformation of the member is inversely proportional to its stiffness. A two-parameter seismic damage model based on component stiffness and energy dissipation was established to consider the initial damage caused by environmental factors. The stiffness of the component and the cumulative energy dissipation capacity were linearly related to the corrosion rate. The computational accuracy of the damage model was checked by the regression of the experimental data. The results showed that the damage model had high computational accuracy and was easy to calculate, and it was suitable for damage description of steel frame joints under earthquake actions. Based on the damage model, it was assumed that the annual corrosion rate of the components was the same, and the time-varying damage model considering the environmental action was established.

摘要: 已服役的结构由于所处的环境作用,其构件力学性能必将随时间不断劣化。基于 12 个不同锈蚀程度钢框架节点的低周往复试验,分析近海大气环境作用导致钢框架节点构件力学性能的劣化。考虑到钢框架节点在地震作用变形达不到其变形极限,因而不适宜采用变形能力作为参数评价其损伤程度。刚度指标能够反映构件承载力与变形两个性能指标,且构件的变形与其刚度成反比,建立能够考虑构件因环境作用而引起的初始损伤的基于构件刚度与耗能的双参数地震损伤模型。由试验数据回归得到构件的刚度与累积耗能能力与锈蚀率线性相关,并验算损伤模型的计算精度。研究表明:建立的损伤模型具有较高的计算精度,且计算方便,适用于对地震作用下的钢框架节点进行损伤描述。在损伤模型的基础之上,假定构件年锈蚀率相同,建立构件考虑环境作用的时变损伤模型。

入藏号: CSCD:6409941

地址: Xu Qiang, Geological Engineering and Surveying Engineering College, Chang'an

University, Xi'an, Shaanxi 710054, China.

Zheng Shansuo, School of Civil Engineering, Xi'an University of Architecture and Technology, Xi'an, Shaanxi 710055, China.

Shang Xiaoyu, Collage of Civil Engineering, Northeast Dianli University, Jilin 132012, China.

地址: 徐强, 长安大学地质工程与测绘工程学院, 西安, 陕西 710054, 中国.

郑山锁, 西安建筑科技大学土木工程学院, 西安, 陕西 710055, 中国.

商校瑀, 东北电力大学建筑工程学院, 吉林 132012, 中国.

电子邮件地址: 538270385@163.com; zhengshansuo@263.net

电子邮件地址: 538270385@163.com; zhengshansuo@263.net

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Yang Liping; Pan Xueping; Liu Jing; Xie Wei; Ma Meng

作者: 杨丽萍; 潘雪萍; 刘晶; 谢巍; 马孟

标题: Spatio - temporal variation characteristics of land surface temperature and cold island effect in Ejina oasis

标题: 基于 Landsat 影像的额济纳绿洲地表温度及冷岛效应时空格局研究

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作者关键词: single - window algorithm; land surface temperature; cold island effect; landscape pattern; Ejina oasis

作者关键词: 单窗算法; 地表温度; 冷岛效应; 景观格局; 额济纳绿洲

摘要: Three Landsat images from 2009 to 2017 were used to retrieve land surface temperature(LST) of the Ejina oasis by the single - window algorithm. Inversion accuracy of the retrieved LST was verified by simultaneously acquired MODIS LST product,and the spatio - temporal variation characteristics of the LST,the cold island index,contagion index (CONTAG),Shannon' s evenness index (SHEI) and Shannon' s diversity index (SHDI) were analyzed. The results demonstrate that for different land use types,LST presented the pattern of water body < forest land < grassland < saline - alkali land < bare land,indicating an obvious oasis -

centered " cold island effect" distribution pattern. Cold island indexes decreased from 2009 to 2013 and then increased from 2013 to 2017 with values of 0. 0031,0. 0020 and 0. 0051,respectively. Based on CONTAG,SHEI and SHDI, it was found that the fragmentation,complexity and distribution patterns of various temperature landscapes had undergone great changes,which could also be corroborated by the same trend of cold island index.

摘要: 基于 2009 年 Landsat - 7、2013 年和 2017 年的 Landsat - 8 影像,采用单窗算法反演了研究区的地表温度。在此基础上,用同期 MODIS 数据验证了地表温度的反演精度,分析了地表温度、冷岛指数、蔓延度指数、均匀度指数和多样性指数等景观格局指数的时空变化特征。结果表明:研究区不同地类地表温度表现出水体<林地<草地<盐碱地<裸地的格局,呈现出明显的以绿洲为中心的"冷岛效应"分布模式;2009 年、2013 年和 2017 年的冷岛指数分别为 0. 0031、0. 0020 和 0. 0051,呈现出先减后增的变化趋势;由蔓延度指数、均匀度指数和多样性指数得出,三个年份温度景观的破碎化程度、复杂程度和分布格局变化较大,与冷岛指数变化趋势相同。

入藏号: CSCD:6414720

地址: Yang Liping, School of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

Pan Xueping, School of Earth Science and Resources,Chang' an University, Xi'an, Shaanxi 710054, China.

Liu Jing, School of Earth Science and Resources,Chang' an University, Xi'an, Shaanxi 710054, China.

Xie Wei, School of Earth Science and Resources,Chang' an University, Xi'an, Shaanxi 710054, China.

Ma Meng, School of Earth Science and Resources,Chang' an University, Xi'an, Shaanxi 710054, China.

地址: 杨丽萍, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

潘雪萍, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

刘晶, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

谢巍, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

马孟, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

电子邮件地址: zylpyang@chd.edu.cn

电子邮件地址: zylpyang@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Huang Qiangbing; Jiang Zikan; Deng Yahong; Wang Lixin; Hu Shiwei

作者: 黄强兵; 姜紫看; 邓亚虹; 王立新; 胡士伟

标题: Optimal length for segmented structure of the metro tunnel obliquely crossing active ground fissure zone

标题: 穿越地裂缝带地铁隧道结构分段长度优化研究

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作者关键词: metro tunnel; ground fissure; segmented tunnel with flexible joints; plastic zone; deformation; optimal length

作者关键词: 地铁隧道; 地裂缝; 分段设缝; 塑性区; 变形; 合理长度

摘要: Ground fissure is the most typical geo-hazard in the city of Xi'an. At present, the segmented metro tunnel in Xi'an metro engineering construction are adopted against the active ground fissures and the optimal length of the segmented tunnel structure is the key to the design of the metro tunnel obliquely crossing active ground fissure zone. Considering the Xi'an metro lines passing through active ground fissure zones, the reasonable mode and optimal length of a sectional tunnel with flexible joints are studied in this paper through finite element numerical simulation for the segmented structure of a metro tunnel. The calculation results show that the plastic zone of the tunnel lining is in a small range and mainly distributes in the arch bottom and skewback of the tunnel under the mode of opposite joint, while it is in a large range and relatively complicated in the mode of cantilever, which is comparatively against the reinforced lining. The better of the two modes is opposite joint and the optimal length of the sectional metro tunnel is 15 m. In addition, the main deformation zone of tunnel outside the scope of ground fissures can be segmented according to 10 - 15 m, the length of the fortified area of tunnel beyond the main deformation zone can be properly increased according to other requirements, such as the tunnel waterproof, adjustment of rail slope, etc. The conclusions can be presented as the reference for structure design of urban metro construction and underground space development under the action of ground fissures.

摘要: 目前西安地铁建设中过地裂缝带隧道均采用分段设缝的结构措施,而隧道结构分段长度的优化问题是地铁隧道穿越地裂缝带设防的关键.本文以西安地铁斜交穿越地裂缝带为工程背景,通过分段设缝的地铁隧道斜交跨地裂缝带的有限元数值模拟,研究了斜交跨地裂缝带地铁隧道分段设缝的合理模式及分段隧道的合理长度.计算结果表明:对缝设置模式下分段设缝隧道结构塑性区范围较小,集中在隧道拱底、拱脚;而悬臂设置模式下塑性区分布范围大且较为复杂,不利于进行衬砌加强.地铁隧道穿越地裂缝带衬砌结构宜采取分段设缝的对缝设置模式,跨地裂缝带的分段隧道合理长度为 15 m,位于地裂缝主变形区内的分段隧道长度可按 10~15 m 考虑,而穿越地裂缝主变形区之外的地铁隧道分段长度可根据轨道调坡及隧道防水等其他要求适当增加.研究成果可为地裂缝发育的城市地铁隧道结构设计及其他地下空间开发提供重要的理论依据和技术参考.

入藏号: CSCD:6457012

地址: Huang Qiangbing, Department of Geological Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Jiang Zikan, Department of Geological Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Deng Yahong, Department of Geological Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Lixin, China Railway First Survey and Design Institute Group Ltd., Xi'an, Shaanxi 710043, China.

Hu Shiwei, Beijing Municipal Road & Bridge Group Co., Ltd, Beijing 100045, China.

地址: 黄强兵, 长安大学地质工程系, 西安, 陕西 710054, 中国.

姜紫看, 长安大学地质工程系, 西安, 陕西 710054, 中国.

邓亚虹, 长安大学地质工程系, 西安, 陕西 710054, 中国.

王立新, 中铁第一勘察设计院集团有限公司, 西安, 陕西 710043, 中国.

胡士伟, 北京市政路桥股份有限公司, 北京 100045, 中国.

电子邮件地址: dcdgx24@chd.edu.cn

电子邮件地址: dcdgx24@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Chen Ziyu; Song Yanhui; Yan Hao; Chen Kangda

作者: 陈子玉; 宋彦辉; 严豪; 陈康达

标题: Analyses of the existing problems in the double parameters reduction method

标题: 双参数强度折减法研究中存在的问题分析

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作者关键词: double parameters strength reduction; strength reduction method; slope stability analysis; reduction path; safety factor

作者关键词: 双参数强度折减; 强度折减法; 边坡稳定性分析; 折减路径; 稳定性系数

摘要: In view of the problems in the study of the strength reduction method based on double reduction parameters, the problems of double parameters strength reduction based on the analysis of the traditional strength reduction principle are summarized. By discussing the essence of strength reduction, three problems of reduction path, comprehensive safety factor and calculation

result verification in the study of double parameters strength reduction are analyzed. The results show that for the strength reduction method based on strength reserve, the essence of strength reduction is to reduce the shear strength τ_{uf} . The choice of reduction path in double parameters strength reduction is not universally applicable, and the original shear strength parameters of the slope are changed. The determination of the comprehensive stability coefficient lacks theoretical evidence, this coefficient has no definite physical meaning, and its result is not suitable for the inhomogeneous slope. The calculation of double parameters strength reduction deviates from the essence of slope stability analysis and makes the results of numerical calculation distorted.

摘要: 针对目前双参数强度折减法研究中的问题,在分析传统强度折减法原理的基础上,总结双参数强度折减法存在的问题.通过对强度折减本质的讨论,分析目前双参数强度折减法研究中折减路径、综合稳定性系数、结果验证三方面问题.分析表明:基于强度储备的强度折减法,强度折减法的本质是对抗剪强度 τ_{uf} 进行折减;双参数强度折减法对折减路径的选择上不具有普遍适用性,且改变了边坡原有抗剪强度参数;综合稳定性系数的确定缺乏理论证明,无明确的物理意义,且其结果不适用于非均质边坡;双参数强度折减法的计算偏离了边坡稳定性分析的实质,使得数值计算的结果失真.

入藏号: CSCD:6457014

地址: Chen Ziyu, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Yan Hao, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Chen Kangda, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Song Yanhui, College of Geology Engineering and Geomatics, Chang'an University;;Key Laboratory of Western Mineral Resources and Geological Engineering Ministry of Education, ;;Key Laboratory of Western Mineral Resources and Geological Engineering Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

地址: 陈子玉, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

严豪, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

陈康达, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

宋彦辉, 长安大学地质工程与测绘学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: chdgcdz@163.com

电子邮件地址: chdgcdz@163.com

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作者: Zhang Yabin; Wang Li; Fan Lihong; Qu Xuanyu

作者: 张亚彬; 王利; 范丽红; 曲轩宇

标题: MHSS ARAIM algorithm combined with gross error detection

标题: 组合粗差探测的 MHSS ARAIM 算法

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语言: Chinese

文献类型: Article

作者关键词: ARAIM; MHSS ARAIM; gross error detection; ARAIM; fault detection and identification; MHSS ARAIM

作者关键词: 粗差探测; 故障检测和识别

摘要: Because there are some shortcomings in the current MHSS ARAIM algorithm, such as the weaker robustness, too many computational subsets and large amount of computation, a multiple hypothesis solution separation advanced receiver autonomous integrity monitoring (MHSS ARAIM) algorithm combined with gross error detection is proposed in this paper. With this new algorithm, the gross error detection method is used to identify and eliminate the gross data in the original data first. Then the MHSS ARAIM algorithm is used to deal with the data after the gross error detection. Therefore, this new algorithm can make up for the weakness of the MHSS ARAIM algorithm. Through the data processing and analysis from several IGS and international GNSS monitoring and assessment system (iGMAS) stations, the results show that this new algorithm is superior to MHSS ARAIM in the aviation phase of LPV-200 when it is used in the navigation with GPS and BDS. And under the assumption of a faulty satellite, accuracy of the effective monitoring threshold (EMT) is improved about 22.47% and 9.63%, and accuracy of the vertical protection level (VPL) is improved about 32.28% and 12.98% respectively for GPS and BDS observations respectively. Moreover, under the assumption of two faulty satellites, accuracy of the EMT is improved about 80.85% and 29.88%, and accuracy of the VPL is improved about 49.66% and 18.24% for GPS and BDS observations respectively.

摘要: 针对目前 MHSS ARAIM (multiple hypothesis solution separation advanced receiver autonomous integrity monitoring) 算法存在的抗差能力弱、计算子集过多、计算量过大等不足, 提出一种组合粗差探测的 MHSS ARAIM 算法。该算法先用粗差探测方法对原始数据进行粗差识别与剔除, 然后用 MHSS ARAIM 算法处理经粗差探测后的数据, 可弥补 MHSS ARAIM 算法的不足。对若干 IGS 和全球连续监测评估系统 iGMAS (international GNSS monitoring and assessment system) 监测站观测数据进行计算和分析。结果表明: 在航行 LPV-200 阶段, 该算法应用于 GPS 和 BDS 导航的性能优于 MHSS ARAIM; 在假设单故障情况下, 该算法对 GPS 和 BDS 观测数据的有效监视门限 EMT (effective monitor threshold) 的精度分别提高了 22.47% 和 9.63%, 对 VPL (vertical protection level) 的精度分别提高了 32.28% 和 12.98%; 在假设双故障情况下, 对 EMT 的精度分别提高了 80.85% 和 29.88%, 对 VPL 的精度分别提高了 49.66% 和 18.24%。

入藏号: CSCD:6414170

地址: Zhang Yabin, College of Geology Engineering and Geomatics, Changan University;; State Key Laboratory of Geographic Information Engineering;; National Administration of

Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, ;;State Key Laboratory of Geographic Information Engineering;;National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, Xian;;Xian;;Xian, ;;; 710054;;710054;;710054.

Wang Li, College of Geology Engineering and Geomatics, Changan University;;State Key Laboratory of Geographic Information Engineering;;National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, ;;State Key Laboratory of Geographic Information Engineering;;National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, Xian;;Xian;;Xian, ;;; 710054;;710054;;710054.

Fan Lihong, College of Geology Engineering and Geomatics, Changan University;;State Key Laboratory of Geographic Information Engineering;;National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, ;;State Key Laboratory of Geographic Information Engineering;;National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, Xian;;Xian;;Xian, ;;; 710054;;710054;;710054.

Qu Xuanyu, College of Geology Engineering and Geomatics, Changan University;;State Key Laboratory of Geographic Information Engineering;;National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, ;;State Key Laboratory of Geographic Information Engineering;;National Administration of Surveying, Mapping and Geoinformation Engineering Research Center of Geographic National Conditions Monitoring, Xian;;Xian;;Xian, ;;; 710054;;710054;;710054.

地址: 张亚彬, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室;;地理国情监测国家测绘地理信息局工程技术研究中心, ;;地理信息工程国家重点实验室;;地理国情监测国家测绘地理信息局工程技术研究中心, 西安;;西安;;西安, 陕西;;陕西;;陕西 710054;;710054;;710054, 中国.

王利, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室;;地理国情监测国家测绘地理信息局工程技术研究中心, ;;地理信息工程国家重点实验室;;地理国情监测国家测绘地理信息局工程技术研究中心, 西安;;西安;;西安, 陕西;;陕西;;陕西 710054;;710054;;710054, 中国.

范丽红, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室;;地理国情监测国家测绘地理信息局工程技术研究中心, ;;地理信息工程国家重点实验室;;地理国情监测国家测绘地理信息局工程技术研究中心, 西安;;西安;;西安, 陕西;;陕西;;陕西 710054;;710054;;710054, 中国.

曲轩宇, 长安大学地质工程与测绘学院;;地理信息工程国家重点实验室;;地理国情监测国家测绘地理信息局工程技术研究中心, ;;地理信息工程国家重点实验室;;地理国情监测国家测绘地理信息局工程技术研究中心, 西安;;西安;;西安, 陕西;;陕西;;陕西 710054;;710054;;710054, 中国.

电子邮件地址: zyb199202@126.com; wangli@chd.edu.cn

电子邮件地址: zyb199202@126.com; wangli@chd.edu.cn

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作者: Zhao Chaoying; Wang Baohang

作者: 赵超英; 王宝行

标题: SAR interferogram denoising based on robust covariance matrix decomposition

标题: SAR 干涉图降噪的稳健协方差矩阵分解法

来源出版物: 测绘学报 卷: 48 期: 1 页: 24-33 出版年: 2019

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作者关键词: homogeneous point; robust estimation; covariance matrix decomposition; interferogram denoising

作者关键词: 同质点; 稳健估计; 协方差矩阵分解; 干涉图去噪

摘要: Interferogram denoising plays an important role to the application of InSAR technique. If the phase noise cannot be well filtered, the phase unwrapping error is frequently arisen, which will further result in the mistakes in the DEM product and the deformation result. The complex value of each SAR resolution unit is superimposed by the phases from different scatterers, so the paper focuses on the characteristics of single dominant phase scattering model (the permanent scatterer) and traditional distributed scatterer of single scattering mechanism. Then the robust covariance matrix, estimated based on multi-baseline SAR data, is decomposed and the eigenvector corresponding to the maximum eigenvalue is chosen as the filtered phase. Besides, the covariance matrix is robustly estimated by weighted averaging the heterogeneous points. This method can operate better than the improved Goldstein filter algorithm in the terms of coherence improvement and effective coherent targets increasing, especially in the low-coherence regions. Eight real TerraSAR-X data over one land subsidence region, Qingxu, Shanxi verifies the advantages of our new method.

摘要: 干涉图降噪在 InSAR 技术应用中发挥着重要作用, 若降噪效果不好将引起干涉图相位解缠的误差, 并进一步导致 DEM 或形变结果的错误。由于干涉图分辨单元的信号(相位)是由分辨单元内多个散射体的回波信号(相位)叠加而成, 本文针对单一主导散射体的散射模型(永久性散射体模型)和只考虑一种散射机制的分布式散射体模型相位的特点, 对多基线 SAR 数据估计的协方差矩阵采用特征值分解的方法来分离相位中的噪声, 通过提取最大特征值对应的特征向量(相位), 从而实现干涉图降噪的目的。而对于协方差矩阵估计时引入的异质点, 本文采用了一种稳健的协方差矩阵估计方法。通过覆盖山西清徐地面沉降形变区的 8 景真实

TerraSAR 数据试验验证了该方法的有效性。结果表明该方法比改进的 Goldstein 滤波方法在相干性提高、有效目标点增加两方面均有显著提高,特别在低相干区域由于相干点的增加也获取了更多的形变监测信息。

入藏号: CSCD:6414172

地址: Zhao Chaoying, School of Geology Engineering and Geomatics,Changan University;;Engineering Research Center of National Geographic Conditions Monitoring,National Administration of Surveying,Mapping and Geoinformation, ;;Engineering Research Center of National Geographic Conditions Monitoring,National Administration of Surveying,Mapping and Geoinformation, Xian;;Xian, ;; 710054;;710054.

Wang Baohang, School of Geology Engineering and Geomatics,Changan University, Xian, 710054.

地址: 赵超英, 长安大学地质工程与测绘学院;;地理国情监测国家测绘地理信息局工程技术研究中心, ;;地理国情监测国家测绘地理信息局工程技术研究中心, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

王宝行, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: zhaochaoying@163.com

电子邮件地址: zhaochaoying@163.com

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作者: Li Bin; Wei Junbo; Ma Bochao; Wang Lu; Xu Mingxia

作者: 李斌; 魏俊博; 马博超; 王璐; 徐明霞

标题: Slicing 3Dlaser point cloud method for volume calculation of irregular object

标题: 不规则体体积计算三维激光点云切片法

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文献类型: Article

作者关键词: three-dimensional laser scanner; point cloud volume calculation; point cloud slicing method; contour polygon; bidirectional latest search; amplification effect; shape distortion

作者关键词: 三维激光扫描; 点云体积计算; 点云切片法; 外轮廓多边形; 双向最近点搜索;

放大效应; 形态畸变

摘要: Volume parameter is the basic content of a spatial body object morphology analysis. However, the challenge lies in the volume calculation of irregular objects. The point cloud slicing method proposed in this study effectively works in calculating the volume of the point cloud of the spatial object obtained through three-dimensional laser scanner (3DLS). In this method, a uniformly spaced sequent slicing process is first conducted in a specific direction on the point cloud of the spatial object obtained through 3DLS. A series of discrete point cloud slices corresponding to the point cloud bodies are then obtained. Subsequently, the outline boundary polygon of the point cloud slicing is searched one by one in accordance with the slicing sequence and areas of the polygon. The point cloud slice is also calculated. Finally, the individual point cloud section volume is calculated through the slicing areas and the adjacent slicing gap. Thus, the total volume of the scanned spatial object can be calculated by summing up the individual volumes. According to the results and analysis of the calculated examples, the slice-based volume-calculating method for the point cloud of irregular objects obtained through 3DLS is correct, concise in process, reliable in results, efficient in calculation methods, and controllable in accuracy. This method comes as a good solution to the volume calculation of irregular objects.

摘要: 体积参数是空间体对象形态分析的基本内容, 难点是不规则体的体积计算。本文提出的点云切片法, 快捷准确地解决了由三维激光扫描空间体对象所得点云体的体积计算难题。该法先将三维激光扫描空间体对象所得点云按特定方向顺序进行等间距的切片处理, 得到与点云体相对应的、离散的系列点云切片; 再依切割次序逐一搜索点云切片外轮廓多边形, 并计算多边形(即点云切片)的面积; 最后, 利用切片面积和相邻切片间距求解点云段块体积, 并求和得到整体点云体(即所扫描空间体对象)的体积。算例计算结果与分析表明, 基于切片的不规则体的三维激光扫描点云的体积计算方法正确、简洁、可靠、高效、可控, 可以解决不规则体的体积计算问题。

入藏号: CSCD:6414174

地址: Li Bin, School of Geology Engineering and Geomatics, Changan University;; Key Laboratory of Western China Mineral Resources and Geological Engineering, Ministry of Education, ;; Key Laboratory of Western China Mineral Resources and Geological Engineering, Ministry of Education, Xian;; Xian, ;; 710054;; 710054.

Wei Junbo, School of Geology Engineering and Geomatics, Changan University, Xian, 710054.

Ma Bochao, School of Geology Engineering and Geomatics, Changan University, Xian, 710054.

Wang Lu, School of Geology Engineering and Geomatics, Changan University, Xian, 710054.

Xu Mingxia, Shaanxi Institute of Technology, Xian, 710300.

地址: 李斌, 长安大学地质工程与测绘学院;; 西部矿产资源与地质工程教育部重点实验室, ;; 西部矿产资源与地质工程教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

魏俊博, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

马博超, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

王璐, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

徐明霞, 陕西国防工业职业技术学院, 西安, 陕西 710300, 中国.

电子邮件地址: binliok@chd.edu.cn; 358924810@qq.com

电子邮件地址: binliok@chd.edu.cn; 358924810@qq.com

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作者: Li Quanzhou; Cui Jianjun

作者: 李泉洲; 崔建军

标题: A method of terrain rendering based on GPU Tessellation

标题: 一种基于 GPU Tessellation 的地形渲染方法

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作者关键词: GPU Tessellation; terrain visualization; GPU rendering; GPU Tessellation; crack elimination

作者关键词: 地形可视化; GPU 渲染; 裂缝消除

摘要: In order to improve rendering efficiency and obtain smoother and more realistic terrain during large-scale terrain real-time rendering, this paper presented a terrain visualization method based on graphic processing unit (GPU) Tessellation technology. In the preprocessing stage, a quadtree was constructed for the terrain in this method. The amount of CPU-GPU data transfer using frustum cropping and levels of detail (LOD) selection was reduced. In the triangulation phase, using the GPU instead of the traditional central processing unit (CPU) for triangulation greatly reduced the burden on the CPU and improved the rendering rate. At the same time, terrain roughness was used to calculate the internal subdivision factor of the GPU Tessellation algorithm to achieve a smooth and detailed terrain rendering effect. The external subdivision factor of GPU Tessellation algorithm was dynamically set according to the level of data detail to eliminate T-conjunction cracks. Results of experiments showed that the method had low CPU utilization and could eliminate T-conjunction cracks with less computational cost, and could output smooth and realistic three-dimensional virtual digital terrain at a higher rendering frame rate in a terrain real-time interactive roaming system. The results showed that this method was practical and could be applied to large-scale terrain visualization systems.

摘要: 为了在大规模地形实时渲染过程中提高渲染效率和得到更平滑逼真的地形, 该文提出了一种基于 GPU Tessellation 技术的地形可视化方法。该方法首先对地形预处理构建四叉树; 使用视锥体裁剪和 LOD 选择降低 CPU-GPU 数据传输量; 在三角化阶段利用 GPU 代替传统的 CPU 进行三角化方法极大地减轻 CPU 的负担并且提高了渲染速率; 同时引入地形粗糙度

计算 GPU Tessellation 算法内部细分因子,达到平滑而又不失细节的地形表面渲染效果;以数据细节层次动态设置 GPU Tessellation 算法的外部细分因子消除了 T 型裂缝。实验结果表明,该方法 CPU 利用率低,能够以较小计算代价消除 T 型裂缝,在地形实时交互式漫游系统中能以较高的渲染帧率输出平滑、逼真的三维虚拟数字地形。该文方法可运用到大规模地形可视化系统中。

入藏号: CSCD:6422263

地址: Li Quanzhou, College of Geology Engineering and Geomatics,Changan University, Xian, 710054.

Cui Jianjun, College of Geology Engineering and Geomatics,Changan University, Xian, 710054.

地址: 李泉洲, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

崔建军, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: li1069681024@163.com; stonecui@chd.edu.cn

电子邮件地址: li1069681024@163.com; stonecui@chd.edu.cn

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作者: Wang Yipeng; Zhang Yongzhi; Zhao Chaoying; Li Yulei; Zhang Tengfei

作者: 王毅鹏; 张永志; 赵超英; 李宇磊; 张腾飞

标题: Design of landslide monitoring cloud platform based on cloud computing technology: taking Jingyang as an example

标题: 云计算技术下的滑坡监测云平台设计以陕西泾阳为例

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作者关键词: cloud computing; Jingyang; landslide; disaster monitoring

作者关键词: 云计算; 泾阳; 滑坡; 灾害监测

摘要: This paper analyzed and discussed the software architecture and key technology of the landslide disaster monitoring cloud platform,based on the data processing and related theory and tecnology. The software architecture of landslide monitoring cloud platform and detailed function module in the core layer of Jingyang county landslide in Shaanxi province was employed as an example. The paltform also reserved the application programming interface to users. In addition,this paper also analyzed the advantages and disadvantages of the landslide monitoring cloud platform,providing certain research and reference value for the future designing and

implementation of other geological disaster monitoring cloud platform.

摘要: 研究分析了基于云计算技术的灾害监测云服务平台的体系架构和关键技术,并结合滑坡灾害监测和数据处理的相关理论,以陕西泾阳的滑坡为例,设计了滑坡灾害监测云服务平台的软件体系结构并细化了核心层的功能模块,也预留了开发应用程序的接口。此外,本文还分析了滑坡灾害监测云平台的优点及不足,为今后设计和实现其他地质灾害监测云服务平台提供了一定的研究和参考价值。

入藏号: CSCD:6460896

地址: Wang Yipeng, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Yongzhi, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhao Chaoying, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Yulei, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Tengfei, School of Geological Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 王毅鹏, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

张永志, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

赵超英, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

李宇磊, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

张腾飞, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: yipeng66@sina.com.cn

电子邮件地址: yipeng66@sina.com.cn

使用次数 (最近 180 天): 1

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作者: Liang Xin; Fan Wen; Su Yanjun; Li Pei

作者: 梁鑫; 范文; 苏艳军; 李培

标题: Study on Early Identification Technology of Concealed Geological Hazards in Vanadium Mining Area of Qinling

标题: 秦岭钒矿集中开采区隐蔽性地质灾害早期识别研究

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作者关键词: Vanadium mining area; concealment; geological hazard; early identification technology; Qinling

作者关键词: 钒矿开采区; 隐蔽性; 地质灾害; 早期识别技术; 秦岭

摘要: Geological hazards in the mineral resources mining area of Qinling have the characteristics of complicated formation conditions,concealment and identification difficulties. How to identify hidden geological hazards is a difficult point. Based on the survey of the geological hazards in the vanadium mining area in Qinling,we summarize the regularity of the geological hazards in this area mainly from the characteristics of the slope rock mass composition,the characteristics of the rock mass structure,elevation,slope shape,the angle of slope and mining activities. On this basis,combined with remote sensing interpretation of UAV,formed a set of suitable methods for early identification of geological disasters in this area and provides technical support and theoretical basis for early warning and prevention of mine slope hazards.

摘要: 秦岭矿产资源开采区地质灾害具有形成条件复杂、隐蔽性强与识别难等特点.如何识别隐蔽性地质灾害是一难点.通过秦岭钒矿开采区地质灾害详细调查,主要从斜坡体岩性组合特征、斜坡岩体结构特征、高程、坡型、坡度以及采矿活动六个方面总结了该区域地质灾害发育规律.在此基础上,结合无人机航拍室内解译提出了一套适用于该地区的隐蔽性斜坡灾害早期识别方法,从而为矿山斜坡灾害预警与防治提供理论依据和技术支持.

入藏号: CSCD:6423901

地址: Liang Xin, Department of Geology Engineering,Chang' an University, Xi'an, Shaanxi 710064, China.

Fan Wen, Department of Geology Engineering,Chang' an University, Xi'an, Shaanxi 710064, China.

Su Yanjun, Department of Geology Engineering,Chang' an University, Xi'an, Shaanxi 710064, China.

Li Pei, Department of Geology Engineering,Chang' an University, Xi'an, Shaanxi 710064, China.

地址: 梁鑫, 长安大学地质工程与测绘学院, 西安, 陕西 710064, 中国.

范文, 长安大学地质工程与测绘学院, 西安, 陕西 710064, 中国.

苏艳军, 长安大学地质工程与测绘学院, 西安, 陕西 710064, 中国.

李培, 长安大学地质工程与测绘学院, 西安, 陕西 710064, 中国.

电子邮件地址: 243337764@qq.com

电子邮件地址: 243337764@qq.com

使用次数 (最近 180 天): 0

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作者: Ji Xiaolin; Wang Wanyin; Qiu Zhiyun

作者: 纪晓琳; 王万银; 邱之云

标题: Parameter choose experimental research to the minimum curvature technique potential field data separation method

标题: 最小曲率位场分离方法参数选择试验研究

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语言: Chinese

文献类型: Article

作者关键词: Minimum curvature; Situ iterative; Single step; Superposition step; Iterative step; Iterative time; Separation of the field data

作者关键词: 最小曲率; 原位迭代; 单步长; 叠加步长; 迭代步长; 迭代次数; 位场分离

摘要: One of the difficult problem in potential field data interpretation is the separation of regional and residual anomalies from the total anomaly. Author did research on the two types of minimum curvature potential field separation difference iterative format of the single step iteration non in situ and in situ iterative in 2015, and the convergence and potential field separation effect have been studied by using Fourier spectrum analysis theory. How to choose the parameters is the research content of this paper. first of all we discussed the choosing of the iteration step and the iteration time using the theory model. By research, single step in situ iterative and superposition step iterative in situ are convergent and can get the better potential field separation results. Choosing of the iteration step depends on the purpose of the separation of the potential field. It is the optimal iteration times when the potential field anomaly iteration maximum residual and the observation field anomaly mean average relative error are tend to zero. We verified the effectiveness of the method using the combination of three layers models, but the step by step potential field separation method need to be research deeply. Then, use the satellite altimetry gravity anomaly of the Gabon basin in south central section of West Africa to prove that the minimum curvature method can be used for the separation of the field data.

摘要: 位场分离是位场解释中最困难的问题之一。本文作者曾在 2015 年研究了单步长非原位和原位迭代两种类型最小曲率位场分离差分迭代格式, 并利用 Fourier 频谱分析理论研究了这两种类型迭代格式的收敛性及位场分离效果, 在实际应用中如何选择有关参数就是本文研究的内容。首先, 利用理论模型对迭代步长和迭代次数选择进行了模型试验, 模型试验显示单步长原位迭代和叠加步长原位迭代均能收敛、且能获得较好的位场分离效果; 迭代步长可根据位场分离目的选取, 当位场异常迭代最大残差差值和原场均值平均相对误差差值趋于 0 时的迭代次数为最佳迭代次数; 其次, 三层组合模型位场分离试验再次验证了原位迭代最小曲率位场分离方法的有效性。最后, 利用西非中南段加蓬盆地卫星测高重力异常数据处理试验显示了最小曲率位场分离方法的实用性。

入藏号: CSCD:6563072

地址: Ji Xiaolin, Gravity and Magnetic Institute of Chang'an University, College of Geology Engineering and Geomatics, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an, Shaanxi 710054, China.

Wang Wanyin, Gravity and Magnetic Institute of Chang'an University, College of Geology Engineering and Geomatics, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an, Shaanxi 710054, China.

Qiu Zhiyun, Gravity and Magnetic Institute of Chang'an University, College of Geology Engineering and Geomatics, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an, Shaanxi 710054, China.

地址: 纪晓琳, 长安大学重磁方法技术研究所, 长安大学地质工程与测绘学院, 西部矿产资源与地质工程教育部重点实验室, 西安, 陕西 710054, 中国.

王万银, 长安大学重磁方法技术研究所, 长安大学地质工程与测绘学院, 西部矿产资源与地质工程教育部重点实验室, 西安, 陕西 710054, 中国.

邱之云, 长安大学重磁方法技术研究所, 长安大学地质工程与测绘学院, 西部矿产资源与地质工程教育部重点实验室, 西安, 陕西 710054, 中国.

电子邮件地址: jixl@chd.edu.cn; wwy7902@chd.edu.cn

电子邮件地址: jixl@chd.edu.cn; wwy7902@chd.edu.cn

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作者: Ji Xiaolin; Wang Wanyin; Du Xiangdong; Lu Baoliang; Huang Xingwen; Feng Xuliang; Guo Yun

作者: 纪晓琳; 王万银; 杜向东; 鲁宝亮; 黄兴文; 冯旭亮; 郭允

标题: Tectonic division by gravity and magnetic anomaly data of salt-bearing basins, south-central section of West Africa

标题: 利用重磁资料研究西非中南段含盐盆地构造区划

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作者关键词: South-central section of West Africa; Salt-bearing basins; Subsalt rifts; Subsalt fault; The minimum curvature technique; Potential field data separation

作者关键词: 西非中南段; 含盐盆地; 盐下裂谷; 盐下断裂; 最小曲率; 位场分离

摘要: The salt-bearing basins in south-central section of West Africa are located on the east coast

of the Atlantic Ocean. The thick salt rock formed during the Aptian period that happened at the transition stage of structural evolution, which is divided into three tectonic sequences: upper salt layer, salt layer and lower salt layer. It is a big challenge to research the major faults that control the boundaries of rifts and morphological dimensions of rifts based on the poor-quality seismic reflection data that is influenced by the shading effect of salt rock. In this paper, we study the subsalt structure of salt-bearing basins in this region using gravity and magnetic anomaly data which have several advantages such as wide area coverage, strong horizontal resolution and less effect from salt rock. In addition, combining the seismic reflection and geologic data, we further study the tectonic pattern of subsalt in this area. Results suggest that the salt-bearing basins in south-central section of West Africa are characterized by zones in east-west and blocks in south-north. The boundaries of Rio Muni Basin, Gabon Basin, Lower Congo Basin and Kwanza Basin are redefined. Two subsalt rifts and 28 subsalt sags are identified, where are present alternating uplifts and depressions. We also infer 16 first-order and 23 second-order subsalt faults, which exhibit extension in east-west and strike-slip in north-east. The results of this study provide geophysical supports to the seismic sequence reanalysis, choosing exploration areas of subsalt oil and gas and the exploration deployment in the next step.

摘要: 西非中南段含盐盆地处于大西洋东岸浅海区,在构造演化的过渡阶段形成了巨厚的 Aptian 期蒸发盐岩,将该区分为盐上层、盐层和盐下层三个构造层序。而盐岩的遮蔽效应使得盐下层地震反射品质差、盐下层序研究程度低,致使裂谷主控断裂、裂谷规模及展布形态不清楚。本文利用重、磁资料覆盖面广、横向分辨能力强、受盐岩影响小的优势,结合地震及地质资料,研究了西非中南段含盐盆地盐下构造格局。通过研究表明,西非中南段含盐盆地整体呈现东西分带,南北分块的构造特征;重新厘定了里奥穆尼、加蓬、下刚果和宽扎 4 个含盐盆地边界;识别了 2 个盐下裂谷带及其内部 28 个盐下凹陷,盐下凹陷呈现垒堑相间的结构特征;推断了盐下一级断裂 16 条,二级断裂 23 条,呈现东西拉张,北东走滑的力学特征。该项研究成果为该区盐下地震层序再解释、盐下油气战略选区及下一步勘探部署提供了地球物理依据。

入藏号: CSCD:6473000

地址: Ji Xiaolin, Institute of Gravity and Magnetic Technology, School of Geology Engineering and Geomatics, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an, Shaanxi 710054, China.

Wang Wanyin, Institute of Gravity and Magnetic Technology, School of Geology Engineering and Geomatics, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an, Shaanxi 710054, China.

Lu Baoliang, Institute of Gravity and Magnetic Technology, School of Geology Engineering and Geomatics, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an, Shaanxi 710054, China.

Du Xiangdong, Exploration Department of CNOOC China Limited, Beijing 100027, China.

Huang Xingwen, Exploration Department of CNOOC China Limited, Beijing 100027, China.

Guo Yun, Exploration Department of CNOOC China Limited, Beijing 100027, China.

Feng Xuliang, Institute of Gravity and Magnetic Technology, School of Geology Engineering and Geomatics, Chang'an University;; School of Earth Sciences and Engineering, Xi'an Shiyou University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Xi'an;; Xi'an, ;; 710054;; 710065.

地址: 纪晓琳, 长安大学重磁方法技术研究所, 长安大学地质工程与测绘学院, 长安大学, 西部矿产资源与地质工程教育部重点实验室, 西安, 陕西 710054, 中国.

王万银, 长安大学重磁方法技术研究所,长安大学地质工程与测绘学院,长安大学, 西部矿产资源与地质工程教育部重点实验室, 西安, 陕西 710054, 中国.

鲁宝亮, 长安大学重磁方法技术研究所,长安大学地质工程与测绘学院,长安大学, 西部矿产资源与地质工程教育部重点实验室, 西安, 陕西 710054, 中国.

杜向东, 中海油研究总院, 北京 100027, 中国.

黄兴文, 中海油研究总院, 北京 100027, 中国.

郭允, 中海油研究总院, 北京 100027, 中国.

冯旭亮, 长安大学重磁方法技术研究所,长安大学地质工程与测绘学院,长安大学;;西安石油大学地球科学与工程学院, 西部矿产资源与地质工程教育部重点实验室;;, 西安;;西安, ;;710054;;710065.

电子邮件地址: jixl@chd.edu.cn; wwy7902@chd.edu.cn

电子邮件地址: jixl@chd.edu.cn; wwy7902@chd.edu.cn

使用次数 (最近 180 天): 1

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作者: Ma Jie; Wang Wanyin; Ji Xiaolin

作者: 马杰; 王万银; 纪晓琳

标题: Tectonic Characteristics of Cesar Basin and Its Adjacent Areas According to Gravity Field

标题: 利用重力场研究塞萨尔盆地及邻区构造特征

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作者关键词: Bouguer gravity anomaly; fault distribution; tectonic zonation; Cesar Basin; tectonic unit

作者关键词: 布格重力异常; 断裂分布; 构造区划; 塞萨尔盆地; 构造单元

摘要: In order to use the geophysical data to study the structural characteristics of the Cesar Basin and its adjacent areas,this paper has systematically collected and compiled the existing gravity data in the study area.Based on Bouguer gravity anomaly,the paper identifies the fracture information by the minimum curvature field separation method and NVDR-THDR,analyses the

geological and geophysical characteristics of major faults and determines the fracture system in the study area by combining with geological geophysical data. In the study area, there are four faults found in the near EW, NNW, NW and NE directions. It is believed that the Oca strike-slip fault extends westward to the sea area, and this extension suggests the position of the SMB strike-slip fault and the Algarrobo strike-slip fault. The four groups of faults control the structural framework of the study area, making it an "inverted triangle" as a whole, while this "inverted triangle" is divided into three structural blocks: West, Middle, and East. The fault boundary between blocks is the Santa Marta rock body, the Cesar Basin and the Sierra de Perija Mountain respectively. Finally, the analysis of fault distribution, basement characteristics and previous research further infers the boundary of the Cesar Basin, which is limited by faults, and the Basin extends southwards and westwards. Within the Basin, faults F8 and F9 divide the Basin into three sub-tectonic units: the northern depression, the central uplift, and the southern depression.

摘要: 为了利用地球物理资料研究塞萨尔盆地及邻区构造特征,系统搜集整理了研究区已有的重力资料。根据布格重力异常,采用最小曲率位场分离方法、归一化总水平导数垂向导数方法(NVDR-THDR)识别出断裂信息,结合地质地球物理资料,重点分析了主要断裂的地质地球物理特征,确定了研究区内的断裂体系。研究发现,研究区内主要发育近EW向、NNW向、NW向和NE向4组断裂,认为Oca走滑断裂向西延伸至海区内,推测了SMB走滑断裂和Algarrobo走滑断裂平面位置;认为不同走向的4组断裂控制了研究区的构造格架,使之整体呈倒三角型,倒三角内分西、中和东3个构造块体,块体间以断裂为界分别为Santa Marta岩体、塞萨尔盆地和Sierra de Perija山;最后,结合断裂分布、基底特征及前人研究,重新推测了塞萨尔盆地的边界,其边界均受断裂所限,盆地范围向南、向西扩展,盆地内部,断裂F8、F9将盆地划分为北部坳陷、中部隆起和南部坳陷3个次级构造单元。

入藏号: CSCD:6432126

地址: Ma Jie, Gravity & Magnetic Institute, Chang'an University;; College of Geology Engineering and Geomatics, Chang'an University;; Chang'an University, ;;; Key Laboratory of Western China's Mineral Resources and Geological Engineering of Ministry of Education, Xi'an;; Xi'an;; Xi'an, ;;; 710054;; 710054;; 710054.

Wang Wanyin, Gravity & Magnetic Institute, Chang'an University;; College of Geology Engineering and Geomatics, Chang'an University;; Chang'an University, ;;; Key Laboratory of Western China's Mineral Resources and Geological Engineering of Ministry of Education, Xi'an;; Xi'an;; Xi'an, ;;; 710054;; 710054;; 710054.

Ji Xiaolin, Gravity & Magnetic Institute, Chang'an University;; College of Geology Engineering and Geomatics, Chang'an University;; Chang'an University, ;;; Key Laboratory of Western China's Mineral Resources and Geological Engineering of Ministry of Education, Xi'an;; Xi'an;; Xi'an, ;;; 710054;; 710054;; 710054.

地址: 马杰, 长安大学重磁方法技术研究所;; 长安大学地质工程与测绘学院;; 长安大学, ;;; 西部矿产资源与地质工程教育部重点实验室, 西安;; 西安;; 西安, ;;; 710054;; 710054;; 710054.

王万银, 长安大学重磁方法技术研究所;; 长安大学地质工程与测绘学院;; 长安大学, ;;; 西部矿产资源与地质工程教育部重点实验室, 西安;; 西安;; 西安, ;;; 710054;; 710054;; 710054.

纪晓琳, 长安大学重磁方法技术研究所;; 长安大学地质工程与测绘学院;; 长安大学, ;;; 西部矿产资源与地质工程教育部重点实验室, 西安;; 西安;; 西安, ;;; 710054;; 710054;; 710054.

电子邮件地址: mj0503@126.com; wwy7902@chd.edu.com

电子邮件地址: mj0503@126.com; wwy7902@chd.edu.com

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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环境科学与工程学院

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作者: Sun Yukun; Bai Bo; Ma Meiling; Wang Honglun; Suo Yourui; Xie Liming; Chai Zhen

作者: 孙钰琨; 白波; 马美玲; 王洪伦; 索有瑞; 谢黎明; 柴禛

标题: Preparation and Field-effect Mobility of Nb Doped MoS₂ Nano-films on SiO₂ Substrate

标题: SiO₂ 基底 Nb 原位掺杂 MoS₂ 纳米薄膜的制备及场效应

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作者关键词: 二维薄膜材料; 过渡金属硫化物; 化学气相沉积法(CVD); 拉曼光谱; 光致发光光谱; 场效应晶体管

摘要: In this study, large-area growth of Nb-MoS₂ layers on SiO₂ substrates using one-pot chemical vapor deposition via two steps was successfully achieved. For the first time, a facile, cost-effective and mass-scalable direct synthesis approach was designed for doping Nb into MoS₂ layers using MoO₃, sulfur (S) and NbCl₅ as precursors. The proposed process allowed retaining the uniformity of large area thin layers which are suitable for device fabrication. The structural and optical properties of the resulting Nb-MoS₂ layers were systematically investigated. Scanning electron microscope (SEM), atomic force microscope (AFM), Raman, photoluminescence (PL) spectra and X-ray photoelectron spectroscopy (XPS) analyses confirmed the formation of continuous and crystalline few-layered MoS₂ and Nb-MoS₂. An obvious blue-shift of up to 90 meV in photoluminescence peaks was observed for samples with different grain sizes. The electrical properties of the as-prepared materials were evaluated by bottom-gate FETs. A field-effect mobility of 1.22 cm²·V⁻¹·s⁻¹ and a current on/off ratio of 10⁵ were obtained. In particular, Nb-MoS₂ prepared by Nb doping greatly reduced the resistance of the film to 66.67 kΩ. These findings provide a novel route towards scaled-up synthesis of high-quality few-layered MoS₂ by transition-metal doping in TMDCs which are suitable for electronic and optoelectronic devices.

摘要: 以氧化钼(MoO₃)、硫(S)和氯化铌(NbCl₅)作为前驱体,利用一锅两步化学气相沉积法,在 SiO₂ 基底上大面积地生长连续性好、均匀负载的 Nb-MoS₂ 薄膜结构。通过扫描电子

显微镜(SEM)和原子力显微镜(AFM)表征可知薄层具有较好的连续性,同时使用拉曼光谱(Raman)、光致发光光谱(PL)和X射线光电子能谱(XPS)证实了掺杂后薄膜内部出现高达90 meV的蓝移现象。将薄膜制成场效应管(FET),并对其电学性能进行测试得出,场效应迁移率为 $1.22 \text{ cm}^2 \cdot \text{V}^{-1} \cdot \text{s}^{-1}$,电流开关比为105,并证实了当Nb掺杂入MoS₂薄膜后使得薄膜整体阻抗大幅降低,整体阻抗降低到66.67 k Ω ,比未掺杂Nb的MoS₂薄膜降低了约40%。本工艺操作简单、成本低、重现率高,为制备高质量、大面积过渡金属掺杂的MoS₂薄膜光电学器件提供了新的途径。

入藏号: CSCD:6511849

地址: Sun Yukun, Changan University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Xian, 710054.

Ma Meiling, Changan University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Xian, 710054.

Chai Zhen, Changan University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Xian, 710054.

Bai Bo, Changan University;;Northwest Plateau Institutes of Biology,Chinese Academy of Sciences, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region;;, Xian;;Xining, ;; 710054;;810001.

Wang Honglun, Northwest Plateau Institutes of Biology,Chinese Academy of Sciences, Xining, Qinghai 810001, China.

Suo Yourui, Northwest Plateau Institutes of Biology,Chinese Academy of Sciences, Xining, Qinghai 810001, China.

Xie Liming, National Center for Nanoscience and Technology, Key Laboratory of Standardization and Measurement for Nanotechnology of Chinese Academy of Sciences, Beijing 100190, China.

地址: 孙钰琨, 长安大学, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

马美玲, 长安大学, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

柴祺, 长安大学, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

白波, 长安大学;;中科院西北高原生物研究所, 旱区地下水文与生态效应教育部重点实验室;;, 西安;;西宁, ;; 710054;;810001.

王洪伦, 中科院西北高原生物研究所, 西宁, 青海 810001, 中国.

索有瑞, 中科院西北高原生物研究所, 西宁, 青海 810001, 中国.

谢黎明, 国家纳米科学中心, 中国科学院纳米标准与检测重点实验室, 北京 100190, 中国.

电子邮件地址: baibochina@163.com

电子邮件地址: baibochina@163.com

使用次数 (最近 180 天): 1

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作者: Wei Hong; Huo Aidi; Guan Wenke; Du Weihong; Yang Lei; Huang Zhikai

作者: 韦红; 霍艾迪; 管文轲; 杜伟宏; 杨磊; 黄志凯

标题: Dynamic Changes of Vegetation Coverage in Tarim River Basin with MODIS Data

标题: 运用中分辨率成像光谱数据对塔里木河流域植被覆盖度动态变化分析

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作者关键词: Tarim River Basin; MODIS data; Vegetation coverage

作者关键词: 塔里木河流域; MODIS 数据; 植被覆盖度

摘要: In order to accelerate the process of vegetation protection and restoration in the Tarim River Basin based on the remote sensing image and basic data of the Tarim River Basin from 2007 to 2018, the 3S technology platform was used to systematically analyze the Tarim River Basin for 12 years. During the year, the annual and interannual variation characteristics of vegetation coverage and the spatial changes in the Tarim River Basin were investigated and tested. The vegetation coverage of the Tarim River Basin tended to improve from 2007 to 2017. The annual average vegetation coverage growth rate in the study area was 3.29% in the past 11 years. In 2017, the vegetation coverage in the upper reaches of the Tarim River increased by 30.8% compared with 2007; the vegetation coverage in the middle reaches of the Tarim River increased by 29.4%; and the vegetation coverage in the lower reaches of the Tarim River increased by 53.2%. Vegetation coverage in the Tarim River Basin was consistent with the growing season of the vegetation. The maximum vegetation coverage during the year appeared in August, and the lowest value appeared in April. Take the upstream section as an example, the difference between the two was 21.39% in 2017. The spatial difference of vegetation coverage in Tarim River Basin is obvious, showing a decreasing trend from upstream to downstream, and the difference between upstream and downstream reaches 4.51 times.

摘要: 为加快塔里木河流域植被的保护、恢复进程,运用 2007-2017 年塔里木河流域遥感影像和基础数据,利用 3S 技术平台,系统分析了塔里木河流域 11 a 年间植被覆盖度年内、年际变化特征以及空间变化,并进行了实地调查和检验。结果表明:(1) 2007-2017 年,塔里木河流域的植被覆盖度总体趋于好转,11 a 间研究区年平均植被覆盖度增加 3.29%; 2017 年塔里木河流域植被覆盖度与 2007 年相比,上游增加了 30.8%,中游增加了 29.4%,下游增加了 53.2%。(2) 塔里木河流域植被覆盖度变化与植被的生长季相一致,年内植被覆盖度最大值出现在 8 月份,最小值出现在 4 月份,上游河段 2017 年两者相差 21.39%。(3) 塔里木河流域植被覆盖度空间差异明显,呈现从上游向下游递减的趋势,上游植被覆盖度是下游的 4.51 倍。

入藏号: CSCD:6562118

地址: Wei Hong, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an, 710054.

Huo Aidi, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an, 710054.

Guan Wenke, Xinjiang Academy of Forestry.

Du Weihong, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education.

Yang Lei, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education.

Huang Zhikai, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education.

地址: 韦红, 长安大学, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

霍艾迪, 长安大学, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.
管文轲, 新疆林业科学院.

杜伟宏, 长安大学, 旱区地下水文与生态效应教育部重点实验室.

杨磊, 长安大学, 旱区地下水文与生态效应教育部重点实验室.

黄志凯, 长安大学, 旱区地下水文与生态效应教育部重点实验室.

电子邮件地址: 710834890@qq.com; shetuanbu2017@126.com

电子邮件地址: 710834890@qq.com; shetuanbu2017@126.com

使用次数 (最近 180 天): 0

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第 3 条, 共 82 条

作者: Song Hao; Zhang Chen; Liu Ming; Zeng Lei; Li Ying; Ma Zhitong

作者: 宋浩; 张琛; 刘明; 曾磊; 李瑛; 马稚桐

标题: The spatial variability of hydraulic conductivity based on geostatistics in Ili - Kunes valley

标题: 基于地统计学的伊犁-巩乃斯河谷渗透系数空间变异性研究

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作者关键词: spatial variability; hydraulic conductivity; Box - Cox transformation; variogram; Kriging interpolation; the Ili - Kunes Valley

作者关键词: 空间变异性; 渗透系数; Box- Cox 变换; 变差函数; 克里金插值; 伊犁-巩乃斯河谷

摘要: The study on the spatial variability of hydraulic conductivity is one of the hot topics in

hydrogeology. However, the variation law of hydraulic conductivity in Ili - Kunes Valley is unclear yet, restricting the research on the formation evolves and resource evaluation of groundwater. In this paper, the geostatistics theory is used to analyze the spatial variability of the hydraulic conductivity of the Ili - Kunes Valley aquifer. The results showed that the hydraulic conductivity of the unconfined aquifer in the western plain of the Ili Valley obeys the normal distribution of Box - Cox transformation. The hydraulic conductivity of confined aquifer obeys lognormal distribution, and the variogram is consistent with Gaussian model. The Kriging optimal value theory was used to analyze the spatial interpolation. The results of the hydraulic conductivity interpolation showed that the hydraulic conductivity is on the high side in the west of Huocheng County, and the lowest in the north of Yining County. The hydraulic conductivity of the Kunes Valley is relatively stable. The hydraulic conductivity of confined aquifer showed that the hydraulic conductivity gradually decreases from east to west, except that the hydraulic conductivity is higher near Cha County. Combining the physiognomy and hydrogeological conditions in this area, the hydraulic conductivity division of unconfined and confined aquifer was divided, which provides a key hydrogeological parameter for the evaluation of the groundwater resources.

摘要: 渗透系数的空间变异性研究是水文地质领域研究的热点问题之一,然而伊犁-巩乃斯河谷区渗透系数的变化规律尚不清楚,一定程度上制约了该地区地下水形成演化和资源评价的研究进程。运用地统计学理论和方法,进行了伊犁-巩乃斯河谷含水层渗透系数的空间变异性分析。结果表明:伊犁河谷西部平原区的潜水含水层的渗透系数服从 Box-Cox 变换的正态分布,承压水的渗透系数服从对数正态分布,变差函数均符合高斯模型;采用 Kriging 最优值理论进行了插值空间分析,潜水渗透系数插值结果表现为霍城县西部渗透系数偏高,伊宁县北部为渗透系数最小的区域,巩乃斯河谷地渗透系数较稳定;承压含水层渗透系数除察县附近外,总体呈现自东向西逐渐变小的特点;结合该区地形地貌和水文地质条件,划分了潜水和承压水的渗透系数分区,为地下水资源评价提供了关键水文地质参数。

入藏号: CSCD:6460705

地址: Song Hao, Chang'an University;;School of Environment Technology and Engineering, Chang 'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education;;, Xi'an;;Xi'an, ;; 710061;;710061.

Zhang Chen, Chang'an University;;School of Environment Technology and Engineering, Chang 'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education;;, Xi'an;;Xi'an, ;; 710061;;710061.

Liu Ming, Chang'an University;;School of Environment Technology and Engineering, Chang 'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education;;, Xi'an;;Xi'an, ;; 710061;;710061.

Ma Zhitong, Chang'an University;;School of Environment Technology and Engineering, Chang 'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education;;, Xi'an;;Xi'an, ;; 710061;;710061.

Zeng Lei, Xi'an Center of Geological Survey, China Geological Survey (CGS), Xi'an, Shaanxi 710054, China.

Li Ying, Xi'an Center of Geological Survey, China Geological Survey (CGS), Xi'an, Shaanxi 710054, China.

地址: 宋浩, 长安大学;;长安大学环境科学与工程学院, 旱区地下水与生态效应教育部重点实验室;;, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

张琛, 长安大学;;长安大学环境科学与工程学院, 旱区地下水与生态效应教育部重点实验室;; 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

刘明, 长安大学;;长安大学环境科学与工程学院, 旱区地下水与生态效应教育部重点实验室;; 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

马稚桐, 长安大学;;长安大学环境科学与工程学院, 旱区地下水与生态效应教育部重点实验室;; 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

曾磊, 中国地质调查局西安地质调查中心, 西安, 陕西 710054, 中国.

李琰, 中国地质调查局西安地质调查中心, 西安, 陕西 710054, 中国.

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第 4 条, 共 82 条

作者: Li Jiandi; Zhang Wei; Zhang Xiaoling; Miao Xinxin; Zhang Fan

作者: 李健弟; 张伟; 张小玲; 苗欣欣; 张帆

标题: Additional Carbon Source for Denitrifying Phosphorus Removal Based on Hydrolysis Acidification of Sludge Pretreated by Ultrasound

标题: 超声预处理污泥发酵液作为反硝化聚磷补充碳源研究

来源出版物: 中国给水排水 卷: 35 期: 9 页: 9-15 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: sewage sludge; ultrasonic pretreatment; hydrolysis acidification; carbon source; denitrifying phosphorus removal

作者关键词: 剩余污泥; 超声预处理; 水解酸化; 碳源; 反硝化聚磷

摘要: The sewage sludge contains rich organic matters and nutrients such as nitrogen, phosphorus. Ultrasonic pretreatment and hydrolysis acidification of sewage sludge can recover the dissolved organic matters and hydrolysis products which can be used as carbon sources of biological nitrogen and phosphorus removal. In order to increase the VFA in the sludge supernatant after hydrolysis acidification, the effects of energy density and duration of ultrasonic pretreatment on the hydrolysis acidification of the sewage sludge and the feasibility of anaerobic fermentation production as the carbon sources of denitrifying phosphorus removal were investigated. The experimental results showed that ultrasonic pretreatment could promote the hydrolysis acidification degree of sludge, the concentrations of SCOD and VFA during hydrolysis increased with the increases of energy density and duration in a certain range. The optimum energy density

and duration was determined to 1.5 W/mL and 10 min, respectively. Addition of fermentation liquid improved the removal rate of phosphate effectively and the removal rate of phosphate was the highest when the adding ratio of fermentation liquid was 1/35 of the wastewater. The system kept operating stably and the removal rate of phosphate had been increasing when using fermentation liquid as the carbon sources of denitrifying phosphorus removal for a long time, and the removal rate of phosphate reached 100% after the system operated for 20 days.

摘要: 剩余污泥含有丰富的有机物和氮、磷等营养物质,对其进行超声预处理及水解酸化可回收溶解性的有机物及水解产物作为生物脱氮除磷工艺的补充碳源。以增加水解酸化后污泥上清液中的挥发性脂肪酸(VFA)为目的,研究了超声声能密度及超声时间对污泥水解酸化释放 SCOD 和 VFA 的影响以及污泥水解酸化产物作为反硝化聚磷工艺补充碳源的可行性。结果表明,超声预处理可以有效促进污泥的水解酸化,在一定的范围内增加超声时间和声能密度可以提高水解酸化过程中产生的 SCOD 和 VFA 浓度;有利于水解产酸的超声预处理条件是声能密度为 1.5 W/mL、超声时间为 10 min。在实际污水中投加污泥发酵液作为补充碳源可以提高反硝化聚磷系统对 PO₄-3-P 的去除率,且发酵液/实际污水体积比为 1/35 时去除率最高;长期以污泥发酵液作为补充碳源,随着运行时间的增加,系统对 PO₄-3-P 的去除率不断提高,运行 20 d 以后去除率达到了 100%。

入藏号: CSCD:6499988

地址: Li Jiandi, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region < Ministry of Education >, Xi'an, Shaanxi 710064, China.

Zhang Xiaoling, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region < Ministry of Education >, Xi'an, Shaanxi 710064, China.

Miao Xinxin, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region < Ministry of Education >, Xi'an, Shaanxi 710064, China.

Zhang Fan, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region < Ministry of Education >, Xi'an, Shaanxi 710064, China.

Zhang Wei, Shanghai Waterway Engineering Design and Consulting Co. Ltd., Shanghai 200120, China.

地址: 李健弟, 长安大学, 旱区地下水与生态效应教育部重点实验室, 西安, 陕西 710064, 中国.

张小玲, 长安大学, 旱区地下水与生态效应教育部重点实验室, 西安, 陕西 710064, 中国.

苗欣欣, 长安大学, 旱区地下水与生态效应教育部重点实验室, 西安, 陕西 710064, 中国.

张帆, 长安大学, 旱区地下水与生态效应教育部重点实验室, 西安, 陕西 710064, 中国.

张伟, 中交上海航道勘察设计研究院有限公司, 上海 200120, 中国.

电子邮件地址: 2577284527@qq.com; zhangxiaolingl01@126.com

电子邮件地址: 2577284527@qq.com; zhangxiaolingl01@126.com

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作者: Zhang Xiaozhou; Lu Yudong; Guo Wen; Li Xin; Liang Shaohuan

作者: 张晓周; 卢玉东; 郭雯; 李鑫; 梁少欢

标题: A Study on Multi-level Collapsibility of Loess at Microscale

标题: 微观尺度下黄土多级湿陷性研究

来源出版物: 水土保持通报 卷: 39 期: 6 页: 170-175 出版年: 2019

文献号: 1000-288X(2019)39:6<170:WGCDXH>2.0.TX;2-D

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文献号: 1000-288X(2019)39:6<170:WGCDXH>2.0.TX;2-D

语言: Chinese

文献类型: Article

作者关键词: collapsibility; multi-level collapsibility; humidification and dehumidification; SEM

作者关键词: 湿陷性; 多级湿陷性; 增湿减湿; 电镜扫描

摘要: [Objective] The multi-level collapsibility of loess was investigated and the way of loess collapsibility deformation was studied at the microscale in order to provide a scientific basis for the study of loess collapsible deformation mechanism. [Methods] We designed and conducted an indoor cyclic collapsibility test, to observe the micro-structure of the same samples under repeated humidification and dehumidification processes. The collapsibility data were analyzed and the scanning electron microscopy images were compared. [Results] The collapsibility data showed that after the loess reached the first collapsibility and water removal stability, adding water into the device would cause the deformation of the sample again. During the collapsibility process, the micro-structure undergone three deformation modes: dissolution, movement and reconstruction. [Conclusion] It is the dynamic process of destruction-reconstruction-destruction of loess structure that leads to multi-level collapsibility of loess.

摘要: [目的]验证黄土多级湿陷性以及探究微观尺度下黄土的湿陷变形方式,为黄土的湿陷变形机理研究提供科学依据。[方法]分别设计、实施了室内循环加水湿陷试验和同一样品增湿前后微观结构观察试验,并分别对湿陷数据与扫描电镜影像进行分析和对比。[结果]湿陷数据表明,在黄土达到一次湿陷稳定以及去水稳定后,在装置内再次加水会导致试样再次发生明显形变,而黄土的微观结构在湿陷过程中发生了溶解、移动、重组三种变形方式。[结论]黄土结构这种破坏-重组-破坏的动态循环过程是黄土能够发生多级湿陷的内在原因。

入藏号: CSCD:6658764

地址: Zhang Xiaozhou, College of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710054;; 710054.

Lu Yudong, College of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710054;; 710054.

Guo Wen, College of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, ;; Key

Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Li Xin, College of Environmental Science and Engineering,Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Liang Shaohuan, College of Environmental Science and Engineering,Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

地址: 张晓周, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

卢玉东, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

郭雯, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

李鑫, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

梁少欢, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: zhang29060926@163.com; luyudongphd@163.com

电子邮件地址: zhang29060926@163.com; luyudongphd@163.com

使用次数 (最近 180 天): 0

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作者: Wei Zhengwen; Jiang Tingbo; Dong Suiming; Chai Lihong

作者: 魏徵文; 蒋廷波; 董岁明; 柴丽红

标题: Preparation of grapefruit skin biological activated carbon and treatment of pyrene contaminated solution

标题: 柚子皮生物活性炭的制备及对芘污染溶液的处理研究

来源出版物: 应用化工 卷: 48 期: 12 页: 2835-2837,2842 出版年: 2019

文献号: 1671-3206(2019)48:12<2835:YZPSWH>2.0.TX;2-N

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文献号: 1671-3206(2019)48:12<2835:YZPSWH>2.0.TX;2-N

语言: Chinese

文献类型: Article

作者关键词: biological activated carbon; pyrene; adsorption

作者关键词: 生物炭; 芘; 吸附

摘要: Biological activated carbon was prepared by roasting grapefruit skin at 450 °C. The infrared spectroscopy (FTIR) and scanning electron microscopy (SEM) showed that the grapefruit skin biochar contained free hydroxyl groups, nitro compounds and anhydrides group, the surface is uneven and has a sheet-like structure with abundant pores. When the dosage of biological activated carbon was 8 g/L, the adsorption amount was 187 mug/g at 16 h, and the pyrene contaminant removal rate was 37%. The adsorption process is in accordance with the Langmiur model.

摘要: 柚子皮在 450 °C 下焙烧, 制得生物活性炭, 经红外光谱(FTIR), 扫描电子显微镜(SEM)表征, 结果表明, 柚子皮生物活性炭中含有游离的羟基、硝基化合物和酸酐集团, 表面不平整, 呈片状结构, 有丰富的孔隙。生物活性炭投加量 8 g/L 时, 吸附时间 16 h, 饱和吸附量为 187 mug/g, 对芘污染物去除率为 37%。吸附过程符合 Langmiur 模型。

入藏号: CSCD:6647385

地址: Wei Zhengwen, School of Water and Environment, Changan University;;Changan University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xian;;Xian, ;; 710054;;710054.

Jiang Tingbo, School of Water and Environment, Changan University;;Changan University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xian;;Xian, ;; 710054;;710054.

Dong Suiming, School of Water and Environment, Changan University;;Changan University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xian;;Xian, ;; 710054;;710054.

Chai Lihong, School of Water and Environment, Changan University;;Changan University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xian;;Xian, ;; 710054;;710054.

地址: 魏徵文, 长安大学水利与环境学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

蒋廷波, 长安大学水利与环境学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

董岁明, 长安大学水利与环境学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

柴丽红, 长安大学水利与环境学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: 970853926@qq.com

电子邮件地址: 970853926@qq.com

使用次数 (最近 180 天): 0

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作者: Lu Xiangfei; Lu Dong; Muhammad Asim Shahzad; Wang Jiahong; Chang Jiangfeng; Li Ting

作者: 吕向菲; 吕东; Muhammad Asim Shahzad; 王家宏; 常江峰; 李婷

标题: Study on the fluorescence detection of Hg~(2+) in water by 5,10,15,20-tetra-(4-carboxyphenyl) porphyrin(TCPP)

标题: 5,10,15,20-四(4-羧基苯基)卟啉(TCPP)检测水体痕量 Hg~(2+)的研究

来源出版物: 应用化工 卷: 48 期: 12 页: 3054-3057 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: Hg~(2+); carboxyl-porphyrin; fluorescence probe; trace detection; Hg~(2+)

作者关键词: 羧基卟啉; 荧光探针; 痕量检测

摘要: Based on the great solubility and high affinity of carboxyloporphyrin for mercury ion in water, the fluorescence properties of 5,10,15,20-tetra-(4-carboxyphenyl) porphyrin and Hg~(2+) were used to realize the water body trace detection of Hg~(2+). The results indicated that the porphyrin was favorable to coordinate with mercury ion, and the color changes of the system exhibited obviously visible before and after the detection of mercury ion. Under neutral conditions, the fluorescence emission spectrum of 5,10,15, 20-tetra-(4-carboxyphenyl) porphyrin was quenched by mercury ion. There is an excellent exponential function between fluorescence intensity of porphyrin and mercury ion concentration with a correlation coefficient of 0.998. Therefore, 5,10,15,20-tetra-(4-carboxyphenyl) porphyrin can be used as a highly efficient and reliable probe for the trace detection of Hg~(2+) in water.

摘要: 由于羧基卟啉在水中良好的溶解性及对 Hg~(2+) 的高亲和性, 利用 5, 10, 15, 20-四(4-羧基苯基)卟啉与 Hg~(2+) 反应前后的荧光特性变化, 实现水体 Hg~(2+) 的痕量检测。结果显示, 该探针与 Hg~(2+) 具有良好的配位性, 且检测前后体系出现的颜色变化具有可视性。在中性条件下, 四羧基卟啉荧光被 Hg~(2+) 猝灭, 荧光强度与汞离子浓度之间存在良好的指数函数关系, 相关系数为 0.998。因此, 5, 10, 15, 20-四(4-羧基苯基)卟啉可作为一种高效、可靠的探针用于水体中 Hg~(2+) 的痕量检测。

入藏号: CSCD:6647433

地址: Muhammad Asim Shahzad, 国家科技大学, 伊斯兰堡, 999010, Pakistan.

Lu Xiangfei, School of Environmental Science and Engineering, Changan University, Xian, 710054.

Lu Dong, College of Environmental Science and Engineering, Shaanxi University of Science

Techonlogy, Xian, 710021.

Wang Jiahong, College of Environmental Science and Engineering, Shaanxi University of Science
Techonlogy, Xian, 710021.

Chang Jiangfeng, College of Environmental Science and Engineering, Shaanxi University of
Science Techonlogy, Xian, 710021.

Li Ting, College of Environmental Science and Engineering, Shaanxi University of Science
Techonlogy, Xian, 710021.

Muhammad Asim Shahzad, National University of Science and Technology(NUST), Islamabad,
999010, Pakistan.

地址: 吕向菲, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

吕东, 陕西科技大学环境科学与工程学院, 西安, 陕西 710021, 中国.

王家宏, 陕西科技大学环境科学与工程学院, 西安, 陕西 710021, 中国.

常江峰, 陕西科技大学环境科学与工程学院, 西安, 陕西 710021, 中国.

李婷, 陕西科技大学环境科学与工程学院, 西安, 陕西 710021, 中国.

电子邮件地址: Sophie_Lv@126.com

电子邮件地址: Sophie_Lv@126.com

使用次数 (最近 180 天): 0

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作者: Xiao Kang; Sun Yaqiao; Maweiguo

作者: 校康; 孙亚乔; 马卫国

标题: Effects of Biochar for Abating Salt Stress and Promoting Seeding Growth of Winter Wheat
in a Saline Soil

标题: 添加生物炭对降低冬小麦幼苗盐害并促进其生长的效果研究

来源出版物: 灌溉排水学报 卷: 38 期: 11 页: 22-27 出版年: 2019

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文献号: 1672-3317(2019)38:11<22:TJSWTD>2.0.TX;2-K

语言: Chinese

文献类型: Article

作者关键词: immobilization rate; K/Na; potassium use efficiency; biomass of wheat seedings;
reed biochar

作者关键词: 离子固持率; 钾钠比; 钾素利用率; 麦苗生物量; 芦苇炭

摘要: The surface soil of the Yellow River Delta is rich in salt, which makes the soil salinized,

compact and barren. The salinization hazard with NaCl as the main component directly affects the quality of coastal soil. Adding biochar to saline-alkali farmland can improve soil properties and promote crop growth. **【Objective】** The purpose of this paper is to clarify the changes of soil salt ions and winter wheat seedling growth after adding biochar to saline soil. **【Method】** A field experiment was conducted to investigate the effects of low dose(0~4 g/kg)of Reed carbon on soil salt ions, potassium-sodium ratio in wheat seedlings, potassium utilization efficiency and seedling biomass. **【Result】** The application of biochar could reduce the salt ions in soil solution, increased the potassium-sodium ratio in the winter wheat seedlings and the potassium use efficiency of the wheat seedlings, and increased the seedling biomass of winter wheat;The salt reduction and the incremental effect under the addition of 4 g/kg biochar use was the most obvious. Compared with CK, the Na⁺ in soil solution decreased by 9.43%, the K/Na and potassium use efficiency of seedlings increased by 56.80% and 25.48%, respectively, and the biomass of wheat seedling increased by 15.72%. **【Conclusion】** Biochar application can promote the increase of biomass by holding Na⁺ in soil solution and increasing K/Na and potassium utilization of winter wheat seedlings. The research can provide a theoretical basis for the process mechanism of biochar for salt reduction and fertilization, increase efficiency and increase yield, and provide preliminary guidance for the feasibility of biochar for salinized soil improvement.

摘要: 黄河三角洲盐碱农田具有盐、板、瘦的特点,以 NaCl 为主要成分的盐渍危害直接影响着滨海土壤质量。生物炭添加可改善土壤性质,促进作物生长。 **【目的】** 明晰炭添加对盐渍土盐离子和冬小麦幼苗生长的影响。 **【方法】** 研究依托田间试验探究了低剂量(0~4 g/kg)的芦苇炭添加对盐渍土盐离子、麦苗体内钾钠比、钾素利用率及幼苗生物量的影响。 **【结果】** 施用生物炭可降低土壤溶液中的盐离子、增加冬小麦幼苗体内钾钠比和麦苗钾素利用率,有助于提升幼苗生物量;以 4 g/kg 炭添加量下的降盐、增量效果最为明显。土壤溶液中的 Na⁺ 较 CK 降低了 9.43%,幼苗 K/Na 和钾素利用率分别提升了 56.80%和 25.48%,麦苗生物量增加了 15.72%。 **【结论】** 炭添加可通过固持土壤溶液中的 Na⁺、提升麦苗 K/Na 和钾素利用率来促进其生物量的增加。研究可为生物炭用于盐渍土改良的降盐培肥和增效增产的过程机理提供理论依据,为生物炭用于盐渍化土壤改良的可行性提供初步指导。

入藏号: CSCD:6634020

地址: Xiao Kang, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710000, China.

Sun Yaqiao, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710000, China.

Maweiguo, Third Middle School of Pucheng, Weinan, Shaanxi 715505, China.

地址: 校康, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710000, 中国.

孙亚乔, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710000, 中国.

马卫国, 蒲城县第三高级中学, 渭南, 陕西 715505, 中国.

电子邮件地址: kxiaocau@163.com; sunyaqiao@126.com

电子邮件地址: kxiaocau@163.com; sunyaqiao@126.com

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作者: Feng Xin; Zhao Jianqiang; Dai Wei; Zhao Qian

作者: 冯鑫; 赵剑强; 代伟; 赵倩

标题: ACCUMULATION CHARACTERISTICS OF NO AND N₂O IN NITRITE DENITRIFYING PHOSPHORUS ACCUMULATION PROCESS

标题: 亚硝酸盐反硝化聚磷过程中 NO 和 N₂O 的累积特征

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文献类型: Article

作者关键词: nitrite denitrifying phosphorus accumulation; nitric oxide; nitrous oxide; inhibition; pH value

作者关键词: 亚硝酸盐反硝化聚磷; 一氧化氮; 氧化亚氮; 抑制; pH 值

摘要: Anaerobic/anoxic/aerobic (An/A/O) sequential batch reactor (SBR) was used to study the accumulation and release characteristics of NO and N₂O in the process of nitrite denitrifying phosphorus accumulation, and the effects of different pH values (6.61 and 7.37) on the production of NO and N₂O. The results showed that there was accumulation of high concentration of NO and N₂O in the denitrifying phosphorus accumulation process of nitrite under the experimental conditions, and the accumulated NO had obvious inhibitory effect on the reduction process of nitrite and the reduction process of NO. The accumulation of NO in the liquid phase led to the increase of dissolved oxygen (DO), and there was a significant correlation between NO and DO. It was speculated that part of NO generated nitrogen and oxygen through the disproportionation reaction in the denitrification process. The release factors of NO in the denitrification process under pH values of 6.61 and 7.37 were 0.86% and 0.58%, and the total production of N₂O was 30.65 and 21.24 mg/L, respectively. NO accumulation might be related to the anaerobic electron accumulation, and N₂O accumulation was mainly related to the inhibition of Nos activity by free nitrite (FNA). High pH value could effectively reduce the production and release of NO and N₂O.

摘要: 实验采用厌氧/缺氧/好氧(An/A/O)序批式反应器(SBR),研究亚硝酸盐反硝化聚磷过程中 NO 和 N₂O 的积累和释放特征,以及不同 pH 值(6.61 和 7.37)对 NO 和 N₂O 产生量的影响。结果表明:试验条件下,亚硝酸盐反硝化聚磷过程存在高浓度 NO 和 N₂O 的积累,积累的 NO 对亚硝酸盐还原过程和 NO 还原过程均有明显的抑制作用。液相积累的 NO 导致溶解氧(DO)的升高,且 NO 和 DO 存在显著相关,推测一部分 NO 在反硝化过程中通过歧化反应生成 N₂ 和 O₂。pH 值为 6.61 和 7.37 下,反硝化过程 NO 的释放因子分别为 0.86% 和 0.58%,N₂O

总产生量分别为 30.65,21.24 mg/L。NO 积累可能与厌氧期电子积累有关,N₂O 积累主要与游离亚硝酸(FNA)抑制 N₂O 还原酶 Nos 活性有关。高 pH 值可有效减少 NO 和 N₂O 的产生和释放。

入藏号: CSCD:6636881

地址: Feng Xin, School of Environmental Science and Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Jianqiang, School of Environmental Science and Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Dai Wei, School of Environmental Science and Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Qian, School of Environmental Science and Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 冯鑫, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

赵剑强, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

代伟, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

赵倩, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: 570786100@qq.com; 626710287@qq.com

电子邮件地址: 570786100@qq.com; 626710287@qq.com

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作者: Zhang Yuhao; Li Xiaoling; Chen Ying; Zhao Taiqi

作者: 张宇浩; 李晓玲; 陈莹; 赵泰淇

标题: EFFECT OF C/S ON BIOLOGICAL NITROGEN REMOVAL

标题: C/S 对生物氮转移途径的影响

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作者关键词: SBBR; C/S; electron donor; heterotrophic denitrification; autotrophic denitrification; SBBR; C/S

作者关键词: 电子供体; 异养反硝化; 自养反硝化

摘要: Electron donors are an essential element of biological nitrogen removal, and the types of

electron donors have an impact on the biological nitrogen transfer pathway. In this experiment, acetate and sodium sulfide were simultaneously used as the electron donors, and NO_3^- -N was used as an electron acceptor to improve the activity of heterotrophic and autotrophic denitrifying bacteria by continuously reducing C/S. In the proportion of nitrogen transfer, the effects of electron donor species on biological nitrogen removal under heterotrophic denitrification and autotrophic denitrification were studied. When $n(\text{C})/n(\text{S}) = 4 : 1$, $n(\text{C})/n(\text{S}) = 2 : 3$, a small amount of NH_4^+ -N was produced. When $n(\text{C})/n(\text{S}) = 4 : 1$, the S^{2-} removal rate could reach 98.58%. At the same time, as the electron donor increased, the sulfur in the state of white suspension gradually increased. The pH and redox potential (ORP) could determine the approximate forms of the remaining materials in the system, so the pH and ORP in the system could provide an indication basis for the biological nitrogen removal pathway. The study found that excess electron donors in the system had better effects on biological nitrogen removal. At the same time, in the case of limited electron acceptors (NO_3^- -N), high electron donors might cause dissimilatory nitrate reduction to ammonium.

摘要: 电子供体是生物脱氮必不可少的要素,且不同种类电子供体对于生物氮转移途径存在影响。以乙酸盐和硫化钠同时作为电子供体,以 NO_3^- -N作为电子受体,通过不断降低C/S改变异养和自养反硝化菌的活性,研究电子供体种类在异养反硝化和自养反硝化的混养状态下对生物脱氮的影响。当 $n(\text{C})/n(\text{S}) = 4 : 1$ 、 $n(\text{C})/n(\text{S}) = 2 : 3$ 时,有少量 NH_4^+ -N的产生,出水分别为1.7、4.9 mg/L。在 $n(\text{C})/n(\text{S}) = 4 : 1$ 中 S^{2-} 去除率可达到98.58%,同时随着电子供体增多,呈现白色悬浮物状态的硫逐步增多。pH、氧化还原电位(ORP)可判断系统内剩余物质的大致存在形态,因此系统内pH和ORP可间接为生物脱氮途径提供指示依据。研究发现,系统内过量的电子供体对生物脱氮效果更好;同时在有限的电子受体(NO_3^- -N)情况下,高电子供体有可能导致反硝化过程向硝酸盐异化还原成铵过程转变。

入藏号: CSCD:6636882

地址: Zhang Yuhao, School of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Chen Ying, School of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Li Xiaoling, School of Architecture and Engineering, Chang'an University, Key Laboratory of Water Supply & Sewage Engineering, Ministry of Housing and Urban-Rural Development, Xi'an, Shaanxi 710061, China.

Zhao Taiqi, School of Environmental Science and Engineering, Tongji University, Shanghai 200092, China.

地址: 张宇浩, 长安大学环境科学与工程学院, 西安, 陕西 710061, 中国.

陈莹, 长安大学环境科学与工程学院, 西安, 陕西 710061, 中国.

李晓玲, 长安大学建筑工程学院, 住建部给水排水重点实验室, 西安, 陕西 710061, 中国.

赵泰淇, 同济大学环境科学与工程学院, 上海 200092, 中国.

电子邮件地址: 934027208@qq.com; lixiaoling20030327@126.com

电子邮件地址: 934027208@qq.com; lixiaoling20030327@126.com

使用次数 (最近 180 天): 0

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作者: Cui Xinchui; Zhao Jianqiang; Yan Longmei; Li Yani

作者: 崔心水; 赵剑强; 闫龙梅; 李亚妮

标题: Influence of Cathode Types on Anode Denitrification and Electricity Generation of Microbial Fuel Cells

标题: 阴极类型对微生物燃料电池阳极脱氮产电的影响

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作者关键词: microbial fuel cell; biocathode; anode denitrification; electricity generation

作者关键词: 微生物燃料电池; 生物阴极; 阳极脱氮; 产电

摘要: The influence of cathode types on electricity generation and anode denitrification performance of microbial fuel cell (MFC) was explored by constructing a two-chamber MFC. The results showed that abiotic cathode of MFC (A-MFC) was dominated by ohmic resistance, while that of the biocathode of MFC (B-MFC) was mainly activated internal resistance. Open circuit voltage (OCV), internal resistance (R_{in}), maximum power density (P) and coulombic efficiency (CE) of A-MFC with $Fe(CN)_6^{3-}$ as electron acceptor were 1.9 times, 0.7 times, 15 times, and 3.5 times of those of B-MFC with NO_3^- as electron acceptor. TN removal rates of A-MFC anode and B-MFC anode were 89.5% and 75.4%, respectively, and average volumetric removal loads were $0.037 \text{ kg}/(\text{m}^3 \cdot \text{d})$ and $0.031 \text{ kg}/(\text{m}^3 \cdot \text{d})$, respectively. The removal rate of $NO_2^- - N$ by B-MFC anode reached 95.0%, and the maximum volumetric removal load reached $0.251 \text{ kg}/(\text{m}^3 \cdot \text{d})$, which was higher than those of A-MFC and conventional cathode denitrification MFC. Compared with A-MFC, B-MFC is more economical and safer and does not produce secondary pollution.

摘要: 通过构建双室微生物燃料电池(MFC),研究了阴极类型对MFC产电特性和阳极脱氮性能的影响。试验结果表明,非生物阴极MFC(A-MFC)以欧姆内阻为主,而生物阴极MFC(BMFC)以活化内阻为主,以 $Fe(CN)_6^{3-}$ 作为电子受体的A-MFC的开路电压OCV、表观内阻 R_{in} 、最大功率密度P、库伦效率CE分别是以 NO_3^- 为电子受体的B-MFC的1.9、0.7、15和3.5倍。A-MFC、B-MFC的阳极对TN的去除率分别为89.5%和75.4%,平均容积去除负荷分别为 0.037 、 $0.031 \text{ kg}/(\text{m}^3 \cdot \text{d})$ 。B-MFC阳极对 $NO_2^- - N$ 的去除率达到了95.0%,最大容积去除负荷达到了 $0.251 \text{ kg}/(\text{m}^3 \cdot \text{d})$,高于A-MFC,也高于传统阴极反硝化MFC;与非生物阴极相比,生物阴极更经济安全,不产生二次污染。

入藏号: CSCD:6628936

地址: Cui Xinchui, School of Environmental Science and Engineering, Chang'an University;; School of Urban Planning and Municipal Engineering, Xi'an Polytechnic University, ;;

Xi'an;;Xi'an, ;; 710064;;710048.

Zhao Jianqiang, School of Environmental Science and Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Yan Longmei, School of Urban Planning and Municipal Engineering,Xi'an Polytechnic University, Xi'an, Shaanxi 710048, China.

Li Yani, School of Urban Planning and Municipal Engineering,Xi'an Polytechnic University, Xi'an, Shaanxi 710048, China.

地址: 崔心水, 长安大学环境科学与工程学院;;西安工程大学城市规划与市政工程学院, ;;西安;;西安, 陕西;;陕西 710064;;710048, 中国.

赵剑强, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

闫龙梅, 西安工程大学城市规划与市政工程学院, 西安, 陕西 710048, 中国.

李亚妮, 西安工程大学城市规划与市政工程学院, 西安, 陕西 710048, 中国.

电子邮件地址: cuixinshui@xpu.edu.cn; 626710287@qq.com

电子邮件地址: cuixinshui@xpu.edu.cn; 626710287@qq.com

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作者: Nie Qiyang; Lu Jiqiang; Sun Xiali; Luo Pingping; Shi Didi; Xue Qiang; Shen Bing

作者: 聂启阳; 吕继强; 孙夏利; 罗平平; 时迪迪; 薛强; 沈冰

标题: Spatial and temporal variations of non-point source pollution risk affected by land use changes in Bahe River Basin

标题: 土地利用变化影响的灞河流域潜在非点源污染风险时空变化特征

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作者关键词: land use change; non-point source pollution; PNPI(potential non-point pollution index) model; spatial and temporal variation; Bahe River Basin

作者关键词: 土地利用变化; 非点源污染; 污染风险; 非点源污染指数(PNPI)模型; 时空变化特征; 灞河流域

摘要: The spatiotemporal variations of non-point source pollution from land use changes have significantly affected the surface water and groundwater quality of the basin. In this paper,Bahe

River Basin, strongly affected by human activities, is chosen as an example, and the improved potential non-point source pollution index (PNPI) model was used to quantitatively analyze the spatiotemporal variations and the main factors of potential non-point source pollution (PNP) risk affected by land use changes in arid area cities in the latest 20 years. The results showed that the main land use patterns in the Bahe River Basin were forest land and cultivated farmland, accounting for 85% of the total basin area. Urban area in the lower reaches of the river basin expanded nearly four times, encroaching on a large number of original grassland and cultivated land due to the strategy of regional integration development in Xi'an from 1995 to 2015. The Quantile classification method was applied to divide the PNPI risk grades into extremely low, low, medium, high and extremely high levels. The extremely high-risk area expanded rapidly as the urbanization in middle and lower reaches of the study watershed, while that the risk level of PNP reduced in the upstream after the water environmental protection measures. Urbanization in Xi'an City is the main reason for the rapid expansion of PNP areas with extremely high risk in the Bahe River Basin.

摘要: 流域内土地利用方式改变引起非点源污染源的时空变化,已显著影响地表、地下水环境质量。以人类活动影响强烈的灞河流域为例,采用改进后的潜在非点源污染指数模型(PNPI),探讨近20年半干旱区城市型河流土地利用变化影响下的流域潜在非点源污染风险时空变化特征及其主导因素。结果表明:灞河流域主要土地利用方式为林地与耕地,共占流域面积的85%。1995-2015年间西安实施区域融合发展战略,河流下游平原区城镇用地扩张近4倍,侵占大量原有草地与耕地;基于Quantile分类法,将研究区潜在非点源污染风险值划分为极低、低、中等、高和极高等级,区域流域内潜在非点源污染风险呈现两极分化现象,即人类活动影响区的非点源污染风险增强,极高风险区迅速扩张,同时上游水源区的非点源污染风险降低;近期,西安市城镇化的快速推进是流域极高潜在非点源污染风险区域迅速扩张的主要原因。

入藏号: CSCD:6619951

地址: Nie Qiyang, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Lu Jiqiang, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Luo Pingping, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Xue Qiang, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Sun Xiali, Shaanxi Survey Bureau of Hydrology and Water Resources, Xi'an, Shaanxi 710068, China.

Shi Didi, School of Soil and Water Conservation, Beijing Forestry University, Beijing 100083, China.

Shen Bing, Xi'an University of Technology, State Key Laboratory Base of Eco-Hydraulic in Arid Area, Xi'an, Shaanxi 710048, China.

地址: 聂启阳, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室,;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

吕继强, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室,;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

罗平平, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室,;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

薛强, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室,;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

孙夏利, 陕西省水文水资源勘测局, 西安, 陕西 710068, 中国.

时迪迪, 北京林业大学水土保持学院, 北京 100083, 中国.

沈冰, 西安理工大学, 西北旱区生态水利工程国家重点实验室, 西安, 陕西 710048, 中国.

使用次数 (最近 180 天): 0

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作者: Zhang Shuqi; Zhang Hongbo; Xin Chen; Nan Zhengnian; Li Zhehao

作者: 张姝琪; 张洪波; 辛琛; 南政年; 李哲浩

标题: A method for characterizing trends and morphological changes of hydrological series

标题: 水文序列趋势及形态变化的表征方法

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作者关键词: Mann-Kendall 法; hydrological series; trend test; Mann-Kendall test method; index system; spatial analysis; Weihe River

作者关键词: 水文序列; 趋势检验; 指标体系; 空间分析; 渭河

摘要: Under the changing environment, the hydrological series show inconsistency, and the morphological changes also show non-monotonic or even non-stationary fluctuation characteristics, which leads to great challenges for traditional hydrological analysis and calculation and water resources accounting. By integrating different statistical test parameters or methods, a set of index system was proposed to characterize the trend form and morphological

change of hydrological series. The applicability of this method was verified by the annual runoff series of seven stations such as Xianyang Station in the Weihe River Basin. The results show that the system can effectively analyze and compare the morphological changes of different hydrological series with the same Mann-Kendall test value, reflecting the macro-characteristics of the morphological changes of hydrological series, and realizing spatial difference representation among different hydrological data sequences.

摘要: 变化环境下水文序列表现出非一致性,形态变化也呈现非单调性甚至非平稳性波动特征,导致传统的水文分析计算和水资源核算面临极大挑战。通过集成不同统计检验参数或方法,提出一套表征水文序列趋势形式及形态变化的指标体系,并以渭河流域咸阳站等7个站点年径流序列为例,验证了该方法的适用性。结果表明,该体系可较为有效地对具有相同Mann-Kendall 检验值的不同水文序列的形态变化进行分析与对比,反映水文序列形态变化的宏观特征,实现不同水文数据序列间的空间差异性表征。

入藏号: CSCD:6617367

地址: Zhang Shuqi, School of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Nan Zhengnian, School of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Zhehao, School of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Hongbo, School of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Xin Chen, Shaanxi Jianghe Reservoir Administration Bureau, Xi'an, Shaanxi 710018, China.

地址: 张姝琪, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

南政年, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

李哲浩, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

张洪波, 长安大学环境科学与工程学院;; 长安大学, ;; 旱区地下水文与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

辛琛, 陕西省江河水库管理局, 西安, 陕西 710018, 中国.

电子邮件地址: jessiezhang@chd.edu.cn; hbzhang@chd.edu.cn

电子邮件地址: jessiezhang@chd.edu.cn; hbzhang@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Zhang Qiyong; Xu Panpan; Qian Hui

作者: 张奇莹; 徐盼盼; 钱会

标题: Study on shear strength anisotropy of undisturbed loess-paleosol sequence in Jingyang county

标题: 泾阳原状黄土-古土壤序列抗剪强度各向异性及其机制研究

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作者关键词: 土力学; 抗剪强度; 各向异性; 影响因素; 形成机制; 修石渡剖面

摘要: System sampling was conducted with an interval of 1 meter at Xiushidu section of Jingyang south plateau, Guanzhong Basin, Shaanxi. Direct shear test was executed under different or same vertical pressures, and microstructure and basic physical properties including dry density, moisture content and porosity were tested. The anisotropic characteristics of the shear strength of undisturbed loess were studied, and their formation mechanisms and influencing factors were also analyzed. The results show that the structural parameters of loess present different anisotropy characteristics as well as the shear strength. The vertical shear strength is generally greater than the horizontal shear strength for the layers above L₇, while the ratio of the vertical shear strength to the horizontal shear strength for L₇ and below layers is less than 1. The anisotropy degree of paleosol is larger than that of corresponding loess. The main influencing factors on shear strength anisotropy of loess-paleosol sequence are the porosity and the moisture content. The effect of the porosity on the horizontal shear strength is greater than that on the vertical shear strength, while the water content is opposite. The dry density is directly proportional to the shear strength but has little effect on the anisotropy of the shear strength. The shear strength anisotropy of natural loess is due to different arrangements of soil particles by aeolian deposition and rotation and rearrangement of particles during shearing.

摘要: 通过对陕西省泾阳南塬修石渡剖面(S₉~L₀)每隔 1 m 的系统取样,进行不同和相同垂直压力下的直剪试验,微观结构观察及含水率、干密度和孔隙率等物理性质的测试,研究原状黄土抗剪强度的各向异性特征及其形成机制和影响因素。结果表明:黄土结构参数与其抗剪强度表现出不同的各向异性特征;对于 L₇ 以上的土层,垂直方向的抗剪强度基本大于水平方向抗剪强度,而 L₇ 及以下土层垂直与水平抗剪强度的比值小于 1;古土壤层抗剪强度各向异性的程度强于对应黄土层;影响黄土-古土壤序列抗剪强度各向异性的因素主要有孔隙率和含水率,孔隙率对水平抗剪强度的影响较为显著,而含水率对抗剪强度各向异性的影响与孔隙率相反;干密度与抗剪强度的大小成正比,但对其各向异性的影响不大。原状黄土抗剪强度之所以具有各向异性的特征,其根本原因是由于沉积过程中土颗粒不同的排列方式以及剪切过程中土颗粒的旋转和重新排列所致。

入藏号: CSCD:6607685

地址: Zhang Qiyong, School of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecology in Arid

Areas,Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Xu Panpan, School of Environmental Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas,Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Qian Hui, School of Environmental Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas,Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

地址: 张奇莹, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

徐盼盼, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

钱会, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: 1274075125@qq.com; qianhui@chd.edu.cn

电子邮件地址: 1274075125@qq.com; qianhui@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Meng Jianhao; Chen Aixia; Wang Xueping; Chen Li; Chen Yang

作者: 孟建昊; 陈爱侠; 王雪平; 陈丽; 陈阳

标题: Study on the influencing factors of photodegradation in the coexistence system of multiple phenolic contaminants

标题: 多种酚类污染物共存体系下光降解影响因素研究

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作者关键词: 酚类内分泌干扰物; 光降解; 光源; 阴阳离子; 腐殖酸

摘要: Many kinds of phenolic endocrine disruptors(PEDs) exist in water,most of which are refractory organic pollutants and can be treated by physical adsorption,photodegradation and

biodegradation. The photodegradation experiment, which contained phenol, bisphenol A (BPA) and 2,4-dichlorophenol (2,4-DCP) in the system, were carried out to study the photodegradation process of three phenolic pollutants in coexistence water system, and discussed the effects of external factors to the photodegradation of phenolic compounds such as light source, iron ion, chloride ion and humic acid (HA). It was found that the photodegradation of phenols was mainly influenced by the wavelength of light source, and the UV degradation efficiency is the best. There was a competitive relationship among three pollutants in system. Ionic strength (Fe^{3+} and Cl^-) promoted the photodegradation of bisphenol A but inhibited 2,4-dichlorophenol. The dual action of anion and cation is related to the structural stability of phenols and the active groups in the system. HA promoted photodegradation of bisphenol A significantly, which inhibited 2,4-dichlorophenol. In addition, the low concentration HA ($\leq 1 \text{ mg/L}$) had a catalytic effect on phenol. This work can provide basic data for the study of photodegradation of various phenolic compounds in water.

摘要: 水体中存在的酚类内分泌干扰物种类较多, 其中大多是难降解有机污染物, 可通过物理吸附、光降解和生物降解等方法处理。以苯酚(phenol)、双酚 A(BPA)和 2,4-二氯苯酚(2,4-DCP)为研究对象, 将 3 种物质置于同一体系中研究水体中多种酚类污染物的光降解过程, 探讨了光源、铁离子、氯离子和腐殖酸等外部因素对酚类光降解的影响。实验结果表明, 酚类物质的光降解主要受光源波长的影响, 紫外光降解效率最好, 且相互间存在竞争关系。离子强度(Fe^{3+} 和 Cl^-)对双酚 A 的光降解产生促进作用, 对 2,4-二氯苯酚表现为抑制作用。阴阳离子的双重作用与酚类的结构稳定性和体系中的活性基团有关。腐殖酸(HA)对双酚 A 的光降解促进作用明显, 对 2,4-二氯苯酚有抑制作用, 低浓度腐殖酸($\leq 1 \text{ mg/L}$)对苯酚有促进作用。可对水体中多种酚类的光降解研究提供基础数据。

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地址: Meng Jianhao, School of Environmental Science and Engineering, Changan University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xian;; Xian, ;; 710054;; 710054.

Chen Aixia, School of Environmental Science and Engineering, Changan University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xian;; Xian, ;; 710054;; 710054.

Wang Xueping, School of Environmental Science and Engineering, Changan University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xian;; Xian, ;; 710054;; 710054.

Chen Li, School of Environmental Science and Engineering, Changan University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xian;; Xian, ;; 710054;; 710054.

Chen Yang, School of Environmental Science and Engineering, Changan University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xian;; Xian, ;; 710054;; 710054.

地址: 孟建昊, 长安大学环境科学与工程学院;; 旱区地下水文与生态效应教育部重点实验

室, ;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

陈爱侠, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

王雪平, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

陈丽, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

陈阳, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: 1254155088@qq.com; 489520939@qq.com

电子邮件地址: 1254155088@qq.com; 489520939@qq.com

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作者: Ma Zhiyuan; Li Jiaqi; Zhai Meijing; Wu Min; Xu Yong

作者: 马致远; 李嘉祺; 翟美静; 吴敏; 许勇

标题: A comparative study of isotopic hydrogeochemistry of geothermal fluids of sedimentary basin type and volcanic type

标题: 沉积型和火山型地热流体的同位素水文地球化学对比研究

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作者关键词: Guanzhong Basin; Tengchong Rehai; hydrogeochemical; isotope; geothermal fluid; henetic formation

作者关键词: 关中盆地; 腾冲热海; 水文地球化学; 同位素; 地热流体; 成因模式

摘要: Geothermal resources can be divided into volcanic type and sedimentary basin type according to the different geological structures and geneses. Many scholars at home and abroad have done many researches on isotopic hydrogeochemistry of geothermal systems of sedimentary basin type. However, the study of volcanic geothermal systems is insufficient, and the comparative study of isotopic hydrogeochemistry between sedimentary and volcanic geothermal fluids needs to

be further carried out. The geothermal system in the abdomen of the Guanzhong Basin and the Tengchong volcanic geothermal system are selected as representative geothermal systems. Isotopic hydrogeochemical methods are used to geological structures of different types of geothermal fluid origin and formation, thermal storage, geothermal fluid openness, and so on. The comparative studies of the similarities and differences may provide a scientific basis of different types of the sustainable development and utilization of geothermal resources in China. The Guanzhong Basin and the Tengchong Rehaia geothermal systems have large differences in thermal storage space, structural conditions and heat sources. The former has a more closed heat storage and a thicker thermal reservoir. The latter has a smoother heat storage channel and a richer heat source. The Tengchong Rehai geothermal system has a high heat storage temperature, shallower burial, faster hot water circulation, and easier development and utilization. Both the Guanzhong Basin and the Tengchong rehai geothermal systems have obvious $\delta^{18}\text{O}$ enrichment. The longer geothermal fluid retention time is the main controlling factor of $\delta^{18}\text{O}$ enrichment for the Guanzhong Basin geothermal fluids, and the higher thermal storage temperature is responsible for the $\delta^{18}\text{O}$ enrichment in the Rehai geothermal fluids. The main controlling factors include: (1) the abdomen of the Guanzhong Basin is a semi-closed and closed sedimentary basin, and the Tengchong Rehai geothermal system is of semi-closed volcanic type. The degree of water-rock reaction during a long geological history is often the main controlling factor determining the hydrochemical type of the hot-storage fluids.

摘要: 地热资源按地质构造及成因的不同可划分为火山型及沉积盆地型两种类型。国内外许多学者对沉积型地热系统的同位素水文地球化学研究较多,而火山型地热系统研究不足,且沉积型和火山型地热流体的同位素水文地球化学对比研究还有待进一步深入。文章以关中盆地腹部沉积型地热系统及腾冲火山地热系统为代表,应用同位素水文地球化学方法对不同类型地热流体的地质构造、地热流体起源及成因、热储开放程度等进行系统对比研究,进而揭示其异同之处,为我国不同类型地热资源的可持续开发利用提供科学依据。关中盆地与腾冲热海地热系统在热储空间、构造条件、热源方面均存在较大差异,前者热储更为封闭,热储层更厚,后者热储通道更为畅通,热源更为丰富;腾冲热海地热系统热储温度高,埋藏更浅,热水循环更快,更易于开发利用。关中盆地与腾冲热海地热系统均存在比较明显的 $\delta^{18}\text{O}$ 富集现象,关中盆地地热流体滞留时间更长是 $\delta^{18}\text{O}$ 富集的主控因素,腾冲较高的热储温度是 $\delta^{18}\text{O}$ 富集的主控因素;关中盆地腹部为沉积-半封闭型、封闭型,腾冲热海地热系统为火山-半封闭型;在漫长的地质历史时期,水岩反应的程度是决定热储流体水化学类型的主控因素。

入藏号: CSCD:6607330

地址: Ma Zhiyuan, College of Environmental Science and Engineering, Changan University, Xian, Shaanxi 710054, China.

Li Jiaqi, College of Environmental Science and Engineering, Changan University, Xian, Shaanxi 710054, China.

Zhai Meijing, College of Environmental Science and Engineering, Changan University, Xian, Shaanxi 710054, China.

Wu Min, College of Environmental Science and Engineering, Changan University;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xian;; Xian, Shaanxi;; Shaanxi 710054;; 710054.

Xu Yong, College of Environmental Science and Engineering, Changan University;; Key

Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xian;;Xian, Shaanxi;;Shaanxi 710054;;710054.

地址: 马致远, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

李嘉祺, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

翟美静, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

吴敏, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

许勇, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: zhiyuanma56@163.com

电子邮件地址: zhiyuanma56@163.com

使用次数 (最近 180 天): 0

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作者: Cheng Donghui; Li Shuang; Yu Dan; Wang Qian; Yang Yinke

作者: 程东会; 李爽; 于丹; 王倩; 杨银科

标题: Effect of entrapped air on hydraulic conductivity in quasi-saturated porous media

标题: 准饱和多孔介质中圈闭气体对渗透系数的影响

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作者关键词: quasi-saturated hydraulic conductivity; entrapment air; effective porosity; Kozeny-Carman equation; Faybishenko formula

作者关键词: 准饱和和渗透系数; 圈闭气体; 有效孔隙度; Kozeny-Carman 方程; Faybishenko 公式

摘要: The groundwater flow with entrapped air was termed as quasi-saturated flow. The entrapped air in quasisaturated flow of aquifer had a significant influence on hydraulic conductivity of porous media. In this paper, the relation between entrapped air saturation and hydraulic conductivity was studied by the column experiments with respect to four medium, silt, fine sand, medium sand and coarse sand, respectively. The results illustrated that the entrapped air saturation in a quasi-saturated aquifer was related to the particle size of the medium, and the

entrapped air saturation in the fine-grained media was greater than that in the coarse-grained. Within a saturation range of 0.15% of entrapped air saturation, the hydraulic conductivity decreased by 32.82%~56.38% compared with that at entrapped saturation, and the hydraulic conductivity can be expressed as a negative linear correlation with entrapped air saturation. The results also showed that the variation of the quasi-saturated hydraulic conductivity could be generalized as the entrapped air occupied the original effective pores and resulted in a decrease in the original effective porosity and hence in hydraulic conductivity. According to this air entrapment theory, the Kozeny-Carman equation could accurately exhibit the variation of the hydraulic conductivity with entrapped air saturation in the quasi-saturated aquifer, and furthermore, the results illustrated the hydraulic conductivity formula based on the Hagen-Poiseuille equation was not suitable for quasi-saturated hydraulic conductivity. In addition, the experimental results also showed it was necessary to remove entrapped air in laboratory measurement of hydraulic conductivity.

摘要: 含圈闭气体的地下水流称为准饱和流, 准饱和流中的圈闭气体对含水层渗透系数有重大影响。通过柱试验开展了粉砂、细砂、中砂和粗砂 4 种介质圈闭气体饱和度与准饱和渗透系数关系的研究。结果表明: 圈闭气体饱和度明显受介质的粒径影响, 在细粒介质中圈闭气体饱和度明显较大; 4 种介质圈闭气体饱和度在 0 ~ 15% 范围内, 准饱和渗透系数与完全饱和相比减少了 32.82% ~ 56.38%, 且准饱和渗透系数与圈闭气体饱和度之间可表达为一个负线性相关的经验公式; 该公式与 Faybishenko 公式等效, 但形式简单, 参数较少, 使用方便; 准饱和渗透系数的变化规律可概化为圈闭气体占据了原有的有效孔隙, 造成原有效孔隙度减少, 从而使渗透系数减小。利用该理论, Kozeny-Carman 方程能较准确地描述准饱和渗透系数的变化规律, 而基于哈根-泊肃叶方程的渗透系数公式则存在较大误差, 不适用于描述准饱和渗透系数; 试验结果证明了室内测定饱和渗透系数时排除圈闭气体的必要性。

入藏号: CSCD:6603248

地址: Cheng Donghui, School of Environment Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an, Xi'an, 710054, 710054.

Li Shuang, School of Environment Science and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Yu Dan, School of Environment Science and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Qian, School of Environment Science and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Yang Yinke, School of Environment Science and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 程东会, 长安大学环境科学与工程学院; 旱区地下水文与生态效应教育部重点实验室, 旱区地下水文与生态效应教育部重点实验室, 西安; 西安, 陕西; 陕西 710054; 710054, 中国.

李爽, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

于丹, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

王倩, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

杨银科, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

电子邮件地址: chdhbsh@chd.edu.cn

电子邮件地址: chdhbsh@chd.edu.cn

使用次数 (最近 180 天): 0
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作者: Luo Hao; Zhou Weibo; Bai Jiefang; Tang Jizhang; Yang Amin

作者: 罗浩; 周维博; 白洁芳; 唐继张; 杨阿敏

标题: Performance evaluation and obstacle degree analysis of water resources management based on GC-TOPSIS Model

标题: 基于 GC-TOPSIS 模型的水资源管理绩效评价及障碍度分析

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作者关键词: water resources management performance; obstacle degree; Three Red Lines; GC-TOPSIS

作者关键词: 水资源管理绩效; 障碍度; 三条红线; GC-TOPSIS 模型; 西安市

摘要: The evaluation index system of water resources management performance was established based on development and utilization, water use efficiency and restriction of pollution. The GC-TOPSIS model was constructed using the combination coefficients determined by game theory, and the water resources management performance of Xi'an City from 2005 to 2016 was evaluated. In addition, the key obstacle indicators were analyzed by an obstacle degree model. The results showed that the overall performance of water resources gradually increased during the 12 years. The performance degree changed from middle level to good, and the trend of single-strategy layer performance and comprehensive performance were basically the same, and both had a good development trend. In terms of obstacle degree, the criterion layer obstacle degree of development and utilization was increasing continuously, which is the main obstacle to the water resource management performance. The criterion layer obstacle degree of water use efficiency and restriction of pollution showed a decreasing trend. In the future, the main obstacle indicators are the rate of change in total water use and per capita daily living water. Cultivating residents' awareness of water saving and open source and expenditure reduction was crucial to the urban water resources management performance improvement.

摘要: 建立基于开发利用、用水效率和限制纳污的水资源管理绩效评价体系, 采用博弈论确定的组合系数构建 GC-TOPSIS 模型, 对 2005-2016 年西安市的水资源管理绩效进行评价。同时,

采用障碍度模型对影响管理绩效的关键因素进行分析研究。研究表明:2005-2016 年西安市水资源管理综合绩效整体呈上升趋势,绩效水平由中级转为良好,单准则层绩效与综合绩效的变化趋势基本一致,均具有良好的发展态势;开发利用准则层障碍度持续增高,是水资源管理绩效的最大障碍因素,而用水效率和限制纳污两个准则层障碍度则不断下降;指标用水总量变化率和人均日生活用水量将是今后一段时期的主要障碍因子。开源节流、培养居民自主节水意识是提高西安市水资源管理绩效的关键。

入藏号: CSCD:6606219

地址: Luo Hao, School of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Zhou Weibo, School of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Tang Jizhang, School of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Yang Amin, School of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Bai Jiefang, Tianshui Governance and Supervision Bureau of Yellow River Soil and Water Conservation, Tianshui, Gansu 741000, China.

地址: 罗浩, 长安大学环境科学与工程学院;; 长安大学, ;; 旱区地下水文与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

周维博, 长安大学环境科学与工程学院;; 长安大学, ;; 旱区地下水文与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

唐继张, 长安大学环境科学与工程学院;; 长安大学, ;; 旱区地下水文与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

杨阿敏, 长安大学环境科学与工程学院;; 长安大学, ;; 旱区地下水文与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

白洁芳, 黄河水土保持天水治理监督局, 天水, 甘肃 741000, 中国.

使用次数 (最近 180 天): 0

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作者: Mu Dengrui; Yuan Weining; Lu Jiqiang; Luo Pingping; Fan Lei

作者: 慕登睿; 袁卫宁; 吕继强; 罗平平; 范磊

标题: Impacts of human activities on design flood of Bahe River Basin

标题: 人类活动干扰对灞河流域设计洪水的影响研究

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作者关键词: 水文与水资源; MCDRM 模型; 人类活动; 设计洪水; 秦岭北麓; 灞河流域

摘要: In arid and semi-arid regions of China, strong human disturbance causes significant changes in urban river flood process, which affects flood control and water resource planning results. In this paper, we study the effects of land use change and reservoir construction and operation on the changes of rainstorm flood processes in different recurrence periods by the Modified Cell Distributed Rainfall Run-off Model (MCDRM). We construct the rainstorm flood model and verify the model parameters and simulation results according to the calculation results of traditional rational formula, take the urban Bahe River at the northern foot of Qinling mountains as an example. The results showed that the trend of increase of urban land area and water area in the basin increased, and the intensity of water resources development and utilization increases obviously, due to the urbanization of Xi'an city speeds up after 2000, and then the construction of the eight rivers moisten Chang'an project. High intensity human activities change underlying surface conditions in runoff generation and confluence of the flood in Bahe River Basin; the designed flood peak volume and total flood amount decreased since 1980. Compared with 1985, the designed flood peak flow with a recurrence period of 10 years, 20 years, 50 years and 100 years in 2015 decreased by 22.98% on average, and the total designed flood runoff decreased by 21.4% on average. Among them, the design flood peak volume decreased by a maximum of 23.88% at 100-year recurrence period, and the total amount of standard design flood runoff decreased by 21.51% at 20-year recurrence period. This paper carried out the study on the simulation and response change of rainstorm flood caused by human activities in urban rivers, which is based on the improved grid distributed rainfall-runoff model, and the results can provide a new reference for the design flood review and calculation of small and medium-sized watersheds in arid and semi-arid areas.

摘要: 我国干旱半干旱地区,强烈的人类活动干扰引起城市河流洪水过程的显著变化,影响防洪与水资源规划设计结果。基于改进的网格化分布式降雨径流模型 MCDRM(Modified Cell Distributed Rainfall Run-off Model),定量研究土地利用变化、水库建设运行对不同重现期暴雨洪水过程变化的影响。以秦岭北麓城市型河流灞河为例,结合流域典型人类活动干扰产汇流下垫面条件的实际情况,构建暴雨洪水模型,并依据推理公式法计算结果率定模型参数。研究表明:2000年后,西安市城镇加速扩张,并启动八水润长安工程建设,使得流域内城市用地及水域面积增加、水资源开发利用强度增加明显。强烈的人类活动改变了流域降雨产流、汇流的下垫面条件,引起流域洪水过程变化;秦岭北麓灞河流域 1980-2015 年设计洪水洪峰、洪水总量均减少。与 1985 年相比,2015 年流域内重现期为 10、20、50、100 年一遇的设计洪峰流量平均减少 22.98%,设计洪水径流总量平均减少约 21.4%。其中,100 年一遇标准设计洪峰

径流减少 23.88%,20 年一遇标准设计洪水径流总量减少 21.51%。基于改进的网格化分布式降雨径流模型,开展城市河流人类活动干扰的暴雨洪水模拟与响应变化研究,结果可为干旱半干旱区中小流域设计洪水复核与计算提供新的参考。

入藏号: CSCD:6606225

地址: Mu Dengrui, School of Environmental Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, ;; 710061;;710061.

Yuan Weining, School of Environmental Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, ;; 710061;;710061.

Lu Jiqiang, School of Environmental Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, ;; 710061;;710061.

Luo Pingping, School of Environmental Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, ;; 710061;;710061.

Fan Lei, School of Environmental Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, ;; 710061;;710061.

地址: 慕登睿, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

袁卫宁, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

吕继强, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

罗平平, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

范磊, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

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作者: Feng Wenwen; Guo Meng; Qian Hui; Hou Kai

作者: 冯文文; 郭梦; 钱会; 侯凯

标题: Research and prediction relationship of the coupling of urbanization and water resources

environment in Xi'an City

标题: 西安市城市化与水资源环境耦合关系研究及预测

来源出版物: 水资源与水工程学报 卷: 30 期: 4 页: 113-118,123 出版年: 2019

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文献类型: Article

作者关键词: urbanization; water resources environment; coupling coordination model; coupling relationship; Xi'an City

作者关键词: 城市化; 水资源环境; 耦合协调模型; 耦合关系; 西安市

摘要: Based on the statistical data of Xi'an from 2005 to 2017, a coupling and coordination model between urbanization and water resources environment was constructed. The coupling relationship and influencing factors between urbanization and water resources environment in Xi'an were analyzed and predicted. The results showed that the coupling degree of urbanization and water resources environment in Xi'an from 2005 to 2017 was between 0.3299 and 0.9675, and the overall trend was increase with fluctuations, and 70% of the years are highly coordinated coupling. 2005-2012 is the stage of urbanization development lagging behind the water resources environment, and 2013-2017 is the stage of the water resources environment ahead of urbanization development. Benefited from a series of fruitful measures of Xi'an, the environmental status of water resources improved. But compared with the rapid development of urbanization, it still appears to be relatively lagging. The water resources environmental index will be lower than the urbanization comprehensive index for a long time. Although the water resources environment has improved in 2020, it still cannot meet the rapid development of urbanization. The shortage of water resources will be a long-term major problem of the urban development of Xi'an. Therefore, it is imperative to strengthen water resources protection, improve municipal water supply and sewage treatment capacity, and enhance public awareness of water conservation.

摘要: 基于西安市 2005-2017 年的统计数据, 构建了城市化与水资源环境间的耦合模型, 对二者间的耦合关系及影响因素进行了分析、预测。结果表明: 2005-2017 年西安市城市化与水资源环境的耦合协调度介于 0.3299 ~ 0.9675 之间, 整体呈波动上升趋势, 70% 的年份属于高协调度耦合; 2005-2012 年为城市化发展滞后于水资源环境阶段, 2013-2017 年为城市化发展超前于水资源环境阶段, 得益于西安市采取一系列富有成效的措施, 使水资源环境状况不断改善, 但与城市化的高速发展相比还是显得不够, 水资源环境指数将长期低于城市化综合指数; 2020 年水资源环境状况虽有所改善, 但仍不能满足未来城市化的快速发展, 水资源短缺将是西安市城市发展长期面临的重大问题, 因此加强水资源保护、提升市政供水和污水处理能力及增强市民节水意识刻不容缓。

入藏号: CSCD:6606231

地址: Feng Wenwen, School of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Guo Meng, School of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Qian Hui, School of Environmental Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas of Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Hou Kai, School of Environmental Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas of Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

地址: 冯文文, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

郭梦, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

钱会, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

侯凯, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

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作者: Chen Li; Chen Aixia; Han Rong; Chen Yang; Mao Wenjing

作者: 陈丽; 陈爱侠; 韩融; 陈阳; 毛文静

标题: EFFECT OF DIFFERENT CATALYSTS ON PYROLYSIS CHARACTERISTICS OF SLUDGE AND MECHANISM ANALYSIS

标题: 不同催化剂对污泥热解特性的影响及机理分析

来源出版物: 环境工程 卷: 37 期: 10 页: 190-195 出版年: 2019

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文献类型: Article

作者关键词: CaO; sludge; rapid pyrolysis; CaO; semi-coke; hydrogen-rich gas

作者关键词: 污泥; 快速热解; 半焦; 富氢燃气

摘要: In order to improve resource utilization of sludge and further diversification of sludge pyrolysis product utilization,in this study,the effect of sludge pyrolysis characteristics was explored on three different catalytic systems of CaO,CaO-semicoke and semi-coke after mechanical chemical pretreatment. The result showed that H₂ yield of CaO catalyst was 80%

higher than that of the original sludge. By TG-DTG and FTIR,we also found that the addition of CaO caused carbon fixation reaction and in-situ release of CO₂ during pyrolysis,which was beneficial to the generating of CO,H₂ and reduced semi-coke yield. Mixing appropriate semi-coke and CaO could optimize the quality of pyrolysis gas,increase the proportion of H₂ significantly even up to 44.21%. It can also promote the production of tar,which provided ideas for the subsequent secondary cracking of tar. Semi-coke,as the single catalyst,facilitated the increase of pore structure and specific surface area of the semi-coke produced in pyrolysis,gave it the potential to be developed into adsorbent materials and supported catalytic materials.

摘要: 为提高污泥资源化,进一步实现污泥热解产物利用的多元化,探究了经机械化学预处理后,CaO、CaO-半焦和半焦 3 种不同催化体系对污泥快速热解产物特性的影响。结果表明: CaO 催化体系下,H₂ 产率较原污泥提高了 80%,通过 TG-DTG、FTIR 分析发现,添加 CaO 有助于热解过程中发生固碳反应和 CO₂ 的原位释放,利于 CO、H₂ 生成和半焦产率的降低;采用适量半焦与 CaO 混合作为催化剂,可以优化热解气品质,显著提高 H₂ 占比,体积分数达到 44.21%,同时促进焦油产生,为后续焦油二次裂解产气提供新思路;完全以半焦为催化剂有利于热解后焦炭孔隙和比表面积的增加,使其具备开发为吸附材料和负载型催化材料的潜力。

入藏号: CSCD:6602899

地址: Chen Li, School of Environmental Science and Engineering,Changan University;;Changan University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Chen Aixia, School of Environmental Science and Engineering,Changan University;;Changan University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Han Rong, School of Environmental Science and Engineering,Changan University;;Changan University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Chen Yang, School of Environmental Science and Engineering,Changan University;;Changan University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Mao Wenjing, Shaanxi Intercity Railway Co.,Ltd, Xi'an, Shaanxi 710018, China.

地址: 陈丽, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

陈爱侠, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

韩融, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

陈阳, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

毛文静, 陕西城际铁路有限公司, 西安, 陕西 710018, 中国.

电子邮件地址: 1160489379@qq.com; 489520939@qq.com

电子邮件地址: 1160489379@qq.com; 489520939@qq.com

使用次数 (最近 180 天): 0

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作者: Ma Xiongde; Fan Limin

作者: 马雄德; 范立民

标题: Evolution characteristics of groundwater and eco-environment in Yulin-Shenmu Mining Area

标题: 榆神矿区地下水与生态环境演化特征

来源出版物: 煤炭科学技术 卷: 47 期: 10 页: 245-252 出版年: 2019

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文献类型: Article

作者关键词: Yulin-Shenmu Mining Area; groundwater level; water-preserved coal mining; arid and semi-arid area; land desertification; ecological environment

作者关键词: 榆神矿区; 地下水位; 保水采煤; 干旱半干旱区; 土地荒漠化; 生态环境

摘要: Generally, mining activities will cause the variation of hydrogeological conditions in the mining area, and then affect the groundwater flow field and ecological environment. The purpose of this article is to study the characteristics of groundwater level change and its environmental effects after 15 years mining in Yulin-Shenmu Mining Area. Groundwater level change was analyzed by observed data before and after coal mining, simultaneously, land desertification process was monitored by two same period remote-sensing image. The results showed: more than 15 years mining had drained at least 3.22% of the total water resources, which had drawn groundwater level down more than 1m of 968 km², accounting 18.4% of the mining area. The area where water level dropped over 8 m mainly located at Mahuangliang Town. Land desertification had tremendously rehabilitated from 2000 to 2016, the area of severe desertification land and moderate desertification land were reduced sharply, but the non-desertification land area was increased. There was no correlated coefficient between groundwater level change and land desertification, and groundwater level decline did not directly caused desertification development. The permitted variation ranges of groundwater level should be decided by relationship between groundwater and vegetation. The upper limit of depth to groundwater must be less than the maximum capillary height, and the lower limit should be determined by the sum of the length of vegetation root and the maximum capillary height of groundwater. Accordingly, the upper limit of depth to groundwater in Yulin-Shenmu Mining Area is 0.5 m, and the lower limit is 4.0 m. The min-depth of groundwater is 0.5 m. The obvious decrease of groundwater level in Yulin-Shenmu Mining Area has not caused the development of land desertification, because the vegetation in these areas has no dependence on

groundwater. In the development and construction of mining areas in arid and semi-arid areas, it is still necessary to attach importance to the constraint of groundwater level threshold and carry out water-preserved coal mining technology.

摘要: 采矿活动一般都会造成矿区水文地质条件的变异,进而影响地下水流场及生态环境。为研究榆神矿区近 15 年采煤活动对地下水及生态环境的影响,通过对比 2000 年和 2016 年榆神矿区地下水流场形态,指出了煤炭资源开采后榆神矿区地下水位变化规律;采用同时段 2 期 ETM+ 遥感影像解译了煤炭资源开采后土地荒漠化演化特征。结果表明:矿区开发建设中矿井涌水量占萨拉乌苏组水资源总量的 3.22%,造成 968 km² 矿区地下潜水位下降幅度超过 1 m,占矿区面积的 18.4%,其中下降幅度大于 8 m 的区域集中在麻黄梁镇;2000-2016 年间榆神矿区土地荒漠化呈逆转趋势,重度荒漠化和中度荒漠化土地面积锐减与非荒漠化土地面积剧增是其主要特征;矿区地下水位下降较大的地区土地荒漠化并未发生明显变化,二者之间没有统计相关性;干旱半干旱区煤炭资源开发受地下水的制约,水位上限必须小于最大毛细高度,水位下限以植被根系长度与地下水最大毛细上升高度之和来确定。据此,榆神矿区水位埋深上限为 0.5 m,下限为 4.0 m。榆神矿区地下水位下降明显的区域并未引起土地荒漠化发展,是由于这些地区植被对地下水依赖性较弱,尽管如此,干旱半干旱区矿区开发建设仍要重视地下水位阈限的约束,推行保水采煤技术。

入藏号: CSCD:6596603

地址: Ma Xiongde, College of Environmental Science and Engineering, Changan University;; Changan University, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Fan Limin, Shaanxi Institute of Geo-Environment Monitoring, Xi'an, Shaanxi 710054, China.

地址: 马雄德, 长安大学环境科学与工程学院;; 长安大学, ;; 旱区地下水文与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

范立民, 陕西省地质环境监测总站, 西安, 陕西 710054, 中国.

电子邮件地址: hgmxd@chd.edu.com

电子邮件地址: hgmxd@chd.edu.com

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作者: Wang Tong; Lv Liang; Wei Xiao

作者: 王通; 吕亮; 卫潇

标题: Progress in Ratiometric Fluorescence Probes Based on Quantum Dots

标题: 量子点比率荧光探针研究进展

来源出版物: 化学通报 卷: 82 期: 10 页: 893-898,892 出版年: 2019

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作者关键词: Quantum dots (QDs); Fluorescence detection; Ratiometric fluorescence probes; Visualization

作者关键词: 量子点; 荧光检测; 比率荧光探针; 可视化

摘要: Quantum dots (QDs) are nano-luminescent particles with excellent luminescent properties, which have broad application prospects in solar energy utilization and fluorescence detection. Combining QDs with another fluorophore can be used as a ratiometric fluorescence probe to visually detect target substances and improve detection sensitivity. In this paper, the types, preparation methods and application of QDs ratiometric fluorescence probes were reviewed, and the shortcomings were analyzed, so as to provide reference for the development of ratiometric fluorescence probes with excellent performance.

摘要: 量子点(QDs)是一种纳米发光粒子,具有优异的发光性能,在太阳能利用、荧光检测等方面具有广阔的应用前景。QDs与另一荧光团复合可构建比率荧光探针,实现可视化检测目标物并且提高了检测灵敏度。本文主要对QDs比率荧光探针的种类、构建方法和应用领域的研究进展进行综述,并对其中的不足进行分析,以期研发具有优异性能的比率荧光探针提供借鉴。

入藏号: CSCD:6590538

地址: Wang Tong, School of Environmental Sciences and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Xi'an, Shaanxi 710054, China.

Lv Liang, School of Environmental Sciences and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Xi'an, Shaanxi 710054, China.

Wei Xiao, School of Environmental Sciences and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Xi'an, Shaanxi 710054, China.

地址: 王通, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

吕亮, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

卫潇, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

电子邮件地址: chdwx@chd.edu.cn

电子邮件地址: chdwx@chd.edu.cn

使用次数 (最近 180 天): 2

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作者: 马雪冬; 韩霁昌; 杜炜; 王伟

作者: Ma Xuedong; Han Jichang; Du Wei; Wang Wei

标题: Preparation and Characterization of Mullite Whiskers from Different Silica Sources via Molten Salt Reaction

标题: 不同氧化硅前驱体熔盐反应制备莫来石晶须

来源出版物: 无机化学学报 卷: 35 期: 10 页: 1885-1895 出版年: 2019

文献号: 1001-4861(2019)35:10<1885:PACOMW>2.0.TX;2-Q

来源出版物: Chinese Journal of Inorganic Chemistry 卷: 35 期: 10 页: 1885-1895 出版年: 2019

文献号: 1001-4861(2019)35:10<1885:PACOMW>2.0.TX;2-Q

语言: English

文献类型: Article

作者关键词: molten salt synthesis; mullite whiskers; thermal pyrolysis; apparent activation energy

作者关键词: 熔盐合成; 莫来石晶须; 热分解; 表观活化能

摘要: Mullite whiskers were prepared using molten salt reaction. The resulting whiskers have been investigated by X-ray diffraction (XRD), scanning electron microscopy (SEM), thermogravimetric analysis (TG-DSC) and high resolution transmission electron microscopy (HRTEM). SEM studies showed that diameter of the mullite whiskers was in a range of 200~400 nm and their length was several microns. The analysis of HRTEM data revealed that the interplanar spacing was 0.539 nm, in accordance with the spacing of (110) crystal plane of mullite. As silica species was introduced into starting reactants, the combination reaction of mullite formation took place, $\gamma\text{-Al}_2\text{O}_3$ was consumed and mullite whiskers grew continuously. The most important factor in controlling mullite formation is the decomposition reaction of aluminum sulfate, and $\alpha\text{-Al}_2\text{O}_3$ is fabricated by thermal pyrolysis of aluminum sulfate at 900 °C in molten sodium sulfate system without silica species participating. According to the thermodynamic calculation, $\alpha\text{-Al}_2\text{O}_3$ is a stable phase as the product of the decomposition of $\text{Al}_2(\text{SO}_4)_3$ in comparison to $\gamma\text{-Al}_2\text{O}_3$, and mullite formation reaction is a spontaneous process in the whole temperature range. The decomposition reaction of aluminum sulfate was investigated by Kissinger-Akahira-Suno method with various heating rates ($\beta=5, 10$ and $15 \text{ K}\cdot\text{min}^{-1}$), and the apparent activation energy (E_a) of reaction is $257.2 \text{ kJ}\cdot\text{mol}^{-1}$.

摘要: 利用熔盐反应制备了莫来石晶须,采用X射线粉末衍射(XRD)、扫描电子显微镜(SEM)、热重分析(TG-DSC)、高分辨透射电镜(HRTEM)等分析表征技术对所制备的莫来石晶须进行了测定。SEM研究表明莫来石晶须的直径在200~400 nm范围,长度可达到几个微米。HRTEM照片显示所制备晶须的晶面间距为0.539 nm,正好与莫来石(110)晶面数据吻合,证明熔盐法制备的晶须为莫来石。随着反应物中氧化硅物种的引入, $\gamma\text{-Al}_2\text{O}_3$ 不断消耗和莫来石相不断生长,获得了各向异性的莫来石晶须。硫酸铝的分解反应是最重要的反应控制步骤,如果没有硅物种参与反应,可以在900 °C下硫酸钠-硫酸铝的复合熔盐体系中得到 $\alpha\text{-Al}_2\text{O}_3$ 。熔盐反应的热力学计算表明,相比于 $\gamma\text{-Al}_2\text{O}_3$, $\alpha\text{-Al}_2\text{O}_3$ 作为硫酸铝分解的产物

具有更稳定的能态。采用 Kissinger-Akahira- Suno 方法对硫酸铝分解过程的动力学进行研究, 硫酸铝分解反应的表现活化能(E_a)为 257.2 kJ·mol⁻¹。

入藏号: CSCD:6592320

地址: Ma Xuedong, College of Environment Science and Engineering, Chang'an University;;Key Laboratory of Degraded and Unused Land Consolidation Engineering, the Ministry of Land and Resources of China, Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education;;Key Laboratory of Degraded and Unused Land Consolidation Engineering, the Ministry of Land and Resources of China, Xi'an;;Xi'an, ;; 710054;;710075.

Han Jichang, Key Laboratory of Degraded and Unused Land Consolidation Engineering, the Ministry of Land and Resources of China, Key Laboratory of Degraded and Unused Land Consolidation Engineering, the Ministry of Land and Resources of China, Xi'an, 710075.

Du Wei, College of Environment Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an, 710054.

Wang Wei, College of Environment Science and Engineering, Chang'an University;;Chang'an University, Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education;;Shaanxi Key Laboratory of Land Consolidation, Xi'an;;Xi'an, ;; 710054;;710054.

地址: 马雪冬, 长安大学环境科学与工程学院;;国土资源部退化及未利用土地整治工程重点实验室, 旱区地下水文与生态效应教育部重点实验室;;国土资源部退化及未利用土地整治工程重点实验室, 西安;;西安, ;; 710054;;710075.

韩霁昌, 国土资源部退化及未利用土地整治工程重点实验室, 国土资源部退化及未利用土地整治工程重点实验室, 西安, 陕西 710075, 中国.

杜炜, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

王伟, 长安大学环境科学与工程学院;;长安大学, 旱区地下水文与生态效应教育部重点实验室;;陕西省土地整治重点实验室, 西安;;西安, ;; 710054;;710054.

电子邮件地址: wwchem@chd.edu.cn

电子邮件地址: wwchem@chd.edu.cn

使用次数 (最近 180 天): 11

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作者: Meng Yan

作者: 孟燕

标题: Preparing and characterizing carboxyl-modified magnetic Fe₃O₄@SiO₂ complex

nanoparticles on the spherical surface

标题: 羧基表面改性磁性 Fe₃O₄@SiO₂ 纳米粒子的制备与表征

来源出版物: 应用化工 卷: 48 期: 9 页: 2134-2136 出版年: 2019

文献号: 1671-3206(2019)48:9<2134:SJBMGX>2.0.TX;2-K

来源出版物: Applied Chemical Industry 卷: 48 期: 9 页: 2134-2136 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: magnetic Fe₃O₄@SiO₂ nanoparticle; modification; amination; carboxylation

作者关键词: 磁性纳米粒子 Fe₃O₄@SiO₂; 修饰; 氨基化; 羧基化

摘要: Fe₃O₄ Magnetic nanoparticles were prepared via a hydrothermal approach, and then carboxylic-modified Fe₃O₄@SiO₂ combined nanoparticles were fabricated by the surface modification using tetraethyl orthosilicate (TEOS), 3-aminopropyltriethoxysilane (3-APTES) and succinic anhydride (SA) successively. The structures and chemical functional groups were characterized by Fourier transform infrared (FTIR), transmission electron microscopy (TEM), vibrating sample magnetometer (VSM) and X-ray powder diffraction (XRD). Results show that magnetic nanoparticles have a uniform size and the magnetization saturation value of 41.6 emu/g, and the carboxylic group had been modified on the surface.

摘要: 利用水热法制备四氧化三铁磁性纳米粒子,依次用正硅酸乙酯、3-氨丙基三乙氧基硅烷和丁二酸酐进行表面修饰,制备了表面羧基化改性的 Fe₃O₄@SiO₂ 磁性纳米粒子。采用红外、透射电镜、振动样品磁强计、X 射线粉末衍射分析对其结构和化学官能团进行表征。结果表明,磁性纳米粒子的粒径均一,饱和磁化强度为 41.6 emu/g,且表面接枝上了羧基官能团。

入藏号: CSCD:6573643

地址: Meng Yan, School of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 孟燕, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

电子邮件地址: mengyan@chd.edu.cn

电子邮件地址: mengyan@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Liu Fengxia; Shi Ziwei; Qian Hui; Feng Wenwen

作者: 柳凤霞; 史紫薇; 钱会; 冯文文

标题: Evolution of groundwater hydrochemical characteristics and water quality evaluation in Yinchuan area

标题: 银川地区地下水水化学特征演化规律及水质评价

来源出版物: 环境化学 卷: 38 期: 9 页: 2055-2066 出版年: 2019

文献号: 0254-6108(2019)38:9<2055:YCDQDX>2.0.TX;2-N

来源出版物: Environmental Chemistry 卷: 38 期: 9 页: 2055-2066 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: Yinchuan area; groundwater; water chemistry; evolution law; water quality evaluation

作者关键词: 银川地区; 地下水; 水化学; 演化规律; 水质评价

摘要: Studying the water chemistry evolution and evaluating groundwater quality are important significant for groundwater resources protection and sustainable development. Based on the groundwater quality monitoring data from 1991 to 2016 in Yinchuan area, we analyzed the hydrochemical characteristics and evolution of groundwater in the study area using classical statistics, Piper diagram, Gibbs diagram, and ion ratio analysis method, and also used fuzzy comprehensive evaluation method to evaluate water quality. The results showed that the chemical composition of groundwater in the study area has not changed significantly in the past 26 years, and it was alkaline water. The concentration of ions in groundwater were steady for many years. The order of cation was: $\text{Na}^+ > \text{Mg}^{2+} > \text{Ca}^{2+} > \text{K}^+$, and the order of anion was $\text{HCO}_3^- > \text{Cl}^- > \text{SO}_4^{2-}$. At present, the groundwater in Yinchuan area basically met the standard of drinking water, and the water quality in the alluvial plain was good. The water quality in Fengdeng Town and the northern part was the worst, and TDS of some wells were greater than $2000 \text{ mg} \cdot \text{L}^{-1}$. Groundwater quality was the worst in 1996 and has improved significantly since 2006. The chemical composition and water quality of groundwater in the study area were affected by hydrogeological conditions, evaporation, rock weathering, recharge water composition and human activities.

摘要: 研究地下水的水化学特征演化规律及水质评价,对地下水水资源保护和可持续开发利用具有重要意义.本文根据银川地区1991-2016年地下水水质监测资料,运用经典统计学、Piper三线图解法、Gibbs图解法、离子比值法对研究区地下水水化学特征及演化规律进行分析,并利用模糊综合评价法对研究区62个水样点进行水质评价.结果表明,26年来研究区地下水水化学组分未发生明显变化,为偏碱性硬水.多年地下水中各离子含量排序一致,阳离子含量排序为: $\text{Na}^+ > \text{Mg}^{2+} > \text{Ca}^{2+} > \text{K}^+$,阴离子含量排序为 $\text{HCO}_3^- > \text{Cl}^- > \text{SO}_4^{2-}$.当前银川地区地下水水质基本满足生活饮用水的标准,山前冲洪积平原地区水质良好,丰登镇及北部地区水质最差,部分井孔的TDS大于 $2000 \text{ mg} \cdot \text{L}^{-1}$.地下水水质在1996年最差,自2006年以来得到明显改善.研究区地下水水化学组分及水质受到水文地质条件、蒸发浓缩作用、岩石风化作用、补给水成分及人类活动的综合影响.

入藏号: CSCD:6576018

地址: Liu Fengxia, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Shi Ziwei, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region of

Ministry of Education, Xi'an;;Xi' an, ;; 710054;;710054.

Qian Hui, School of Environmental Science and Engineering,Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region of Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region of Ministry of Education, Xi'an;;Xi' an, ;; 710054;;710054.

Feng Wenwen, School of Environmental Science and Engineering,Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region of Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region of Ministry of Education, Xi'an;;Xi' an, ;; 710054;;710054.

地址: 柳凤霞, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

史紫薇, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

钱会, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

冯文文, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

电子邮件地址: qianhui@chd.edu.cn

电子邮件地址: qianhui@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Li Junting; Zhang Yanhui; Shen Yuanyuan; Liu Shangjie; Wang Shuai

作者: 李俊亭; 张彦辉; 申圆圆; 刘尚杰; 王帅

标题: Reconstruction project of groundwater balance experiment site of Zhengzhou: mainly test equipments and data automatic acquisition

标题: 郑州地下水均衡试验场的改建工程主要测试设施与数据自动化采集

来源出版物: 水文地质工程地质 卷: 46 期: 5 页: 38-43 出版年: 2019

文献号: 1000-3665(2019)46:5<38:ZZDXSJ>2.0.TX;2-V

来源出版物: Hydrogeology & Engineering Geology 卷: 46 期: 5 页: 38-43 出版年: 2019

文献号: 1000-3665(2019)46:5<38:ZZDXSJ>2.0.TX;2-V

语言: Chinese

文献类型: Article

作者关键词: automatic water supplying instrument; negative pressure sensor; 5 TM moisture and

temperature sensor; data automatic collection system

作者关键词: 自动补水仪; 负压传感器; 5 TM 水分与温度传感器; 数据自动化采集系统

摘要: The reconstruction project of groundwater balance experiment site of Zhenzhou was rebulbied by geoenvironmental monitoring institute of Henan Province,belongs to one of the national groundwater monitoring projects,which performed by China geological Environment Monitoring Institute. The development of science and technology has laid a good foundation for the automation of observation field observation data collection. The experiment field data needs to be automated collectionincluding 3m high main pole weather station test system with 3m high main pole; solar full radiation,solar net radiation,direct solar observation instrument; E-601 evaporator; 5 TM soil moisture and temperature sensor; automatic water supplying instrument; negative pressure measuring instrument. other data automation collection instrumentes have been marketized except the latter two items ,which belong to the author 's invention and utility patents. The automatic water supply instrument is a device based on the traditional Mario bottle hydration principle for simulating the depth of the groundwater level. It is. It uses a control circuit to automatically replenish the amount of water consumed by evaporation as well as record the duration of precipitation. process. The negative pressure measurement utilizes the characteristic that the air kinematic viscosity is about 15 times greater than the water kinematic viscosity, that is to say,when the water just passes through the porous ceramic head,the gas cannot pass through the porous ceramic head,though which a sensor for measuring the negative pressure in the vadose zone is designed. Data acquisition based on the compensation principle of Wheatstone bridge balance. Due to the much more numberes of controlling cables for power supply and data acquisition, the data collection automation system uses a three-level integration scheme.

摘要: 郑州地下水均衡试验场的改建,是由中国地质环境监测院主持的国家地下水监测工程中地下水均衡试验场的改建项目之一,由河南省环境地质监测院具体负责实施。科学技术的发展,为试验场观测数据采集的自动化奠定了良好基础。试验场数据采集需要自动化的有: 3m 高主杆气象站测试系统;太阳全辐射、太阳净辐射、太阳直射观测仪,E601 蒸发仪,5 TM 含水率、温度传感器,自动补水仪,负压测量仪。除后两项外,其他需要数据采集仪器已经市场化。后两项是作者的发明与实用专利。自动补水仪是用来模拟地下水位埋深的设备,它是传统的马里奥特瓶补水原理为基础,采用控制电路使其可以自动补给因蒸发而消耗的水量,同时还可以记录降水的历时过程。负压测量是利用空气运动黏度约大于水运动黏度的 15 倍这一特性,即当水刚通过多孔瓷头时,气体不能通过多孔瓷头,据此设计了在包气带中能测定负压的传感器。数据采集则应用了惠斯登电桥平衡的补偿原理。由于控制、供电、采集数据的电缆过多,因此数据自动化采集系统应用了三级采集、逐级集成的方案。

入藏号: CSCD:6571479

地址: Li Junting, School of Environmental Science and Engineering, Changan University;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xian;;Xian, Shaanxi;;Shaanxi 710054;;710054.

Zhang Yanhui, Xian Yongtai Sensor Technology Limited Company, Xian, Shaanxi 710018, China.

Liu Shangjie, Xian Yongtai Sensor Technology Limited Company, Xian, Shaanxi 710018, China.

Shen Yuanyuan, School of Biological and Environmental Engineering, Xian Univeisity, Xian, Shaanxi 710065, China.

Wang Shuai, No. 2 Institute of Geological & Mineral Resources Survey of Henan, Zhengzhou, He'nan 450053.

地址: 李俊亭, 长安大学环境科学与工程学院;;干旱区地下水文与生态效应教育部重点实验室, ;;干旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

张彦辉, 西安永泰传感器科技有限公司, 西安, 陕西 710018, 中国.

刘尚杰, 西安永泰传感器科技有限公司, 西安, 陕西 710018, 中国.

申圆圆, 西安文理学院生物与环境工程学院, 西安, 陕西 710065, 中国.

王帅, 河南省地质矿产勘查开发局第二地质环境调查院, 郑州, 河南 450053, 中国.

电子邮件地址: 13689193382@163.com

电子邮件地址: 13689193382@163.com

使用次数 (最近 180 天): 0

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作者: Dou Yan; Lu Kaibin; Deng Peijie; Zhang Fengyi; Zhang Xiuyu; Luo Wen

作者: 窦妍; 卢楷彬; 邓培杰; 张凤义; 张修禹; 罗文

标题: Study on the nitrogenous transformation in weak alkaline soil amended with different rates of nitrite

标题: 不同浓度亚硝态氮在弱碱性土壤中的转化规律研究

来源出版物: 应用化工 卷: 48 期: 8 页: 1830-1832,1836 出版年: 2019

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作者关键词: NO₂-N; NO₃-N; accumulation effect; weak alkaline soil

作者关键词: 亚硝态氮; 硝态氮; 累积效应; 弱碱性土壤

摘要: The soil was collected from Hua county, Shaanxi province. In laboratory, the transformation rule of nitrogen was studied in the weakly alkaline soil amended with different initial concentrations of nitrogenous nitrogen (11.2, 56, 112, 280, 560 mg/kg soil), and the cumulative effect of nitrogenous nitrogen was discussed. The results showed that the cumulative effect of nitrite nitrogen in soil increased with the increase of concentration, that is the conversion time to NO₃-N increased with the increase of the initial concentration of NO₂-N. In the process of conversion from high concentration of NO₂-N (560 mg/kg) to NO₃-N, from the 10th day on, the conversion rate of NO₂-N decreased significantly, which was lower than the state when the initial concentration was 280 mg/kg, and the reaction was strongly inhibited; When the initial

pH value of the soil was adjusted,the inhibitory effect at this concentration was hardly affected.Therefore,it is necessary to pay attention to the regional environment with high concentration of nitrite nitrogen,and take some measures in time to prevent its further impact on human health.

摘要: 选取陕西省华县耕作土壤,在实验室条件下研究该弱碱性土壤在不同初始浓度的亚硝态氮(11.2,56,112,280,560 mg/kg 土)存在下的氮的转化规律,并进一步阐明亚硝态氮在该土壤中的累积效应。结果表明,土壤中的亚硝态氮的累积效应随着浓度的增大不断增强,即土壤中亚硝态氮转化为硝态氮的转化时间随着亚硝态氮的初始浓度的增加而增加。但是,高浓度的亚硝态氮(560 mg/kg)向硝态氮转化过程中,从第 10 d 开始,亚硝态氮的转化速率明显下降,低于初始浓度为 280 mg/kg 时的状态,反应受到强烈的抑制作用;当调整土壤的初始 pH 值时,该浓度下的抑制作用也几乎不被影响。因此,对出现高浓度亚硝态氮的地区环境需要引起重视,并及时采取一定的措施,以防止其对人类健康产生进一步的影响。

入藏号: CSCD:6564343

地址: Dou Yan, School of Environmental Science and Engineering,Changan University, Xian, 710054.

Lu Kaibin, School of Environmental Science and Engineering,Changan University, Xian, 710054.

Deng Peijie, School of Environmental Science and Engineering,Changan University, Xian, 710054.

Zhang Fengyi, School of Environmental Science and Engineering,Changan University, Xian, 710054.

Zhang Xiuyu, School of Environmental Science and Engineering,Changan University, Xian, 710054.

Luo Wen, School of Environmental Science and Engineering,Changan University, Xian, 710054.

地址: 窦妍, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

卢楷彬, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

邓培杰, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

张风义, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

张修禹, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

罗文, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

电子邮件地址: 46477849@qq.com

电子邮件地址: 46477849@qq.com

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作者: Sun Yongchang; Zhang Bingqing; Liu Liming; Liu Xiaonan; Shi Zhengjun

作者: 孙永昌; 张冰清; 刘力鸣; 刘肖南; 史正军

标题: Preparation of Lignin-based Carbon Material and Adsorption Mechanism of Cr(VI) from Wastewater

标题: 木质素基炭材料的制备及其对 Cr(VI)的吸附机制研究

来源出版物: 林产化学与工业 卷: 39 期: 4 页: 120-128 出版年: 2019

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作者关键词: Cr(VI); lignin; carbon material; Cr(VI); adsorption

作者关键词: 木质素; 炭材料; 吸附

摘要: The industrial residue corncob lignin(CL) was used as raw material and activated by phosphoric acid, potassium hydroxide, and zinc chloride, respectively, to obtain lignin-based carbon materials, PA-CL, PH-CL and ZC-CL. And the carbon materials were used for adsorbing the chromium(Cr (VI)) ions from wastewater. Results showed that phosphoric acid activation process was simple, environmentally friendly and the activation temperature was low. And the phosphoric acid activated sample had higher adsorption efficiency for Cr(VI) than NaOH and ZnCl₂ activated samples. The removal efficiency of Cr(VI) by using PA-CL reached 79.2% in the first 5 min and 96.5% in 40 min with the initial Cr(VI) mass concentration 50 mg/L and adsorbent dosage 0.05 g at 50 °C. The structural features of carbon material were analyzed by FT-IR and SEM and the functional groups on the surface of carbon materials were tested by the Boehm titration. The results showed that the phosphate group was introduced onto the surface of PA-CL and the total acidity increased to 3.20 mmol/g from 2.54mmol/g(original lignin), which was beneficial to adsorption of Cr(VI). The adsorption was described well with the pseudo-second-order model with q_e of 390.6 mg/g and R^2 of 0.991 0, for PA-CL. And the adsorption isotherm conformed to the Langmuir model with $R^2 > 0.9$, which indicated that the adsorption of Cr(VI) on PA-CL was chemical adsorption-based monolayer adsorption.

摘要: 以工业残渣玉米芯木质素(CL)为原料,利用磷酸、氢氧化钾和氯化锌分别对其活化制备木质素基炭材料 PA-CL、PH-CL 和 ZC-CL,并将其应用于废水中重金属 Cr(VI)的吸附。3 种活化方法对比分析表明:磷酸活化工艺简单、环保、活化温度低,对 Cr(VI)的吸附效率高于氢氧化钾、氯化锌活化样品。PA-CL 在 Cr(VI)初始质量浓度为 50 mg/L、50 °C、投加量为 0.05 g 时,吸附 5 min,Cr(VI)去除率可达 79.2%,40 min 时达到 96.5%,吸附效果较好。采用 FT-IR、SEM 等手段分析 PA-CL 的结构及形貌,Boehm 滴定法测定炭材料表面官能团数量,结果表明:磷酸根基团被引入 PA-CL 样品表面,使得总酸度由原料木质素的 2.54 mmol/g 增大到 3.20 mmol/g,有利于重金属 Cr(VI)的吸附。PA-CL 对 Cr(VI)的吸附符合反应动力学准二级模型方程,平衡吸附量(q_e)为 390.625 mg/g, R^2 为 0.991 0;吸附等温线符合 Langmuir 模型,不同温度下的 R^2 均大于 0.9,说明 PA-CL 对 Cr(VI)的吸附为化学吸附过程占主导的单分子层吸附。

入藏号: CSCD:6566135

地址: Sun Yongchang, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an, Shaanxi 710054, China.

Zhang Bingqing, School of Environmental Science and Engineering, Chang'an University, Key

Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an, Shaanxi 710054, China.

Liu Liming, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an, Shaanxi 710054, China.

Liu Xiaonan, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an, Shaanxi 710054, China.

Shi Zhengjun, School of Chemical Engineering, Southwest Forestry University, Kunming, Yunnan 650224, China.

地址: 孙永昌, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

张冰清, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

刘力鸣, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

刘肖南, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

史正军, 西南林业大学化学工程学院, 昆明, 云南 650224, 中国.

电子邮件地址: ycsun@chd.edu.cn; shizhengjun1979@163.com

电子邮件地址: ycsun@chd.edu.cn; shizhengjun1979@163.com

使用次数 (最近 180 天): 0

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作者: Du Yifan; Ai Chaoqian; Zhang Yaoyao; Wang Wei

作者: 杜毅帆; 艾超前; 张瑶瑶; 王伟

标题: Preparation and Quasi-superhydrophobic Properties of the Surface of Mullite Whiskers/Cordierite

标题: 莫来石晶须/堇青石表面层的制备及准超疏水性能

来源出版物: 高等学校化学学报 卷: 40 期: 9 页: 1955-1963 出版年: 2019

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来源出版物: Chemical Journal of Chinese Universities 卷: 40 期: 9 页: 1955-1963 出版年: 2019

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作者关键词: Cordierite ceramics; Mullite whiskers; Wetting angle; Hydrophobicity; Surface roughness

作者关键词: 堇青石陶瓷; 莫来石晶须; 润湿角; 疏水性; 表面粗糙度

摘要: Silicon-aluminum hybrid gel powders were prepared by sol-gel technology, and the microstructure of mullite whiskers/cordierite was obtained through growth of mullite whiskers on the surface of cordierite ceramic substrate by molten salt reaction. X-Ray diffraction, scanning electron microscopy and energy dispersive X-ray spectroscopy were employed to characterize the structural morphology and phase compositions. The results show that the surface of cordierite ceramic was covered by dense mullite whiskers with nanometer-sized (100-300 nm) diameters and micrometer-sized lengths. The surface modification of mullite whiskers was performed by coupling reaction between n-dodecyltrimethoxysilan and numerous active groups (Si-OH, Al-OH) on the surface of mullite whiskers, and static wetting angle of this sample is 146°. Dynamic wetting studies show that mullite whiskers increase the surface roughness of cordierite ceramics, making the hydrophilic mullite whiskers/cordierite surface more hydrophilic and the surface of the mullite whiskers/cordierite modified by the silane coupling agent change into quasi-superhydrophobic surface.

摘要: 采用溶胶-凝胶法制备了硅铝混合凝胶粉体,再通过熔盐反应在堇青石陶瓷基体上生长莫来石晶须,制得莫来石晶须/堇青石表面层微结构。表征结果表明,莫来石晶须紧密生长在堇青石基体上,晶须直径为 100~300 nm,长度可达几个微米。莫来石晶须表面含有大量 Si-OH 和 Al-OH 极性亲水基团,采用十二烷基三甲氧基硅烷与活性基团间的偶联反应将非极性基团引入莫来石晶须表面,获得了静态润湿角为 146°的莫来石晶须/堇青石表面层。动态润湿研究表明,合成的莫来石晶须增大了堇青石陶瓷的表面粗糙度,使亲水的莫来石晶须/堇青石表面更加亲水,而硅烷偶联剂修饰的堇青石/莫来石晶须表面则成为准超疏水表面。

入藏号: CSCD:6566066

地址: Du Yifan, Department of Chemical Engineering, College of Environment Science and Engineering, Changan University, Xi'an, Shaanxi 710054, China.

Ai Chaoqian, Department of Chemical Engineering, College of Environment Science and Engineering, Changan University, Xi'an, Shaanxi 710054, China.

Zhang Yaoyao, Department of Chemical Engineering, College of Environment Science and Engineering, Changan University, Xi'an, Shaanxi 710054, China.

Wang Wei, Department of Chemical Engineering, College of Environment Science and Engineering, Changan University; Changan University, ; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an; Xi'an, ; 710054; 710054.

地址: 杜毅帆, 长安大学环境科学与工程学院化工系, 西安, 陕西 710054, 中国.

艾超前, 长安大学环境科学与工程学院化工系, 西安, 陕西 710054, 中国.

张瑶瑶, 长安大学环境科学与工程学院化工系, 西安, 陕西 710054, 中国.

王伟, 长安大学环境科学与工程学院化工系; 长安大学, ; 旱区地下水文与生态效应教育部重点实验室, 西安; 西安, ; 710054; 710054.

电子邮件地址: wwchem@chd.edu.cn

电子邮件地址: wwchem@chd.edu.cn

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作者: Wang Meiqi; Yang Fan; Huang Tengting; Guan Weisheng

作者: 王美琪; 杨帆; 黄腾腾; 关卫省

标题: Preparation and modification of CaFe₂O₄ photocatalytic material

标题: CaFe₂O₄ 光催化材料的制备及改性研究

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作者关键词: CaFe₂O₄; CaFe₂O₄; preparation; modification; photocatalysis

作者关键词: 制备; 改性; 光催化

摘要: CaFe₂O₄ is a p-type semiconductor photocatalytic material with a band gap of 1.9 eV. Due to its stable structure and unique catalytic properties, it has been developed in water treatment in recent years. The structural characteristics, the main preparation methods and modification methods of CaFe₂O₄, were analyzed. The future development of the materials was prospected from the advantages and disadvantages of CaFe₂O₄.

摘要: CaFe₂O₄ 是禁带宽度在 1.9 eV 的 p 型半导体光催化材料, 由于其具有稳定结构和独特催化性能, 近几年在水处理方面得到了一定发展。分析了 CaFe₂O₄ 的结构特点、几种主要制备方法和改性方法, 并针对 CaFe₂O₄ 的优缺点, 对材料未来的发展趋势进行了展望。

入藏号: CSCD:6559099

地址: Wang Meiqi, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, MOE, Xi'an, Shaanxi 710054, China.

Yang Fan, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, MOE, Xi'an, Shaanxi 710054, China.

Huang Tengting, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, MOE, Xi'an, Shaanxi 710054, China.

Guan Weisheng, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, MOE, Xi'an, Shaanxi 710054, China.

地址: 王美琪, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室,

西安, 陕西 710054, 中国.

杨帆, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

黄腾腾, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

关卫省, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

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作者: Sun Yaqiao; Xiao Kang; Duan Lei; Wang Xiaodong

作者: 孙亚乔; 校康; 段磊; 王晓冬

标题: Chromium Migration and Transformation Mechanism in the Presence of Clay Minerals: A Review

标题: 粘土矿物作用下铬的迁移转化机理研究进展

来源出版物: 生态环境学报 卷: 28 期: 7 页: 1484-1491 出版年: 2019

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作者关键词: chromium; clay minerals; oxidation-reduction; adsorption-desorption; catalysis

作者关键词: 铬; 粘土矿物; 氧化-还原; 吸附-解吸; 催化

摘要: Excessive chromium content threatens the ecological environment. It could provide theoretical basis for the restoration of chromium contaminated soil to explore the mechanism of migration and transformation of chromium under the action of clay minerals. In this paper, the research status of the migration and transformation mechanism of chromium under the action of clay minerals is summarized and analyzed from the aspects of oxidation-reduction, adsorption-desorption and catalysis of clay minerals. The effects of oxides and microorganisms, pH, temperature, organic matter and mineral types on the migration and transformation of chromium were discussed. Firstly, manganese oxide was the only natural mineral that oxidizes Cr(III). The higher the content of Mn(II) or Mn(III), the stronger the oxidizing ability of manganese oxide. The stability of Cr(III) was high under low temperature and alkaline conditions. Manganese oxidizing bacteria could accelerate the oxidation of Cr(III), however, Mn(II) adsorbed

on the mineral surface would inhibit the oxidation of Cr(III). Secondly, minerals such as pyrite, biotite, chlorite, chlorite, magnetite were often used for Cr(VI) reduction, and Fe(II) and S₂- in pyrite composition could effectively reduce Cr(VI), biotite and chlorite could reduce Cr(VI) only by Fe(II) produced by biological action. The reduction rate of Cr(VI) by montmorillonite, illite, kaolinite and pyrite was higher at pH<4.5. Finally, Kaolinite, illite, vermiculite and montmorillonite could adsorb and hold Cr(VI), and the adsorption effect was obvious under the condition of low acidity and organic matter content, and the adsorption order was kaolinite>Illite>vermiculitemontmorillonite. The interlayer bonding of clay minerals was stronger than that of surface bonding, and clay minerals could be modified to improve the adsorption effect. In terms of adsorption mechanism, Langumiur and Freundlich equations were widely used to describe the adsorption of chromium by minerals. The study on the migration and transformation mechanism of chromium under the action of clay minerals can give us a better understanding of the detoxification principle of sediment and soil to chromium and the role of minerals in it. This is of far-reaching significance for the improvement of adsorption properties of mineral materials and the treatment of chromium contaminated soil.

摘要: 铬含量超标威胁生态环境安全,探究多种粘土矿物作用下铬的迁移转化机理可以为铬污染土壤修复提供理论依据。主要从粘土矿物对铬的氧化-还原、吸附-解吸、催化作用等几个方面归纳分析了粘土矿物作用下铬迁移转化机理的研究现状,探讨了氧化物及微生物作用、pH、温度、有机质、矿物类型等因素对铬迁移转化的影响。首先,锰氧化物是氧化 Cr(III)的唯一天然矿物,其结构中 Mn(II)或 Mn(III)含量越高,氧化能力越强;低温、碱性条件下,Cr(III)稳定性较高。锰氧化细菌会加速 Cr(III)的氧化,矿物表面吸附的 Mn(II)会抑制 Cr(III)的氧化。其次,黄铁矿、黑云母、绿泥石、柯绿泥石、磁铁矿等矿物常用于 Cr(VI)还原,黄铁矿组成中的 Fe(II)和 S₂-能有效地还原 Cr(VI),而黑云母、绿泥石只有经生物作用产生 Fe(II)才能还原 Cr(VI),蒙脱石、伊利石、高岭石、黄铁矿对 Cr(VI)的还原速率在 pH<4.5 时较大。最后,高岭石、伊利石、蛭石、蒙脱石可吸附固持 Cr(VI),且酸性、有机质含量低的条件下吸附效果明显,吸附顺序为:高岭石>伊利石>蛭石蒙脱石;粘土矿物层间结合比表面结合更强,可对粘粒矿物进行改性以提高吸附效果。在吸附机理方面,研究者广泛采用 Langumiur、 Freundlich 等方程来描述矿物对铬的吸附。粘土矿物作用下铬的迁移转化机理探究,可以使我们更加深入的了解沉积物、土壤对铬的解毒原理以及矿物在其中所起的作用,这对于矿物材料吸附性能的提高、铬污染土壤的治理具有深远的意义。

入藏号: CSCD:6555862

地址: Sun Yaqiao, School of Environmental Science and Engineering, Changan University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xian, 710054.

Xiao Kang, School of Environmental Science and Engineering, Changan University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xian, 710054.

Duan Lei, School of Environmental Science and Engineering, Changan University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xian, 710054.

Wang Xiaodong, School of Environmental Science and Engineering, Changan University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xian, 710054.

地址: 孙亚乔, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室,

西安, 陕西 710054, 中国.

校康, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

段磊, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

王晓冬, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

电子邮件地址: sunyaqiao@126.com; 17862001597@163.com

电子邮件地址: sunyaqiao@126.com; 17862001597@163.com

使用次数 (最近 180 天): 1

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作者: Guo Qian; Zhang Ting; Lu Ruiliang

作者: 郭倩; 张婷; 吕瑞亮

标题: Application and Prospect of Ion Chromatography in Cultural Relics Protection

标题: 离子色谱法在文物保护方面的应用及前景

来源出版物: 化学世界 卷: 60 期: 8 页: 524-532 出版年: 2019

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作者关键词: ion chromatography; cultural relic protection; anions; harmful gases

作者关键词: 离子色谱法; 文物保护; 阴离子; 有害气体

摘要: Ion chromatography is a technical means to use ion exchange technology for determining the aqueous solution possessing positive and negative charge, with good selectivity, high sensitivity, simple operation and great suitability for a variety of ions, and it has been widely used in various fields. Based on previous studies, we reviews the determination of salt ions easily soluble by ion chromatography so as to provide approach for solving the problems of salt damage and water damage in cultural relics. For ancient buildings and relics exposed outdoors, acid anion is detected by ion chromatography and the reasons for acidification and weathering of cultural relics are explained. Indirect measurement of harmful pollutants by ion chromatography can improve the preservation environment of cultural relics. This review can make people understand the importance of ion chromatography in cultural relic protection.

摘要: 离子色谱法是利用离子交换技术测定水溶液中带正负电荷的技术手段, 具有选择性好,

灵敏度高,操作简单,可同时测定多种离子的特点,已广泛应用于各种领域。综述了通过离子色谱法测定易溶盐离子,从而为文物盐害、水害问题的解决提供依据;对于室外暴露的古建筑、古遗迹,则通过离子色谱测定酸根阴离子、解释文物酸化、风化的原因;对于馆藏文物,尤其是博物馆陈列展物,则可以通过离子色谱法间接测定有害污染气体,改善文物保存环境。旨在使人们了解离子色谱法在文物保护领域的重要性。

入藏号: CSCD:6548553

地址: Guo Qian, College of Environmental Science and Engineering,Changan University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region,Ministry of Education, Xi' an, Shaanxi 710064, China.

Zhang Ting, College of Environmental Science and Engineering,Changan University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region,Ministry of Education, Xi' an, Shaanxi 710064, China.

Lu Ruiliang, College of Environmental Science and Engineering,Changan University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region,Ministry of Education, Xi' an, Shaanxi 710064, China.

地址: 郭倩, 长安大学环境科学与工程学院, 旱区地下水与生态效应教育部重点实验室, 西安, 陕西 710064, 中国.

张婷, 长安大学环境科学与工程学院, 旱区地下水与生态效应教育部重点实验室, 西安, 陕西 710064, 中国.

吕瑞亮, 长安大学环境科学与工程学院, 旱区地下水与生态效应教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: 524886206@qq.com

电子邮件地址: 524886206@qq.com

使用次数 (最近 180 天): 1

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作者: Qiao Xiaoying; Ma Shaoyang; Hou Huifang

作者: 乔晓英; 马少阳; 候会芳

标题: Effects of soil temperature on the growth of *Carex duriuscula* in Mu Us bottomland

标题: 毛乌素湖盆滩地土壤温度对寸草苔生长的影响

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作者关键词: *Carex duriuscula*; soil temperature; plant growth parameter; plant physiological parameter; Mu Us bottomland

作者关键词: 寸草苔; 土壤温度; 植物生长参数; 植物生理参数; 毛乌素湖盆滩地

摘要: Soil hydrothermal conditions affect plant growth, species distribution, and community stability. Here, a temperature-controlling experiment was performed using *Carex duriuscula*, a dominant species in the Mu Us bottomland. There were four soil temperature conditions, including control, warming I, warming II, and cooling. Plant height, spike number, and the contents of chlorophyll, malondialdehyde and soluble sugar of *C. duriuscula* were measured periodically. The results showed that: (1) Plant height was positively correlated with soil temperature before August, but negatively correlated with soil temperature after August. (2) The contents of malondialdehyde and soluble sugar of *C. duriuscula* were positively correlated with soil temperature from the end of August to the beginning of September and negatively correlated with soil temperature from mid-September to October. Warming or cooling treatment inhibited chlorophyll synthesis. Malondialdehyde and soluble sugar could be used as indicators of the effects of soil temperature on plant growth. (3) Regression models with soil temperature as an independent variable and plant growth parameters or physiological parameters as dependent variables were constructed. The exponential model of plant spike number and soil temperature could be used to predict the effects of soil temperature on the growth of *C. duriuscula* due to the high fitting degree of the model.

摘要: 土壤水热状况影响植物的生长发育、分布以及群落稳定性。选择毛乌素湖盆滩地优势植物寸草苔(*Carex duriuscula*)进行温控实验,设置对照、升温 I、升温 II、降温处理 4 种土壤温度控温条件,定期测定寸草苔株高、穗数、叶绿素、丙二醛、可溶性糖。结果表明:(1)寸草苔生长指标中,株高与 8 月之前的土壤温度呈正相关,与 8 月之后的土壤温度呈负相关;(2)寸草苔生理指标中,丙二醛、可溶性糖在 8 月底到 9 月初与土壤温度呈正相关,9 月中旬至 10 月份呈负相关;土壤升温或降温都不利于叶绿素合成。丙二醛、可溶性糖可作为寸草苔植物生长受土壤温度影响的指示参数;(3)构建以土壤温度为自变量、植物生长参数或植物生理参数为因变量的回归模型;土壤温度与穗数的指数模型因其拟合度高,可以预测土壤温度对寸草苔生长的影响。

入藏号: CSCD:6548986

地址: Qiao Xiaoying, College of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Arid Area Groundwater and Ecological Effect of the Ministry of Education;; Shaanxi Key Laboratory of Mineral Resources Exploration and Comprehensive Utilization, ;; Key Laboratory of Arid Area Groundwater and Ecological Effect of the Ministry of Education;; Shaanxi Key Laboratory of Mineral Resources Exploration and Comprehensive Utilization, Xi' an;; Xi' an;; X' an, ;;; 710054;; 710054;; 710054.

Ma Shaoyang, College of Environmental Science and Engineering, Chang'an University, Xi' an, 710054.

Hou Huifang, College of Environmental Science and Engineering, Chang'an University, Xi' an, 710054.

地址: 乔晓英, 长安大学环境科学与工程学院;; 干旱区地下水文与生态效应教育部重点实验室;; 陕西省矿产资源勘查与综合利用重点实验室, ;; 干旱区地下水文与生态效应教育部重点实验室;; 陕西省矿产资源勘查与综合利用重点实验室, 西安;; 西安;; 西安, ;;; 710054;; 710054;; 710054.

马少阳, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

候会芳, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

电子邮件地址: qiaoxiaoy@163.com

电子邮件地址: qiaoxiaoy@163.com

使用次数 (最近 180 天): 0

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作者: Li Jicheng; Wang Bin; Zhang Hongbo; Li Jiaojiao

作者: 李吉程; 王斌; 张洪波; 李娇娇

标题: Early warning system of drought crisis for Jinghuiqu irrigation district

标题: 泾惠渠灌区旱灾危机预警研究

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作者关键词: agricultural drought; drought crisis; diagnosis system; alarm index; Jinghuiqu irrigation district

作者关键词: 农业干旱; 旱灾危机; 诊断体系; 预警指标; 泾惠渠灌区

摘要: Drought disaster is generally considered as a multifactorial-driven natural hazard, affecting the largest population and the widest range, which often threatens agricultural economic development and social stability. The current drought management pays more attention to meteorological change and drought monitoring and plays an important role in defending the disaster. However, it is unfortunate that the researches on process simulation and crisis management of drought event are lack, especially on considering the influence of human activity, and even often lead to the insufficient information for drought decision-making due to the lack of integrated early warning system, causing great agricultural economic loss. Therefore, it is of great significance to improve the early warning system of drought crisis for regional disaster prevention and social sustainable development. This paper defined the concept of drought crisis, describing its connotation and emphasized the influence on drought development of human activity. According to this concept, the index system to evaluate drought crisis was built, and formed the drought crisis early warning system for irrigation districts by coupling with hydrological simulation model, water resources allocation model, crisis warning model and other

models. The warning system is to provide a whole-process support for drought crisis management from diagnosis,early warning to decision-making. The drought crisis alarm index (DCAI) in this system is constructs by integrating the drought status index and drought resistance index,which is employed to represent drought crisis regime in the next three months. In this paper,the Jinhuiqu irrigation district is taken as a case area. Result of drought crisis early warning during the verification period,show that the simulated alarm information and decision-making advice are consistent with the official version,further verifying the scientific and applicability of the drought crisis early warning system and coping mechanism. It can provide decision support for drought management and crisis response in irrigation districts.

摘要: 旱灾是所有自然灾害中影响人口最多,范围最广,驱动因素也最复杂的一种灾害,常威胁区域农业经济发展与社会稳定。而现行的旱灾应对体制多关注气象驱动与旱情监测,对于旱事件发展的过程模拟与危机管理缺乏研究,尤其对人类活动的驱动性影响考虑不足,常因整合性预警体系的缺失,导致旱灾危机诊断和抗旱决策信息不够充分,进而引发农业经济损失。因此,完善旱灾危机预警系统对区域防灾减灾以及社会可持续发展具有重要意义。本文定义了有别于旱情和旱灾的旱灾危机的概念与内涵,考虑了人类活动对旱灾形成过程的影响,并基于旱情评估、水文模拟、水资源调控、危机预警等模型构建了面向灌区的旱灾危机预警系统,以实现旱灾危机从诊断、预警到决策的全过程支持。系统以泾惠渠灌区为研究区,通过将干旱状态指标与抗旱能力指标相融合,构建了综合旱灾危机预警指标(DCAI),表征灌区未来3个月的危机情势,通过对校验期灌区旱灾危机的滚动预警与决策模拟,发现预警指标与决策建议与官方发布的监测结果较为一致,进一步验证了旱灾危机预警系统与应对机制的科学性与适用性,认为其预期可为灌区干旱管理与危机应对提供决策支持。

入藏号: CSCD:6550600

地址: Li Jicheng, School of Environmental Science and Engineering,Chang'an University, Xi'an, Shaanxi 710054, China.

Li Jiaojiao, School of Environmental Science and Engineering,Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Bin, The Pearl River Hydraulic Research Institute, Guangzhou, Guangdong 510611, China.

Zhang Hongbo, School of Environmental Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

地址: 李吉程, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

李娇娇, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

王斌, 珠江水利科学研究院, 广州, 广东 510611, 中国.

张洪波, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: 463549321@qq.com; hbzhang@chd.edu.cn

电子邮件地址: 463549321@qq.com; hbzhang@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Gao Wenlong; Guan Yanling

作者: 高文龙; 官燕玲

标题: SELECTION METHOD OF SOLAR COLLECTOR AREA FOR GROUND SOURCE HEAT PUMP COMPOSITE SYSTEM

标题: 土壤源热泵复合系统太阳能集热器面积的选择方法

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作者关键词: 土壤源热泵; 太阳能集热器; 复合系统; 埋管换热器; 岩土温度恢复

摘要: For a solar-assisted ground source heat pump composite system with solar energy collector to restore rocksoils temperature around the buried pipe that used to supply heat in buildings,the reasonable selection method for the area of solar collectors in this system is studied.Under the climatic conditions of Xian,the dynamic heat transfer model of the composite systems is established by using TRNSYS software for the residential building area of 10000 m².According to whether the solar thermal system is running in the winter for combined heating,the simulation calculation is carried out in two working conditions,and the optimal collector area corresponding to the different thermal conductivity of rock-soils is obtained.Therefore,the relationship between the optimal collector area per unit building area and the thermal conductivity of rock-soils is obtained.

摘要: 针对以太阳能集热系统恢复埋管周围岩土温度的土壤源热泵建筑供暖的复合系统,研究该系统太阳能集热器面积的合理选择方法。在西安市气候条件下,针对 10000 m² 的住宅建筑面积,应用 TRNSYS 软件建立该复合系统的动态运行换热模型。根据太阳能集热系统是否在冬季联合供暖运行分 2 种工况进行多种条件的仿真计算,得到对应不同岩土导热系数值的相对最佳集热器面积,从而得到这 2 种工况的单位建筑面积相对最佳集热器面积与岩土导热系数的关系。

入藏号: CSCD:6544543

地址: Gao Wenlong, School of Environmental Science and Engineering,Changan University, Xian, 710054.

Guan Yanling, School of Environmental Science and Engineering,Changan University, Xian, 710054.

地址: 高文龙, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

官燕玲, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

电子邮件地址: guanyl@chd.edu.cn

电子邮件地址: guanyl@chd.edu.cn

使用次数 (最近 180 天): 1

使用次数 (2013 年至今): 2

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作者: Zong Yuhan; Ge Weiwei; Zhao Ming; Wang Zhaohan; Yang Zhengyi; Li Yuliang

作者: 宗宇寒; 葛伟伟; 赵鸣; 汪赵含; 杨正意; 李宇亮

标题: Determination of nitrate nitrogen in water by hydrazine sulfate reduction method

标题: 硫酸肼还原法测定水中硝酸盐氮评价

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作者关键词: hydrazine sulfate reduction; nitrate nitrogen; interfering ions

作者关键词: 硫酸肼还原法; 硝酸盐氮; 干扰离子

摘要: By using hydrazine sulfate reduction method to determine the content of nitrate in water, and to study the possible interference ions (chloride ion, nitrite ion, sulfate ion and ammonium ion) during the experiment, and to analyze the effect on the experimental results. In view of the interference experiment of chloride ion on the measurement results, the ultraviolet spectrophotometry and hydrazine sulfate reduction method were used to compare. The results show that: the linear range of the standard curve is basically stable between 0.996 0 and 0.999 4, and the experimental results of interfering ions show that the chlorine ions and nitrite ions will influence the results. Among them, chloride ion will make the determination result low, nitrite ion will make the determination result high. At last, the accuracy of hydrazine sulfate reduction method was compared with that of ultraviolet spectrophotometry.

摘要: 通过采用硫酸肼还原法来测定水中的硝酸盐氮含量,并对实验过程中可能产生影响的干扰离子(氯离子、亚硝酸根离子、硫酸根离子以及铵根离子)进行研究测定,分析其对实验结果是否产生影响;针对氯离子对测量结果的干扰实验,同时采用了紫外分光光度法与硫酸肼还原法进行比较。结果表明,硫酸肼还原法作出的标准曲线线性范围基本稳定在 0.996 0~0.999 4 之间,氯离子以及亚硝酸根离子均会对测定结果产生影响,其中,氯离子会使最终测定结果偏低,亚硝酸根离子会使最终测定结果偏高。将硫酸肼还原法与紫外分光光度法准确度进行比较,得出的结论是硫酸肼还原法准确度较高。

入藏号: CSCD:6538936

地址: Zong Yuhan, School of Environmental Science and Engineering,Changan University;;Key Laboratory of Underground Hydrology and Ecological Effects,Ministry of Education, ;;Key Laboratory of Underground Hydrology and Ecological Effects,Ministry of Education, Xian;;Xian, ;; 710054;;710054.

Ge Weiwei, School of Environmental Science and Engineering,Changan University, Xian, 710054.

Zhao Ming, School of Environmental Science and Engineering,Changan University, Xian, 710054.

Wang Zhaohan, School of Environmental Science and Engineering,Changan University, Xian, 710054.

Yang Zhengyi, School of Environmental Science and Engineering,Changan University, Xian, 710054.

Li Yuliang, Key Laboratory of Underground Hydrology and Ecological Effects,Ministry of Education, Key Laboratory of Underground Hydrology and Ecological Effects,Ministry of Education, Xian, 710054.

地址: 宗宇寒, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

葛伟伟, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

赵鸣, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

汪赵含, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

杨正意, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

李宇亮, 旱区地下水文与生态效应教育部重点实验室, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

电子邮件地址: 1137257417@qq.com

电子邮件地址: 1137257417@qq.com

使用次数 (最近 180 天): 0

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作者: Dai Wei; Zhao Jianqiang; Ding Jiazhi; Liu Shuang

作者: 代伟; 赵剑强; 丁家志; 刘双

标题: Nitrification,Denitrification,and N₂O Production Under Saline and Alkaline Conditions

标题: 高盐高碱环境下硝化反硝化过程及 N₂O 产生特征

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作者关键词: N₂O; saline and alkaline conditions; nitrification and denitrification; N₂O; sequencing batch biofilm reactor (SBBR); highthroughput sequencing

作者关键词: 高盐高碱; 硝化反硝化; 序批式生物膜反应器(SBBR); 高通量测序

摘要: A sequencing biofilm batch reactor (SBBR) running continuously in an anaerobic/aerobic/anoxic (A_n/O/A) mode was adopted to study the characteristics of nitrification and denitrification process and nitrous oxide (N₂O) production under high saline and alkaline conditions. Different carbon and nitrogen ratios (C/N) were also investigated. A_n influent C/N ratio of 5,2,and 0 (control),achieved the following results: TN removal efficiency was (98.17 ± 0.42)%,(65.78 ± 2.47)%,and (44.08 ± 0.27)%,respectively; total N₂O production was (32.07 ± 2.03) mg•L⁻¹·h⁻¹,(21.81 ± 0.85) mg•L⁻¹·h⁻¹,and (17.32 ± 0.95) mg•L⁻¹·h⁻¹, respectively; and the N₂O conversion rate (i. e.,the ratio of total N₂O production to total nitrogen removal) was (29.75 ± 0.93)%, (30.04 ± 2.17)%,and (41.69 ± 0.80)%,respectively. The nitrification process proceeded normally during the nitrite stage,and nitrite-oxidizing bacteria (NOB) were strongly inhibited under the high saline and alkaline conditions. Due to the inhibition of N₂O reductase under these conditions,N₂O production was higher during the heterotrophic denitrification process than during the ammonia oxidation process. With an increase in the carbon to nitrogen ratio,more carbon sources were available for denitrification meaning that the total nitrogen removal rate and N₂O production were both increased. As the ratio of carbon to nitrogen was increased,the N₂O conversion rate decreased,which may have been caused by electron competition among the nitrogen oxide reductases during the denitrification process; the higher the ratio of carbon to nitrogen,the weaker the electron competition. High-throughput sequencing indicated that ammonium-oxidizing bacteria (AOB) were enriched and NOB were almost entirely absent in the SBBR. Thauera, Azoarcus,and Gemmobacter were the dominant heterotrophic denitrifying bacteria identified in the system.

摘要: 采用稳定运行在高盐高碱环境厌氧/好氧/缺氧(A_n/O/A)模式下的序批式生物膜反应器(SBBR),考察在不同碳氮比(C/N)条件下,硝化反硝化过程及N₂O产生特征.结果表明,在C/N为5、2和对照组(C/N=0)时,总氮去除率分别为(98.17±0.42)%、(65.78±2.47)%和(44.08±0.27)%;N₂O的产生量分别为(32.07±2.03)、(21.81±0.85)和(17.32±0.95)mg•L⁻¹·h⁻¹;N₂O转化率(N₂O产生量在去除总氮中的比例)分别为(29.75±0.93)%、(30.04±2.17)%和(41.69±0.80)%.高盐高碱条件下,亚硝酸盐氧化菌(NO₂-oxidizing bacteria)受到很强的抑制作用,硝化过程基本停留在亚硝酸盐阶段.由于高盐高碱环境对N₂O还原酶活性的抑制,使得异养反硝化过程产生了大量N₂O,随着碳氮比的增大,有更多的碳源用于反硝化过程,因而总氮去除率和N₂O产生量均随之增加.随着碳氮比的增大,N₂O转化率随之降低,这可能是由于异养反硝化过程氮素还原酶对电子的竞争所形成的,碳氮比越高,电子竞争越弱.高通量测序表明:在SBBR中,氨氧化细菌(AOB)被富集,而几乎不存在NOB;优势异养反硝化菌属主要是Thauera、Azoarcus和Gemmobacter.

入藏号: CSCD:6540424

地址: Dai Wei, School of Environmental Science and Engineering,Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region,Ministry of Education, Xi'an, Shaanxi 710064, China.

Zhao Jianqiang, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region, Ministry of Education, Xi'an, Shaanxi 710064, China.

Ding Jiazhi, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region, Ministry of Education, Xi'an, Shaanxi 710064, China.

Liu Shuang, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region, Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 代伟, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710064, 中国.

赵剑强, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710064, 中国.

丁家志, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710064, 中国.

刘双, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: 1181147206@qq.com; 626710287@qq.com

电子邮件地址: 1181147206@qq.com; 626710287@qq.com

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作者: Li Junting; Wang Shuai; Song Gaoju; Qiao Xiaoying; Wang Jihua

作者: 李俊亭; 王帅; 宋高举; 乔晓英; 王继华

标题: Reconstruction project of groundwater balance experiment site of Zhengzhou: general ideas and application prospect

标题: 郑州地下水均衡试验场的改建工程总体思路与应用展望

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文献类型: Article

作者关键词: test medium; test column; automatic water supplying instrument; contrasting

experiment of evaporation; parameter variability

作者关键词: 试验介质; 试验柱; 自动补水仪; 蒸发对比试验; 参数变异性

摘要: The reconstruction project of groundwater balance experiment site of Zhengzhou was hosted by geoenvironmental monitoring institute of Henan Province, belongs to one of the national groundwater monitoring projects, which is performed by Institute of China Geo-Environment Monitoring. This paper discusses in detail the general ideas, the specific practices of each implementation link, operation and its application prospects of the reconstruction project. In the reconstruction, the representative of test medium to Henan Province should be fully noticed, the test column should have better mechanical and thermal properties, the data collection should be fully automated, and the monitoring area should be properly broadened. Under the general idea, a test tube constructed of FRP material was designed, and the test media collected by five typical geomorphic units in Henan Province were selected to construct a total of 25 test columns of 1, 2, 3, 5, 7 meters for simulating multi-layer geological structure of vadose zone. A total of 25 automatic water supplying instrument were designed to simulate and control the depth of water level around the test column, and 140 negative pressure sensors and 140 moisture sensors (including temperature) were set to detect the moisture movement information in the test column. Data collection adopts a step-by-step integration approach that greatly simplifies the cable line, based on this, a data acquisition box is designed to obtain the environmental information of the experimental process in time. In the experiment site, a small (3 m main pole) weather station capable of measuring air temperature, air humidity, air pressure, wind direction, wind speed, precipitation, and evaporation was set up; one set of solar radiation, solar radiation and direct sunlight is installed; a comparative observation facility for evaporation (including precipitation) of 0.3 m² and 1 m² calibres was also set up. Finally, the paper points out that attention should be paid to the study of vadose zone parameters in the field in order to truly solve the practical application of test results.

摘要: 郑州地下水均衡试验场的改建,是由中国地质环境监测院主持的国家地下水监测工程中地下水均衡试验场的改建项目之一,由河南省地质环境监测院具体负责实施。文章详细论述了改建工程的总体思路、各实施环节的具体做法、运行及其应用前景。在改建时充分考虑到试验介质对河南省的代表性;试验柱要有较好的力学、热学性能;数据采集要全面自动化;监测面适当拓宽等。在总体思路下,设计了由玻璃钢材质构建的试验筒,选取河南省5个典型地貌单元采集的试验介质,构成了模拟包气带多层地质结构的1,2,3,5,7 m试验柱共计25个。围绕试验柱设计了能模拟控制水位埋深的自动补水仪25台,以及为了探测试验柱内水分运移信息设置了负压传感器140只、水分传感器(含温度)140只。数据采集采用了逐级集成的方法,大大简化了线路布设,据此设计了一台数据采集箱,可及时获得实验过程的环境信息。在试验场设置了能测定空气温度、空气湿度、气压、风向、风速、降水量、蒸发量的小型(主杆3 m)气象站一座;在试验场设置了太阳全辐射、太阳净辐射与太阳直射的观测仪各一台。试验场还设置了0.3 m²和1 m²口径的蒸发量(含降水量)对比观测设施一处。要真正解决试验成果的实际应用问题,应注意开展野外包气带参数的研究。

入藏号: CSCD:6536086

地址: Li Junting, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710054;; 710054.

Qiao Xiaoying, School of Environmental Science and Engineering, Chang'an University;; Key

Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Wang Shuai, No. 2 Institute of Geological&Mineral Resources Survey of Henan, Zhengzhou, He'nan 450053.

Song Gaoju, No. 2 Institute of Geological&Mineral Resources Survey of Henan, Zhengzhou, He'nan 450053.

Wang Jihua, Geo-environmental Monitoring Institute of Henan Province, Zhengzhou, He'nan 450016.

地址: 李俊亭, 长安大学环境科学与工程学院;;干旱区地下水文与生态效应教育部重点实验室, ;;干旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

乔晓英, 长安大学环境科学与工程学院;;干旱区地下水文与生态效应教育部重点实验室, ;;干旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

王帅, 河南省地质矿产勘查开发局第二地质环境调查院, 郑州, 河南 450053, 中国.

宋高举, 河南省地质矿产勘查开发局第二地质环境调查院, 郑州, 河南 450053, 中国.

王继华, 河南省地质环境监测院, 郑州, 河南 450016, 中国.

电子邮件地址: 13689193382@163.com

电子邮件地址: 13689193382@163.com

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作者: Guo Meng; Zhang Qiyang; Qian Hui; Xu Panpan; Chen Yao

作者: 郭梦; 张奇莹; 钱会; 徐盼盼; 陈垚

标题: Analysis on the drought temporal-spatial distribution characteristics of Shaanxi Province based on SPEI

标题: 基于 SPEI 干旱指数的陕西省干旱时空分布特征分析

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作者关键词: standardized precipitation evapotranspiration index(SPEI); penman-monteith model; mutation analysis; drought evolution; drought frequency; spatial distribution characteristics

作者关键词: SPEI 干旱指数; Penman - Monteith 模型; 突变分析; 干旱演变; 干旱频率; 时空分布特征

摘要: Shaanxi Province is an ecologically fragile and drought-prone area. Based on the measured data of 18 meteorological stations from 1956 to 2016, the annual scale standard precipitation evapotranspiration index (SPEI) was calculated using the Penman-Monteith model. The drought temporal-spatial distribution characteristics of Shaanxi Province during the past 61 years was discussed by combining with sliding average, MK method, wavelet analysis and Kriging spatial interpolation method. The results showed that the SPEI of Shaanxi Province is decreasing in fluctuation from the perspective of time process, indicating an inconspicuous trend that Shaanxi Province is gripped by more severe droughts. In addition, the drought extent in Shaanxi Province has shown a significant expansion trend since 1986. The SPEI shows a aberrance point that suddenly decrease in 1980 and the SPEI cycle has three main oscillation periods of five years, 16 years and 30 years. There are different degrees of drought over the spatial variations, and the difference of station distribution is both big and uneven. The frequency of drought from big to small is moderate drought, mild drought, extreme drought and heavy drought. The frequency of heavy drought is the lowest, whose high value center is located at Yan'an Station, whereas the frequency of moderate drought is the highest and its distribution range is the largest, whose high value center is located at Lueyang Station and Hanzhong Station. This study provides a scientific basis for drought disaster prevention, agricultural production and policy formulation in whole Shaanxi Province.

摘要: 陕西省属于生态脆弱区且旱灾频发。基于陕西省 1956 - 2016 年 18 个气象站点的实测气象资料, 利用 Penman - Monteith 模型计算年尺度标准降水蒸散指数(SPEI), 并结合滑动平均、MK 检验、小波分析和 Kring 空间插值法等方法探讨了陕西省 61 年来的干旱时空变化特征。结果表明: 从时间变化上看, 陕西省 SPEI 指数呈现在波动中下降趋势, 表明全省正在向干旱化发展, 但总体变化趋势不显著; 全省干旱影响范围自 1986 年起呈现显著扩大化趋势; SPEI 指数在 1980 年出现突然减小的变异点; SPEI 指数周期存在多时间尺度特征, 具有 5, 16 和 30a 的三个主震荡周期; 从空间变化上看, 全省有不同程度干旱发生, 各站点分布差异较大且不平衡, 干旱频率由大到小依次为中旱>轻旱>特旱>重旱, 重旱发生频率最低, 高值中心位于延安站, 中旱发生频率最高且分布范围最大, 高值中心位于略阳站和汉中站。此研究可为全省防灾减灾, 农业生产以及政策制定提供科学依据。

入藏号: CSCD:6534997

地址: Guo Meng, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an;; Xi'an, ;; 710064;; 710064.

Zhang Qiyong, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an;; Xi'an, ;; 710064;; 710064.

Qian Hui, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education,

Xi'an;;Xi'an, ;; 710064;;710064.

Xu Panpan, School of Environmental Science and Engineering,Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas,Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas,Ministry of Education, Xi'an;;Xi'an, ;; 710064;;710064.

Chen Yao, School of Environmental Science and Engineering,Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas,Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas,Ministry of Education, Xi'an;;Xi'an, ;; 710064;;710064.

地址: 郭梦, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

张奇莹, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

钱会, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

徐盼盼, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

陈垚, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

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第 41 条, 共 82 条

作者: Wang Shuai; Yang Chenxi

作者: 王帅; 杨晨曦

标题: Preparation and properties of hydrophobic/lipophilic modified grapefruit fiber

标题: 疏水/亲油改性柚子皮纤维的制备及其性能研究

来源出版物: 应用化工 卷: 48 期: 6 页: 1321-1325 出版年: 2019

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语言: Chinese

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作者关键词: grapefruit peel; SiO₂ nanoparticles; dodecyltrimethoxysilane; hydrophobic modification

作者关键词: 柚子皮; SiO₂ 纳米微粒; 十二烷基三甲氧基硅烷; 疏水改性

摘要: The hydrophobic/lipophilic material was prepared by dip coating method using grapefruit skin as a substrate, tetraethyl orthosilicate (TEOS) and dodecyltrimethoxysilane (DTMS) to prepare a precursor liquid. The material was characterized by FTIR, SEM and contact angle measuring instrument, and the oil absorption effect and oil-water separation ability of modified grapefruit peel were studied. The results showed that SiO₂ was successfully attached to the surface of grapefruit skin fiber, and the coating produced by DTMS hydrolysis successfully condensed with the hydroxyl surface of grapefruit skin, so that the hydrophobic coating was coated on the surface of grapefruit skin. The maximum adsorption capacity of modified grapefruit peel to vegetable oil, kerosene, benzene and toluene was 13.3, 9.6, 7.7, 7.5 g/g. In vegetable oil, kerosene, benzene, toluene/water mixture, the maximum adsorption amounts are 12.6, 9.5, 7.5, 7.3 g/g. At the same time, the modified grapefruit peel has good oil-water separation ability and reusability.

摘要: 以柚子皮为基材, 正硅酸乙酯 (TEOS)、十二烷基三甲氧基硅烷 (DTMS) 制作前驱液, 通过浸涂法制备复合疏水/亲脂材料。利用 FTIR、SEM、接触角测量仪对该材料进行表征, 并研究改性柚子皮吸油效果及油水分离能力。结果表明, SiO₂ 成功的附着在柚子皮纤维表面, 并且 DTMS 水解产生的涂层成功的与柚子皮表面羟基缩合, 使疏水涂层涂覆在柚子皮表面。改性柚子皮对植物油、煤油、苯、甲苯的最大吸附量为 13.3, 9.6, 7.7, 7.5 g/g。在植物油、煤油、苯、甲苯/水混合液中, 其最大吸附量为 12.6, 9.5, 7.5, 7.3 g/g。同时改性柚子皮具有良好的油水分离能力与可重复利用性能。

入藏号: CSCD:6525591

地址: Wang Shuai, College of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Yang Chenxi, Key Laboratory of Groundwater and Ecological Effects of the Ministry of Education in Dry Areas, Key Laboratory of Groundwater and Ecological Effects of the Ministry of Education in Dry Areas, Xi'an, Shaanxi 710054, China.

地址: 王帅, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

杨晨曦, 旱区地下水文与生态效应教育部重点实验室, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

电子邮件地址: 632337018@qq.com

电子邮件地址: 632337018@qq.com

使用次数 (最近 180 天): 0

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作者: Zhu Junyan; Li Liangzhong; Zhu Xiaohui; Xiang Mingdeng; Chen Ying; Yu Yunjiang

作者: 朱俊彦; 李良忠; 朱晓辉; 向明灯; 陈莹; 于云江

标题: Application of Solid Phase Microextraction Technique in Environmental Analysis and Monitoring

标题: 固相微萃取技术在环境监测分析中的应用进展

来源出版物: 中国环境监测 卷: 35 期: 3 页: 8-18 出版年: 2019

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语言: Chinese

文献类型: Review

作者关键词: solid phase microextraction; fiber coating; environmental monitoring

作者关键词: 固相微萃取; 纤维涂层; 环境监测

摘要: Sample pretreatment is a critical step in the whole analytical procedure. The purpose of this process is to reduce the interference of impurities on samples and to concentrate the target objects. Solid phase microextraction is an innovative sample pretreatment technology that integrates sampling, extraction, enrichment and injection. In recent years, solid phase microextraction has been widely applied in environmental pollutant monitoring and analysis. In this paper, the methods of solid phase microextraction pretreatment in different environmental substrates such as water, atmosphere, soil, and sediment are summarized. The advantages, disadvantages, and the applicability of coating materials (nanomaterials, ionic liquids, etc.) and device forms (cold fiber solid phase microextraction, arrow solid phase microextraction, etc.) are also critically evaluated. Further research directions are proposed towards problems and deficiencies in the application of solid phase microextraction in different environmental matrices.

摘要: 样品前处理是整个样品分析过程中的关键一环,其目的在于减少杂质对待测物的干扰及对目标物进行富集。固相微萃取技术是集采样、萃取、富集、进样于一体的样品前处理新技术。近年来,固相微萃取技术在环境污染物监测分析领域得到了广泛应用,该文章系统地综述了固相微萃取技术在不同环境基质(水体、大气、土壤及沉积物)预处理的方法,比较了不同类型涂层材料(如纳米材料、离子液体等)与装置形式(如内部冷却固相微萃取、箭形固相微萃取等)的优缺点及应用范围。针对现阶段固相微萃取技术应用于不同环境基质中存在的问题和不足,提出进一步研究的方向。

入藏号: CSCD:6519478

地址: Zhu Junyan, School of Environmental Science and Engineering, Chang'an University;; South China Institute of Environmental Sciences, Ministry of Environmental Protection, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education;; State Environmental Protection Key Laboratory of Environmental Pollution Health Risk Assessment, Xi'an;; Guangzhou, ;; 710054;; 510535.

Li Liangzhong, South China Institute of Environmental Sciences, Ministry of Environmental Protection, State Environmental Protection Key Laboratory of Environmental Pollution Health Risk Assessment, Guangzhou, Guangdong 510535, China.

Zhu Xiaohui, South China Institute of Environmental Sciences, Ministry of Environmental Protection, State Environmental Protection Key Laboratory of Environmental Pollution Health Risk Assessment, Guangzhou, Guangdong 510535, China.

Xiang Mingdeng, South China Institute of Environmental Sciences, Ministry of Environmental

Protection, State Environmental Protection Key Laboratory of Environmental Pollution Health Risk Assessment, Guangzhou, Guangdong 510535, China.

Yu Yunjiang, South China Institute of Environmental Sciences, Ministry of Environmental Protection, State Environmental Protection Key Laboratory of Environmental Pollution Health Risk Assessment, Guangzhou, Guangdong 510535, China.

Chen Ying, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an, Shaanxi 710054, China.

地址: 朱俊彦, 长安大学环境科学与工程学院;;环境保护部华南环境科学研究所, 旱区地下水文与生态效应教育部重点实验室;;国家环境保护环境污染健康风险评估重点实验室, 西安;;广州, 陕西;;广东 710054;;510535, 中国.

李良忠, 环境保护部华南环境科学研究所, 国家环境保护环境污染健康风险评估重点实验室, 广州, 广东 510535, 中国.

朱晓辉, 环境保护部华南环境科学研究所, 国家环境保护环境污染健康风险评估重点实验室, 广州, 广东 510535, 中国.

向明灯, 环境保护部华南环境科学研究所, 国家环境保护环境污染健康风险评估重点实验室, 广州, 广东 510535, 中国.

于云江, 环境保护部华南环境科学研究所, 国家环境保护环境污染健康风险评估重点实验室, 广州, 广东 510535, 中国.

陈莹, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

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作者: Ma Lianjing; Zhao Baofeng

作者: 马莲净; 赵宝峰

标题: Water yield analysis of underground drainage boreholes on the basis of logarithmic normal distribution

标题: 基于对数正态分布的井下疏放水钻孔水量分析

来源出版物: 煤田地质与勘探 卷: 47 期: 3 页: 140-146,153 出版年: 2019

文献号: 1001-1986(2019)47:3<140:JYDSZT>2.0.TX;2-#

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文献类型: Article

作者关键词: aquifer; working face; drainage borehole; logarithmic normal distribution; specific field

作者关键词: 含水层; 工作面; 疏放水钻孔; 对数正态分布; 单位涌水量

摘要: In order to analyze the distribution rule of water flow from underground drainage borehole in coal mines, histogram, Q-Q chart and nonparametric tests were used to test the logarithmic normal distribution model for water flow from underground drainage borehole in typical working face, and the nonlinear regression model was fitted. Combined with hydrogeological conditions, the parameters in the model were analyzed. The result shows that water flow from underground drainage boreholes in working face obeys the lognormal distribution. The logarithmic mean and standard deviation of water flow from drainage borehole of typical working face have a positive linear dependence relation with mean and standard deviation of aquifer specific field of the corresponding coal field. The skewness and kurtosis of distribution curve are mainly controlled by the water abundance and its degree of uniformity of the roof quifer. The water flow from drainage borehole of adjacent multi-working faces also obeys the lognormal distribution. The research results will provide reference for the design of drainage borehole and drainage system.

摘要: 为了研究煤矿井下疏放水钻孔水量的分布规律,利用直方图、Q-Q图和非参数检验法对典型工作面疏放水钻孔水量进行了对数正态分布模型的检验,并进行了非线性回归模型的拟合,结合工作面水文地质条件,对模型中的参数进行了分析。结果表明:工作面井下疏放水钻孔水量服从对数正态分布,模型中典型工作面疏放水钻孔水量的均值和标准差与所属井田含水层单位涌水量的均值和标准差呈线性相关,分布曲线中的偏度和峰度主要受顶板含水层富水性及其均一程度控制,同井田内相邻多工作面疏放水钻孔水量也服从对数正态分布。研究成果可以为顶板水疏放钻孔和排水系统的设计提供参考。

入藏号: CSCD:6519087

地址: Ma Lianjing, School of Environmental Science and Engineering, Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Zhao Baofeng, Xi'an Research Institute Co. Ltd., China Coal Technology and Engineering Group Corp., Xi'an, Shaanxi 710077, China.

地址: 马莲净, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

赵宝峰, 中煤科工集团西安研究院有限公司, 西安, 陕西 710077, 中国.

电子邮件地址: 23098210@qq.com; sunman1220@163.com

电子邮件地址: 23098210@qq.com; sunman1220@163.com

使用次数 (最近 180 天): 0

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作者: Xu Bin; Zhang Yan

作者: 徐斌; 张艳

标题: GIS-Based Spatial Analysis Model for Regionalization of Groundwater Hydrochemical Type

标题: 地下水化学类型分区的 GIS 空间分析模型

来源出版物: 武汉大学学报. 信息科学版 卷: 44 期: 6 页: 866-874 出版年: 2019

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作者关键词: GIS; groundwater; hydrochemical type; GIS; spatial analysis; Thiessen polygon

作者关键词: 地下水; 水化学类型; 空间分析; 泰森多边形

摘要: This study is carried out to simplify the procedure of regionalization of groundwater hydrochemical type, and to objectively reflect spatial distribution characteristics of groundwater hydrochemical types. Based on the geographic information system (GIS) technology, the spatial analysis model for regionalization of groundwater hydrochemical type is designed and built by ArcGIS ModelBuilder. Using milligrams equivalent percent raster data of $K^{++}Na^{+}$ 、 $Ca^{(2+)}$ 、 $Mg^{(2+)}$ 、 HCO_3^{-} 、 $SO_4^{(2-)}$ and Cl^{-} , the combinations and sequence of cations and anions are encoded, and the identification and spatial regionalization of groundwater hydrochemical type are automatically completed. The model is validated by measured sample data, and the results of the regionalization of groundwater hydrochemical types are compared with traditional methods. The result shows that the method is efficient and feasible by using spatial analysis model to identify and regionalize the groundwater hydrochemical type, and the overall effect of hydrochemical type regionalization is consistent with that of traditional methods, and the spatial analysis model can better reflect the spatial evolution characteristics of groundwater hydrochemical types.

摘要: 为了简化地下水化学类型分区的流程, 客观地反映地下水化学类型的空间分布特征, 基于 GIS 技术设计了地下水化学类型分区空间分析模型, 利用 $K^{++}Na^{+}$ 、 $Ca^{(2+)}$ 、 $Mg^{(2+)}$ 、 HCO_3^{-} 、 $SO_4^{(2-)}$ 、 Cl^{-} 毫克当量百分数栅格数据, 对阴阳离子进行组合排序编码, 自动完成水化学类型的识别与空间分区, 并使用 ArcGIS 的 Model-Builder 实现了模型构建。以实际样本数据为例对该模型进行了验证, 对地下水化学类型分区结果与传统方法进行了对比分析。结果表明, 采用空间分析模型进行地下水化学类型分区的方法高效可行, 水化学分区整体效果与传统方法基本一致, 空间分析模型方法能够更好地反映地下水化学类型的空间演化特征。

入藏号: CSCD:6515973

地址: Xu Bin, School of Environmental Science and Engineering, Chang'an University; Chang'an University, ; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an; Xi'an, ; 710054; 710054.

Zhang Yan, School of Earth Science and Resources, Chang'an University; Shaanxi Key Laboratory of Land Consolidation, ; Shaanxi Key Laboratory of Land Consolidation, Xi'an; Xi'an, ;

710054;;710054.

地址: 徐斌, 长安大学环境科学与工程学院;;长安大学,;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

张艳, 长安大学地球科学与资源学院;;陕西省土地整治重点实验室,;;陕西省土地整治重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: xubin@chd.edu.cn

电子邮件地址: xubin@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 3

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作者: Liu Shan; Liu Danrong; Sun Zhaohui; Zhang Yue; Zhao Chunpeng; Wei Li

作者: 刘珊; 刘丹荣; 孙朝辉; 张悦; 赵春朋; 魏莉

标题: The study to the removal of copper(II) ions by sodium alginate loaded with HFO gel spheres

标题: 海藻酸钠负载 HFO 凝胶球吸附 Cu(II)的研究

来源出版物: 功能材料 卷: 50 期: 5 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: HFO; Cu(II); sodium alginate; HFO; hydrogel beads; copper(II) ions; adsorption

作者关键词: 海藻酸钠; 凝胶球; 吸附

摘要: Based on the embedding method, millimeter sodium alginate ball SA/HFO hydrated ferric oxide gel was prepared to study the adsorption behavior of Cu(II) in water. The results showed that the best pH of SA/HFO gel ball for Cu(II) was 5.5. The kinetic study showed that the equilibrium time of adsorption was 21 h, and the adsorption process was more consistent with the quasi-second-order kinetic model. The adsorption isotherm fitting results revealed that the adsorption behavior was more consistent with the Langmuir adsorption isotherm model. And the temperature data showed that increasing the temperature was conducive to the reaction, and the thermodynamic process was spontaneous, endothermic and entropy increasing. The SA/HFO gel ball was conducted desorption and adsorption experiments again after adsorption of Cu(II), and it could still maintain good adsorption properties after eight cycles.

摘要: 利用包埋法制得毫米级海藻酸钠负载 HFO 凝胶球 SA/HFO,探究了其在水中 Cu(II)的

吸附行为.实验结果表明,SA/HFO 凝胶球对 Cu(II)的吸附在 pH 值=5.5 时效果最好;通过动力学研究可知,吸附平衡时间为 21 h,拟二级动力学模型能很好的描述该吸附过程;吸附等温线拟合结果揭示了该吸附过程更符合 Langmuir 吸附等温模型;由温度数据得出,升高温度有利于反应的进行且该热力学过程为自发、吸热、熵增过程;将 SA/HFO 凝胶球吸附 Cu(II)后的材料解吸并再次进行吸附实验,仍能保持良好的吸附效果.

入藏号: CSCD:6509458

地址: Liu Shan, School of Environmental Science and Engineering,Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710054, China.

Liu Danrong, School of Environmental Science and Engineering,Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710054, China.

Sun Zhaohui, School of Environmental Science and Engineering,Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710054, China.

Zhang Yue, School of Environmental Science and Engineering,Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710054, China.

Zhao Chunpeng, School of Environmental Science and Engineering,Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710054, China.

Wei Li, School of Environmental Science and Engineering,Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710054, China.

地址: 刘珊, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

刘丹荣, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

孙朝辉, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

张悦, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

赵春朋, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

魏莉, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

电子邮件地址: 763177251@qq.com

电子邮件地址: 763177251@qq.com

使用次数 (最近 180 天): 1

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作者: Liu Shuang; Zhao Jianqiang; Wang Sha; Lan Lan; Li Xiaoling; Lu Zhaolin

作者: 刘双; 赵剑强; 王莎; 兰兰; 李晓玲; 芦昭霖

标题: Ammonia production mechanism in a simultaneous occurrence of sulfur autotrophic and heterotrophic mixed nitrite denitrification process

标题: 硫自养与异养混合亚硝酸盐反硝化过程铵生成机制

来源出版物: 环境工程学报 卷: 13 期: 6 页: 1366-1373 出版年: 2019

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作者关键词: COD/N; S/N; mixotrophic denitrification; dissimilatory nitrite reduction to ammonia; COD/N; S/N

作者关键词: 混合反硝化; 异化亚硝酸盐还原为铵

摘要: In this study, the ammonia production mechanism by a simultaneous autotrophic and heterotrophic (mixotrophic) denitrification process was identified in a sequencing batch biofilm reactor(SBBR) fed with nitrite, sulfide and sodium acetate supplementation, and six different COD/N ratios and five different S/N ratios were designed for this purpose. The result showed that the nitrite removal efficiency was up to 99% when COD/N ratio was higher than 2 and S/N ratio was higher than 1. The increase of ammonia concentration occurred when ORP was lower than -400 mV, and high S/N ratio could enhance the ammonia production with a constant COD/N ratio in influent. While at constant S/N ratio and COD/N ratio of 3, a significant increase of ammonia yield occurred. The microbial analysis showed that sulfur autotrophic denitrification, heterotrophic denitrification as well as dissimilatory nitrite reduction to ammonia were coexisted in this carbon-nitrogen-sulfur synchronous mixing system, in which the ammonia production mechanism may be the process of dissimilatory nitrite reduction to ammonia in the presence of low redox potential and excess electron donor.

摘要: 为研究亚硝酸盐型碳、氮、硫同步脱除系统的特性,采用 SBBR,以亚硝酸盐、硫化物及乙酸钠为基质,探索 6 种进水 COD/N 及 5 种进水 S/N 下碳、硫混合亚硝酸盐反硝化过程铵的生成机制。结果表明:在进水 COD/N 高于 2、S/N 高于 1 时,NO₂-N 去除率高达 99%;同时,当氧化还原电位(ORP)低于 -400mV 时,会出现铵浓度明显升高现象,在此条件下,进水 COD/N 不变时,较高的 S/N 会促进铵的生成;控制进水 S/N 不变,COD/N 为 3 时铵浓度升高最为明显。微生物分析结果表明,该碳、氮、硫混合体系中同时存在硫自养反硝化、异养反硝化及亚硝酸盐异化还原为铵等过程,碳、硫混合亚硝酸盐反硝化过程铵的生成机制可能是低氧化还原电位和过量电子供体存在的情况下亚硝酸盐异化还原为铵的过程。

入藏号: CSCD:6511231

地址: Liu Shuang, School of Environmental Science and Engineering, Chang an University, Xi 'an, 710064.

Zhao Jianqiang, School of Environmental Science and Engineering, Chang an University, Xi 'an, 710064.

Wang Sha, School of Environmental Science and Engineering, Chang an University, Xi 'an, 710064.

Lan Lan, School of Environmental Science and Engineering, Chang an University, Xi 'an, 710064.

Li Xiaoling, School of Environmental Science and Engineering, Chang an University, Xi 'an, 710064.

Lu Zhaolin, School of Environmental Science and Engineering, Chang an University, Xi 'an, 710064.

地址: 刘双, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

赵剑强, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

王莎, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

兰兰, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

李晓玲, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

芦昭霖, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: 416430937@qq.com; 626710287@qq.com

电子邮件地址: 416430937@qq.com; 626710287@qq.com

使用次数 (最近 180 天): 0

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作者: Li Qian; Fu Wanchen; Zhang Cunshe; Wang Yue; Wang Wei

作者: 李倩; 符婉琛; 张存社; 王悦; 王伟

标题: Preparation and electrochemical properties of polypyrrole /manganese dioxide composites

标题: 聚吡咯/二氧化锰复合材料的制备及其电化学性能研究

来源出版物: 应用化工 卷: 48 期: 5 页: 995-1000 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: manganese dioxide; polypyrrole; supercapacitor; nanocomposite structure

作者关键词: 二氧化锰; 聚吡咯; 超级电容器; 纳米复合结构

摘要: The urchin-like MnO₂ was synthesized by hydrothermal method, the PPy@ MnO₂ was prepared from pyrrole and MnO₂ nanosphere, and the effects of coating time and coating content on the electrochemical properties of PPy@ MnO₂ were investigated. Using the synthetic PPy@

MnO₂ nanocomposite as the working electrode, the electrochemical performance was measured using a three-electrode system in a 1 mol /L Na₂SO₄ solution. Studies on cyclic voltammetry, constant current charging and discharging, and electrochemical impedance spectroscopy (EIS) of PPy@ MnO₂ nanocomposites showed that the electrochemical performance of PPy@ MnO₂ nanocomposites is the best when the mass ratio of pyrrole to MnO₂ is 10 : 1 and the coating time is 6 h, the specific capacitance of PPy@ alpha-MnO₂-60 is 177.3 F/g in the current density 0.5 A/g.

摘要: 利用水热法合成了海胆状 MnO₂, 通过吡咯聚合制备了 PPy@ MnO₂ 复合结构, 研究了包覆时间、包覆量对 PPy@ MnO₂ 电化学性能的影响。用 PPy@ MnO₂ 纳米复合材料作为工作电极, 在 1 mol/L 的 Na₂SO₄ 溶液中利用三电极体系进行了电化学性能测试。PPy@ MnO₂ 纳米复合材料的循环伏安、恒电流充放电和电化学阻抗谱 (EIS) 研究表明, PPy@ alpha-MnO₂-60 纳米复合材料在吡咯与二氧化锰质量比 10 : 1、包覆时间 6 h 时电化学性能最佳, 在电流密度 0.5 A/g 时比电容值为 177.3 F/g。

入藏号: CSCD:6506268

地址: Li Qian, Chang'an University, College of Environment Science and Engineering, Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an, Shaanxi 710054, China.

Fu Wanchen, Chang'an University, College of Environment Science and Engineering, Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an, Shaanxi 710054, China.

Wang Wei, Chang'an University, College of Environment Science and Engineering, Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an, Shaanxi 710054, China.

Zhang Cunshe, Shaanxi Research Design Institute of Petroleum and Chemical Industry, Xi'an, Shaanxi 710054, China.

Wang Yue, Shaanxi Research Design Institute of Petroleum and Chemical Industry, Xi'an, Shaanxi 710054, China.

地址: 李倩, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

符婉琛, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

王伟, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

张存社, 陕西省石油化工研究设计院, 西安, 陕西 710054, 中国.

王悦, 陕西省石油化工研究设计院, 西安, 陕西 710054, 中国.

电子邮件地址: 13299161351@163.com; wwchem@chd.edu.cn

电子邮件地址: 13299161351@163.com; wwchem@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Du Wei; Ai Chaoqian; Ma Xuedong; Du Yifan; Wang Wei

作者: 杜炜; 艾超前; 马雪东; 杜毅帆; 王伟

标题: Progress in the application and preparation of inorganic whiskers

标题: 无机晶须的制备及应用进展

来源出版物: 应用化工 卷: 48 期: 5 页: 1163-1166,1171 出版年: 2019

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语言: Chinese

文献类型: Review

作者关键词: inorganic whiskers; preparation; properties; application

作者关键词: 无机晶须; 制备; 性能; 应用

摘要: This paper mainly focus on the preparation methods of inorganic whiskers, and the structure, properties and application of some common whiskers such as silicon carbide, aluminum borate, zinc oxide, potassium titanate, mullite, calcium sulfate and magnesium sulfate. At the same time, the transition from structural materials to functional materials is not only the major focus of current research, but also the future development direction of high-tech materials.

摘要: 综述了无机晶须的制备方法和一些常见晶须如碳化硅、硼酸铝、氧化锌、钛酸钾、莫来石、硫酸钙、硫酸镁的结构、性能及其应用情况。同时,从结构型材料转向功能型材料是现在研究的重点,也是未来高新材料研究的发展方向。

入藏号: CSCD:6506306

地址: Du Wei, Department of Chemical Engineering, College of Environment Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Ai Chaoqian, Department of Chemical Engineering, College of Environment Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Ma Xuedong, Department of Chemical Engineering, College of Environment Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Du Yifan, Department of Chemical Engineering, College of Environment Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Wang Wei, Department of Chemical Engineering, College of Environment Science and

Engineering, Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;;Xi'an, ;;710054;;710054.

地址: 杜炜, 长安大学环境科学与工程学院化学工程系;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

艾超前, 长安大学环境科学与工程学院化学工程系;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

马雪东, 长安大学环境科学与工程学院化学工程系;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

杜毅帆, 长安大学环境科学与工程学院化学工程系;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

王伟, 长安大学环境科学与工程学院化学工程系;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: wwchem@chd.edu.cn

电子邮件地址: wwchem@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Dong Jie; Zhou Peiyao; Ge Jialiang; Wang Xin

作者: 董洁; 周佩瑶; 葛佳亮; 王昕

标题: Numerical simulation of pollutant migration in a coal mining plant based on MT3DMS

标题: 基于 MT3DMS 的某采煤厂污染物运移模拟

来源出版物: 水资源与水工程学报 卷: 30 期: 2 页: 81-87 出版年: 2019

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语言: Chinese

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作者关键词: MT3DMS; characteristic pollutant; MT3DMS (A Modular Three - Dimensional Multispecies Solute Transport model); pollutant migration; impermeable layer; leak detection frequency; coalmining plant

作者关键词: 特征污染物; 污染物运移; 防渗层; 检漏频率; 煤矿

摘要: With the rapid development of industrialization, environmental pollution caused by a large

number of coal mining has become increasingly severe. In order to protect the ecological environment of stone coal mining area in Ankang City, it is very important to understand the local pollutant migration rules. Therefore, based on the groundwater head data of February 2018 in Ankang City, a solute transport model was established by using the MT3DMS module of Visual Modflow to study the transport of various characteristic pollutants in polluted areas of coal mining plants under different conditions and to provide the corresponding pollution prevention and control suggestions. The results showed that: the excess area of the three characteristic pollutants (Al^{3+} , Fe^{3+} , NH_4^+) was between 1893 - 5975 m^2 after 1000 d leakage without any treatments. When the impermeable layer is installed or the leakage detection frequency is increased, only 1693 m^2 of NH_4^+ appears after the leakage of 1000 d, and the concentration of other pollutants is lower than the level of the limit.

摘要: 随着工业化发展速度加快,大量采煤带来的环境污染问题日益突出.为了保护安康石煤开采区域的生态环境,掌握当地污染物运移规律尤为重要.因此,基于安康市2018年2月地下水水流场资料,利用Visual Modflow中的MT3DMS模块建立溶质运移模型,对采煤厂污染易发区域的多种特征污染物在不同情况下的运移进行研究,并提出相应的污染防治建议.结果表明:当未采取任何措施时, Al^{3+} 、 Fe^{3+} 和 NH_4^+ 这3种特征污染物在泄漏1000 d后超标面积在1893~5975 m^2 之间;当安装防渗层或加快检漏频率后,仅 NH_4^+ 在泄漏1000 d后出现1693 m^2 的超标,其余污染物浓度均低于超标限.

入藏号: CSCD:6498706

地址: Dong Jie, College of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Zhou Peiyao, College of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Ge Jialiang, College of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Wang Xin, Shaanxi Institute of Engineering Prospecting(SIEP), Xi'an, Shaanxi 710068, China.

地址: 董洁, 长安大学环境科学与工程学院;; 旱区地下水文与生态效应教育部重点实验室, ;; 旱区地下水文与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

周佩瑶, 长安大学环境科学与工程学院;; 旱区地下水文与生态效应教育部重点实验室, ;; 旱区地下水文与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

葛佳亮, 长安大学环境科学与工程学院;; 旱区地下水文与生态效应教育部重点实验室, ;; 旱区地下水文与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

王昕, 陕西工程勘察研究院有限公司, 西安, 陕西 710068, 中国.

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作者: Ma Zhitong; Wang Wenke; Zhang Zaiyong; Zhao Ming; Chen Li; Song Hao; Yu Peiyuan

作者: 马稚桐; 王文科; 张在勇; 赵明; 陈立; 宋浩; 虞佩媛

标题: Simulation study on diurnal distribution variation of soil water in shallow vadose zone

标题: 浅层包气带土壤水昼夜分布变化规律模拟研究

来源出版物: 水资源与水工程学报 卷: 30 期: 2 页: 245-251,260 出版年: 2019

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作者关键词: vadose zone; soil water diurnal distribution; soil water content; variation law of soil water; temperature gradient; vapor transport; arid and semi-arid regions

作者关键词: 包气带; 土壤水分昼夜分布; 土壤含水率; 土壤水变化规律; 温度梯度; 水蒸汽运移; 干旱半干旱地区

摘要: In the arid and semi-arid regions of Northwest China, the distribution characteristics of subsurface hydrological elements such as soil water content and temperature in shallow vadose zone play vital roles in protecting the epigenetic ecological environment. Based on the in-situ soil column experiment in wind-blown sand area of Ordos Basin, the water vapor movement, soil water content and temperature distributions of one-dimensional infiltration process were numerically simulated using HYDRUS - 1 D model, and verified by the measured values. The results showed that the temperature gradient plays a dominate role in the diurnal distributions of soil water content and water vapor flux in shallow vadose zone. Water vapor movement process can be divided into three stages in daily-scale: stage 1 (1: 00 - 7: 00), stage 2 (8: 00 - 16: 00), and stage 3 (17: 00 - 23: 00). Water vapor flux moved upwards and the water content decreased when the direction of temperature gradient was upward; conversely, the water content increased. Using the HYDRUS model to analyze the water vapor movement, and reveal the mechanism of soil temperature on soil water distribution can provide a scientific basis for evaporation process and ecological environment protection in arid areas.

摘要: 西北干旱半干旱地区, 浅层包气带含水率与地温等地下水要素的分布特征对保护旱区表生生态环境起到至关重要的作用. 以鄂尔多斯风沙滩地区原位土柱试验为基础, 采用 HYDRUS-1 D 对一维入渗过程的水蒸汽变化、含水率和温度分布进行数值模拟并通过实测值进行验证. 结果表明: 温度梯度对浅层包气带土壤含水率昼夜变化及水蒸汽通量分布起到主控作用; 日尺度剖面水蒸汽运动过程可分为 3 个阶段: 阶段 1 (1: 00- 7: 00), 阶段 2 (8: 00- 16: 00) 及阶段 3 (17: 00- 23: 00); 当温度梯度方向向上, 水蒸汽通量向上运动时, 含水率变小, 反之, 含水率变大. 利用 HYDRUS 模型分析水蒸汽的运动规律, 揭示了土壤温度对土壤水分布的影响机制, 为旱区蒸发过程及生态环境保护提供科学依据.

入藏号: CSCD:6498731

地址: Ma Zhitong, School of Environmental Science and Engineering, Chang'an University;; ;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Xi'an;;Xi'an, ;; 710054;;710054.

Wang Wenke, School of Environmental Science and Engineering, Chang'an University;; ;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Xi'an;;Xi'an, ;; 710054;;710054.

Zhang Zaiyong, School of Environmental Science and Engineering, Chang'an University;; ;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Xi'an;;Xi'an, ;; 710054;;710054.

Zhao Ming, School of Environmental Science and Engineering, Chang'an University;; ;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Xi'an;;Xi'an, ;; 710054;;710054.

Chen Li, School of Environmental Science and Engineering, Chang'an University;; ;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Xi'an;;Xi'an, ;; 710054;;710054.

Song Hao, School of Environmental Science and Engineering, Chang'an University;; ;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Xi'an;;Xi'an, ;; 710054;;710054.

Yu Peiyuan, School of Environmental Science and Engineering, Chang'an University;; ;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Xi'an;;Xi'an, ;; 710054;;710054.

地址: 马稚桐, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

王文科, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

张在勇, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

赵明, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

陈立, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

宋浩, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

虞佩媛, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

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作者: Zheng Xiaolu; Huo Aidi; Zhu Xinghua; Jiang Cheng

作者: 郑小路; 霍艾迪; 朱兴华; 姜程

标题: Review of research processes in soil erosion prediction model on the Loess Plateau

标题: 黄土高原土壤侵蚀预报模型研究进展

来源出版物: 应用化工 卷: 48 期: 4 页: 902-906,912 出版年: 2019

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作者关键词: soil erosion; numerical simulation; soil erosion prediction model; Loess Plateau

作者关键词: 土壤侵蚀; 数值模拟; 土壤侵蚀预报模型; 黄土高原

摘要: Loess Plateau is one of the areas with the most serious soil erosion in the world. The Loess Plateau has a steep slope, a high degree of fragmentation and a complex water erosion model. The situation of soil erosion is extremely serious. The soil erosion prediction model will provide the basis for macro decision of small watershed comprehensive management and land use planning, and provide a reference for the effective evaluation of water and soil conservation effects in small watersheds. This paper compares and analyzes the applicability of commonly used numerical simulation models in the simulation of soil erosion processes on the Loess Plateau. The results show that the physical model can more effectively simulate the various processes of soil erosion and sediment transport. Therefore, it has the ability to predict future scenarios and explain the response to climate change, human activities and soil erosion, which provides a theoretical basis for realizing the erosion dynamic simulation of different scale basins.

摘要: 建立土壤侵蚀预报模型将为小流域综合治理、土地利用规划提供依据,为小流域水土保持效果有效评价提供参考.黄土高原坡面陡峭、破碎程度高、坡面水蚀模型复杂,水土流失的情况极为严重.通过对常用的数值模拟模型在黄土高原土壤侵蚀过程模拟中的适用性进行了对比和分析;结果表明经验模型模拟的精度更高,但是对侵蚀过程不能做出理论性的解释,而物理成因模型能够更好做到这一点.因此物理模型具有预测未来情景变化和解释气候变化、人类活动对土壤侵蚀响应的能力,可以为实现不同尺度流域的侵蚀动态模拟预报提供一定的理论基础.

入藏号: CSCD:6492608

地址: Zheng Xiaolu, School of Environmental Science & Engineering, Chang'an University, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an, Xi'an, 710054; 710054.

Huo Aidi, School of Environmental Science & Engineering, Chang'an University, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an, Xi'an, 710054; 710054.

Jiang Cheng, School of Environmental Science & Engineering, Chang'an University, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid

Region, Ministry of Education, Xi'an; Xi'an, ; 710054; 710054.

Zhu Xinghua, School of Geological Engineering and Surveying, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 郑小路, 长安大学环境科学与工程学院;; 长安大学, ; 旱区地下水文与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

霍艾迪, 长安大学环境科学与工程学院;; 长安大学, ; 旱区地下水文与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

姜程, 长安大学环境科学与工程学院;; 长安大学, ; 旱区地下水文与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

朱兴华, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: zhengxiaoluu@163.com; huoaidi@126.com

电子邮件地址: zhengxiaoluu@163.com; huoaidi@126.com

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作者: Lan Lan; Zhao Jianqiang; Ding Xiaoqian; Wang Sha; Liu Shuang

作者: 兰兰; 赵剑强; 丁晓倩; 王莎; 刘双

标题: Quick Start of Nitrosification and Anaerobic Ammonium Oxidation Process with Oxygen-Limited Continuous Aeration

标题: 限氧连续曝气快速启动亚硝化-厌氧氨氧化工艺

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作者关键词: 连续流; 生物膜; 连续曝气; 亚硝化; 厌氧氨氧化; 启动

摘要: The starting process of anaerobic ammonium oxidation in continuous flow biofilm reactor was researched, the results showed that, after 25 d acclimation, a stable partial nitrification for anaerobic ammonia oxidation (Anammox) was achieved with seeded of common mixed sludge in the aerobic tank plant of a wastewater treatment plant, and with the continuous aeration at the mass concentration of DO was 1.5~2 mg/L, under the condition of completely autotrophy,

temperature and pH was (32.01) °C and pH of 7.2~8 respectively. Anammox bacteria enrichment was achieved at the mass concentration of DO was 2 mg/L and the influent mass concentration of NH₄⁺-N was 500 mg/L after about 40 d, the TN removal rate reached more than 40%. After reactor operation of 125 d, removal rate of TN could reach more than 70%, and the maximum was up to 84% at the mass concentration of DO was 1 mg/L and the influent mass concentration of NH₄⁺-N was 125 mg/L. The influent volume flow rate was 0.75 L/h, and the highest TN removal load was 1.89 g/(L·d).

摘要: 实验探究了厌氧氨氧化在连续流生物膜反应器中的启动过程.结果表明,接种某污水处理厂好氧池普通混合污泥,在温度(32.01)°C、pH 为 7.2~8、完全自养条件下,通过连续曝气将溶解氧(DO)的质量浓度维持在 1.5~2 mg/L,经过约 25 d 驯化,实现了适合厌氧氨氧化的部分亚硝化.逐步将进水 NH₄⁺-N 的质量浓度提高至 500 mg/L, DO 的质量浓度控制在 2 mg/L 左右,仍采用连续曝气,经过约 40 d 的驯化培养后,成功实现了氧化氨氧化细菌的富集,TN 去除率可达 40%以上.在反应器运行 125 d 后,进水 TN 的质量浓度为 125 mg/L 条件下,DO 的质量浓度控制在 1 mg/L 左右,TN 去除率可稳定在 70%以上,最高可达 84%,此时,进水体积流量为 0.75 L/h,TN 最高去除负荷为 1.89 g/(L·d).

入藏号: CSCD:6495423

地址: Lan Lan, School of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Jianqiang, School of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Ding Xiaoqian, School of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Sha, School of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Shuang, School of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 兰兰, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

赵剑强, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

丁晓倩, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

王莎, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

刘双, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: 1406709344@qq.com; 626710287@qq.com

电子邮件地址: 1406709344@qq.com; 626710287@qq.com

使用次数 (最近 180 天): 0

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作者: Wang Kai; Yang Zeyuan; Yuan Yue; Chen Zhijun

作者: 王锴; 杨泽元; 袁悦; 陈志军

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标题: 毛乌素沙地南缘降水入渗滞后补给与模型参数敏感性分析

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文献类型: Article

作者关键词: precipitation infiltration lag; numerical model; parameter sensibility; shallow groundwater area; Mu Us sandy land

作者关键词: 降水入渗滞后; 数值模型; 参数敏感性; 地下水浅埋区; 毛乌素沙地

摘要: [Objective]The lagging infiltration recharge in south margin of Mu Us sandy land and parameter sensitivity of numerical model were studied in order to provide scientific basis for rational exploitation and utilization of groundwater resources and protection of ecological environment in this area.[Methods] Lagging infiltration recharge was analyzed based on field monitoring data,and sensitivity analysis of numerical model parameters was conducted using ratio of variation(ROV).[Results]The response depth of water content to the precipitation was 3~10 cm in small rain scenario,and 30~60 cm,60~90 cm,more than 90 cm in middle,heavy and storm rain scenarios.The groundwater recharge was approximately 4~11h lagged.Sensitivity analysis showed that saturated water content(θ)was the most sensitive parameter to the bottom flux.[Conclusion]The response depth of water content are linearly correlated with the precipitation and the groundwater recharge lag time has a positive correlation with θ .

摘要: [目的]研究陕北毛乌素沙地南缘降水入渗滞后补给与数值模型参数敏感性,为该地区地下水资源合理开发利用与生态环境保护提供科学依据。[方法]基于原位监测数据分析降水入渗滞后补给现象,采用输入输出变化率(ROV)分析数值模型参数敏感性。[结果]小雨型的降水包气带响应深度为3~10 cm,中雨型为30~60 cm,大雨型为60~90 cm,暴雨型均大于90 cm,地下水补给滞后时间约4~11h。参数敏感性分析表明,底部通量对于饱和含水率最为敏感。[结论]入渗响应深度与降水量线性相关,降水补给滞后时间与饱和含水率显著正相关。

入藏号: CSCD:6487832

地址: Wang Kai, School of Environmental Science and Engineering,Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Regions of Ministry of Education;;Engineering Research Center of Groundwater and Eco-environment of Shaanxi Province, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Regions of Ministry of Education;;Engineering Research Center of Groundwater and Eco-environment of Shaanxi Province, Xi'an;;Xi'an;;Xi'an, Shaanxi;;Shaanxi;;Shaanxi 710054;;710054;;710054.

Yang Zeyuan, School of Environmental Science and Engineering,Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Regions of Ministry of Education;;Engineering Research Center of Groundwater and Eco-environment of Shaanxi Province, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Regions of

Ministry of Education;;Engineering Research Center of Groundwater and Eco-environment of Shaanxi Province, Xi'an;;Xi'an;;Xi'an, Shaanxi;;Shaanxi;;Shaanxi 710054;;710054;;710054.

Yuan Yue, School of Environmental Science and Engineering,Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Regions of Ministry of Education;;Engineering Research Center of Groundwater and Eco-environment of Shaanxi Province, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Regions of Ministry of Education;;Engineering Research Center of Groundwater and Eco-environment of Shaanxi Province, Xi'an;;Xi'an;;Xi'an, Shaanxi;;Shaanxi;;Shaanxi 710054;;710054;;710054.

Chen Zhijun, School of Environmental Science and Engineering,Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Regions of Ministry of Education;;Engineering Research Center of Groundwater and Eco-environment of Shaanxi Province, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Regions of Ministry of Education;;Engineering Research Center of Groundwater and Eco-environment of Shaanxi Province, Xi'an;;Xi'an;;Xi'an, Shaanxi;;Shaanxi;;Shaanxi 710054;;710054;;710054.

地址: 王锴, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室;;陕西省地下水与生态环境工程研究中心, ;;旱区地下水文与生态效应教育部重点实验室;;陕西省地下水与生态环境工程研究中心, 西安;;西安;;西安, 陕西;;陕西;;陕西 710054;;710054;;710054, 中国.

杨泽元, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室;;陕西省地下水与生态环境工程研究中心, ;;旱区地下水文与生态效应教育部重点实验室;;陕西省地下水与生态环境工程研究中心, 西安;;西安;;西安, 陕西;;陕西;;陕西 710054;;710054;;710054, 中国.

袁悦, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室;;陕西省地下水与生态环境工程研究中心, ;;旱区地下水文与生态效应教育部重点实验室;;陕西省地下水与生态环境工程研究中心, 西安;;西安;;西安, 陕西;;陕西;;陕西 710054;;710054;;710054, 中国.

陈志军, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室;;陕西省地下水与生态环境工程研究中心, ;;旱区地下水文与生态效应教育部重点实验室;;陕西省地下水与生态环境工程研究中心, 西安;;西安;;西安, 陕西;;陕西;;陕西 710054;;710054;;710054, 中国.

电子邮件地址: wangkai.sc@qq.com; yangzeyu@chd.edu.cn

电子邮件地址: wangkai.sc@qq.com; yangzeyu@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Zhang Chen; Duan Lei; Liu Mingming; Li Ying; Song Hao

作者: 张琛; 段磊; 刘明明; 李瑛; 宋浩

标题: A study of the conversion between the Daxigou river and groundwater

标题: 伊犁河支流大西沟河水与地下水转化关系研究

来源出版物: 水文地质工程地质 卷: 46 期: 3 页: 18-26 出版年: 2019

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作者关键词: hydrochemistry; environmental isotope; river water; groundwater; Daxigou river

作者关键词: 水化学; 环境同位素; 河水; 地下水; 大西沟河

摘要: A study of the conversion between a river and groundwater is of great significance for the rational development and utilization of regional water resources. Based on the analyses of the conversion between the Daxigou River water and groundwater, this paper analyzes the groundwater dynamic field and uses hydrochemical type, dissolved total solids (TDS), chloride (Cl⁻) and environmental isotopes ¹⁸O, D, T and other indicators as tracers to examine the conversion relationship between the Daxigou River and groundwater and their transformation intensity. The results show that the hydrochemical types of rivers and groundwater in the study area are mainly of HCO₃-Ca type, and the spatial distribution characteristics of the hydrochemical types are similar. The concentrations of TDS and Cl⁻ increase first and then decrease, but the variation in groundwater is greater than that of the river water. The comparative analysis of hydrochemistry and environmental isotope indexes in the Daxigou river water and groundwater reveals that the supply and discharge relationship between rivers and groundwater in the study area is characterized by obvious segmentation. From river exit to downstream, conversion of the river water and groundwater occur three times. In the sloped gravel plain area in front of the mountains, the river water infiltrates into the groundwater, and the recharge accounts for 56% of the submarine runoff. In the fine soil plain area, the groundwater recharges the river water, and the recharge source is from the mixed water body in the unconfined aquifer which is a leakage recharge from the confined aquifer. The proportion from the unconfined and confined aquifers accounts for 20.4% and 58.4% of the river runoff, respectively. The river in the windy desert area supplies the groundwater until the river is zero-flow. The results of this study may provide theoretical and technical support for the establishment of the water cycle evolution model and the rational development and utilization of water resources of the study area.

摘要: 开展河流和地下水转换关系研究对于区域水资源合理开发利用具有重要意义.文章以大西沟河水与地下水转换关系为目标,在分析地下水动力场的基础上,通过水化学类型、溶解性总固体(TDS)、氯离子(Cl⁻)等水化学以及环境同位素¹⁸O、D、T等指标作为示踪剂,分析大西沟河和地下水的转换关系和转化强度.结果表明:研究区河流和地下水化学类型主要为HCO₃Ca,水化学类型空间分布特征相似;TDS和Cl⁻浓度表现为先增加后下降,但地下水的变化幅度大于河水.通过对大西沟河水和地下水中的水化学和环境同位素指标对比分析,发现研究区河流与地下水之间补给排泄关系具有明显的分段性;从河流出口到下游地区,河水和地下水之间发生了三次转化关系:在山前倾斜砾质平原区以河水入渗补给地下水为主,补给量占该段潜水径流量的56%;到了细土平原区出现地下水补给河水地段,补给源为承压水越流

补给潜水后的混合水体,潜水和承压水补给比例占该段河水径流量的 20.4%与 58.4%;风成沙漠区河水沿途渗漏补给地下水直至河流断流.本次研究结果为建立研究区水循环演化模式和水资源合理开发利用提供了理论和技术支持.

入藏号: CSCD:6489486

地址: Zhang Chen, School of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Ministry of Education on Groundwater and Ecological Effects in Arid Areas, Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710061;; 710061.

Duan Lei, School of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Ministry of Education on Groundwater and Ecological Effects in Arid Areas, Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710061;; 710061.

Liu Mingming, School of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Ministry of Education on Groundwater and Ecological Effects in Arid Areas, Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710061;; 710061.

Song Hao, School of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Ministry of Education on Groundwater and Ecological Effects in Arid Areas, Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710061;; 710061.

Li Ying, School of Environmental Science and Engineering, Chang'an University;; Chang'an University;; Xi'an Geological Survey Center of China Geological Survey, ;; Key Laboratory of Ministry of Education on Groundwater and Ecological Effects in Arid Areas, Ministry of Education;; Xi'an;; Xi'an;; Xi'an, Shaanxi;; Shaanxi;; Shaanxi 710061;; 710061;; 710054.

地址: 张琛, 长安大学环境科学与工程学院;; 长安大学, ;; 教育部旱区地下水与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710061;; 710061, 中国.

段磊, 长安大学环境科学与工程学院;; 长安大学, ;; 教育部旱区地下水与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710061;; 710061, 中国.

刘明明, 长安大学环境科学与工程学院;; 长安大学, ;; 教育部旱区地下水与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710061;; 710061, 中国.

宋浩, 长安大学环境科学与工程学院;; 长安大学, ;; 教育部旱区地下水与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710061;; 710061, 中国.

李瑛, 长安大学环境科学与工程学院;; 长安大学;; 中国地质调查局西安地质调查中心, ;; 教育部旱区地下水与生态效应教育部重点实验室;; 西安;; 西安;; 西安, 陕西;; 陕西;; 陕西 710061;; 710061;; 710054, 中国.

电子邮件地址: 1241235196@qq.com; duanlei1978@126.com

电子邮件地址: 1241235196@qq.com; duanlei1978@126.com

使用次数 (最近 180 天): 0

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作者: Zhang Xiaozhou; Lu Yudong; Li Xin; Lu Yangchun; Pan Wangsheng

作者: 张晓周; 卢玉东; 李鑫; 卢阳春; 潘网生

标题: The change of Malan loess porosity in south Jingyang plateau under humidification condition

标题: 增湿条件下泾阳南塬马兰黄土孔隙率变化研究

来源出版物: 干旱区资源与环境 卷: 33 期: 6 页: 99-104 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: porosity; humidification; SEM; feret diameter

作者关键词: 孔隙率; 增湿; 扫描电子显微镜; 定方向接线径

摘要: Study the variation characteristics of porosities of undisturbed Malan loess of the south Jingyang plateau before and after humidification can provide a basis for the pore parameters of loess collapsibility mechanism. The Image-Pro Plus (IPP) was used to binarize the microscopic images of the undisturbed loess samples that taken from the same positions, and the statistics, comparison and analysis of pores were made at the same time. The results showed that the decrease of macro pores after humidification is the main reason for collapsibility of Malan loess, and this collapsibility will be reflected again during the next humidification and dehumidification process. The incorporation of IPP and scanning electron microscope technology can quickly analyze loess microstructure and obtain relevant pore parameters, which provide great convenience for using to establish collapsible model.

摘要: 研究泾阳南塬原状马兰黄土孔隙率在增湿前后的变化特征, 为黄土湿陷机理孔隙参数的确定提供一种依据。利用影像分析软件对扫描电子显微镜下获得的泾阳南塬原状马兰黄土增湿前后同一位置的微观影像进行二值化处理, 并对马兰黄土中的不同类型的孔隙进行统计、对比、分析。结果表明增湿后架空结构破坏导致的大孔隙减少是马兰黄土发生湿陷的主要原因, 并且这种湿陷会在下次孔隙变化时再次体现。将影像分析软件和电镜扫描技术相结合能够快速分析黄土微观结构并获得相关孔隙参数。

入藏号: CSCD:6485151

地址: Zhang Xiaozhou, College of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Lu Yudong, College of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Li Xin, College of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an;; Xi'an, ;;

710054;;710054.

Lu Yangchun, College of Environmental Science and Engineering,Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas,Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas,Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Pan Wangsheng, College of Environmental Science and Engineering,Chang'an University;;School of Tourism and Resources Environment,Qiannan Normal University for Nationalities, ;; Xi'an;;Duyun, ;; 710054;;558000.

地址: 张晓周, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

卢玉东, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

李鑫, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

卢阳春, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

潘网生, 长安大学环境科学与工程学院;;黔南民族师范学院旅游与资源环境学院, ;; 西安;;都匀, ;; 710054;;558000.

电子邮件地址: zhang29060926@163.com; luyudong@chd.edu.cn

电子邮件地址: zhang29060926@163.com; luyudong@chd.edu.cn

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作者: Xie Yaping; Cheng Jixia; Yan Mingquan

作者: 谢亚萍; 程继夏; 晏明全

标题: Effect of hardness cations on the complexation between coagulant ferric ion and dissolved organic matter by differential UV-visible absorbance spectroscopy

标题: 利用差分光谱法研究硬度离子 Ca^{2+}/Mg^{2+} 对混凝剂铁盐与溶解性有机物络合的影响

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作者关键词: UV-visible absorbance spectroscopy titration; hardness cations; ferric ion; complexation; dissolved organic matter (DOM)

作者关键词: 紫外-可见光谱滴定; 硬度离子; 铁盐; 络合; 溶解性有机物(DOM)

摘要: Hardness cations (Ca^{2+} and Mg^{2+}) are widely present in water, while their effects on the removal of dissolved organic matter (DOM) by coagulation in water treatment are unclear yet. This is partly due to the lack of methods to characterize the interaction among DOM, coagulants, and hardness cations under the conditions of coagulation. In this study, the differential UV-visible absorbance spectroscopy method was used to quantitatively characterize the effect of hardness cations on the complexation between ferric ion and DOM at pH 7. It demonstrates that the presence of hardness cations could significantly affect the complexation between Fe^{3+} and DOM, and the inhibition against their complexation was aggravated with the increase of the concentrations of Ca^{2+} or Mg^{2+} , especially for the latter cation. The results provide a new method to reveal the mechanism of coagulation, as well as the effect of hardness cations on it.

摘要: 硬度离子 $\text{Ca}^{2+}/\text{Mg}^{2+}$ 在水体中广泛存在, 而其对水处理混凝工艺去除溶解性有机物(DOM)的影响并不是很清楚, 这主要是由于缺乏可用于表征混凝环境条件下 DOM、混凝剂、硬度离子之间相互作用过程的方法。采用差分光谱法, 定量表征在 pH 为 7 时 Ca^{2+} 或 Mg^{2+} 对混凝剂 Fe^{3+} 与 DOM 络合过程的影响。结果表明, Ca^{2+} 或 Mg^{2+} 的存在会显著影响 Fe^{3+} 与 DOM 的络合过程, 随着 Ca^{2+} 或 Mg^{2+} 的浓度增大, 对 Fe^{3+} 与 DOM 络合产生的抑制越显著, 尤其是 Mg^{2+} 。研究为深入认识混凝去除 DOM 的机理提供了新方法与新视角。

入藏号: CSCD:6486717

地址: Xie Yaping, College of Environmental Sciences and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Cheng Jixia, College of Environmental Sciences and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Yan Mingquan, School of Environmental Science and Engineering, Peking University, Key Laboratory of Water and Sediment Sciences, Ministry of Education, Beijing 100871, China.

地址: 谢亚萍, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

程继夏, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

晏明全, 北京大学环境科学与工程学院, 教育部水沙科学重点实验室, 北京 100871, 中国.

电子邮件地址: xie-yp@foxmail.com; yanmq@pku.edu.cn

电子邮件地址: xie-yp@foxmail.com; yanmq@pku.edu.cn

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作者: Li Meng; Chen Aixia; Chen Bei; Hu Weixing; Meng Jianhao; Han Rong

作者: 李萌; 陈爱侠; 陈贝; 胡卫星; 孟建昊; 韩融

标题: Dynamic adsorption of dimethyl phthalate onto fly ash in the simulated river

标题: 粉煤灰对模拟河流中 DMP 的动态吸附

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作者关键词: sudden river pollution accidents; plastic plasticizer pollution; dimethyl phthalate; fly ash; simulated river

作者关键词: 河流突发污染事故; 塑料增塑剂污染; 邻苯二甲酸二甲酯; 粉煤灰; 模拟河流

摘要: For the sudden environmental problems by pollutants leakage, the dynamic adsorption of dimethyl phthalate (DMP) onto fly ash was conducted in a simulated river unit, which was made of a plexiglass reaction tank, and a continuous injection of DMP with the same initial concentration into it. The experimental data were fitted by the Logistic penetrating model, and the effects of flow rate of the river, DMP initial concentration and adsorbent dosing ways on adsorption performance of fly ash were analyzed. The results showed that the Logistic penetrating model yielded an accurate and reliable fit for the dynamic adsorption process of DMP onto fly ash with a high R^2 value of 0.992. With the increase of influent flow rate, DMP could more easily penetrate the surface of adsorbent, the adsorption capacity per unit time increased from 17.81 $\mu\text{g}\cdot\text{g}^{-1}$ to 27.78 $\mu\text{g}\cdot\text{g}^{-1}$, the maximum removal rate increased from 35.63% to 55.57%, the breakthrough time was shortened accordingly. An increase of the initial concentration of DMP solution was found to enlarge the concentration difference between the DMP and the fly ash, improve DMP amount in contact with the adsorbent per unit time. Then the time to reach saturation was shorten from 131 min to 119 min, the breakthrough point on the breakthrough curve shifted to left, and the adsorption performance of fly ash was improved. A complete distribution the fly ash on the bottom of tank could form enough contact between the fly ash and DMP and reduce the mass transfer resistance, the adsorption rate coefficient increased from 0.003 9 to 0.004 7, and the adsorption capacity of fly ash increased. This study will provide some theoretical references for emergent treatment of sudden river pollution accidents.

摘要: 针对污染物泄露导致的河流污染问题,以邻苯二甲酸二甲酯(DMP)为研究对象,以粉煤灰作为吸附剂、有机玻璃反应槽作为反应装置,向其持续注入初始浓度相同的 DMP 溶液,将其所得实验数据拟合 Logistic 穿透模型,研究模拟河流条件下,粉煤灰对 DMP 的动态吸附规律;同时,分析了水流速度、DMP 初始浓度及吸附剂投加方式 3 种因素对粉煤灰去除 DMP 性能的影响。结果表明:Logistic 穿透模型能较好地拟合河流中粉煤灰动态吸附 DMP 的过程;提高溶液的进水流速,污染物更容易穿透吸附剂表面,单位时间内的最大吸附量由 17.81 $\mu\text{g}\cdot\text{g}^{-1}$ 增加至 27.78 $\mu\text{g}\cdot\text{g}^{-1}$,最大去除率由 35.63% 升高至 55.57%,穿透时间提前;随着 DMP 溶液初始浓度的增加,粉煤灰与 DMP 分子之间的浓度差增大,相同时间内与粉煤灰接触的 DMP 污染物增多,达到饱和的时间由 131 min 缩短至 119 min,穿透曲线上的穿透点左移,粉煤灰的吸附性能提高;将粉煤灰全部平铺在槽体底部时,吸附质能够充分地与其接触,传质

阻力减小,吸附速率常数由 0.003 9 提高至 0.004 7,粉煤灰的吸附率升高。该研究可为河流突发性污染的应急处理提供一定理论依据。

入藏号: CSCD:6486721

地址: Li Meng, School of Environmental Science and Engineering, Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region, Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region, Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Chen Aixia, School of Environmental Science and Engineering, Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region, Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region, Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Hu Weixing, School of Environmental Science and Engineering, Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region, Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region, Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Meng Jianhao, School of Environmental Science and Engineering, Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region, Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region, Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Han Rong, School of Environmental Science and Engineering, Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region, Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region, Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Chen Bei, Chang'an University Haiwei Environmental Technology Company, Xi'an, Shaanxi 710054, China.

地址: 李萌, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

陈爱侠, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

胡卫星, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

孟建昊, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

韩融, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

陈贝, 长安大学海威环境技术公司, 西安, 陕西 710054, 中国.

电子邮件地址: 1312496410@qq.com; 489520939@qq.com

电子邮件地址: 1312496410@qq.com; 489520939@qq.com

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作者: Tao Danyu; Guan Yanling; Gao Yanli; Tian Anmin; Zhao Guangyin; Zhang Lei

作者: 陶丹玉; 官燕玲; 高艳丽; 田安民; 赵广印; 张雷

标题: EXPERIMENTAL INVESTIGATIONS AND NUMERICAL PREDICTIONS OF HUMIDITY STATE OF ANEW BUILDING ENVELOPE

标题: 新建建筑围护结构湿状态试验研究及数值预测

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作者关键词: experiments; numerical simulation; moisture content; new independent building; building envelopes

作者关键词: 试验; 数值模拟; 含湿率; 新建独立小屋; 围护结构

摘要: At the Wei Shui campus of Chang'an University, an independent building was constructed according to the modern design and construction standards, a temperature and humidity testing system was installed on the outer envelope for the continuous 897-day testing. Based on the data provided by the system, a dynamic simulation model of the thermal and moisture coupling of the enclosure structure was established with the help of CHAMPS software, and the experimental verification was carried out. Variations of moisture content in the outer enclosure structure of the new building were investigated both experimentally and with the help of numerical simulations. The change of the volume moisture content of the reinforced concrete (RC) north wall in 8 years after completion of the building was predicted by the simulations. The results show that more than two years (nearly 807 days) were required after the completion of the building for the RC north wall to reach the dry state according to the predictions. Moreover, it is demonstrated that the changes in volume moisture content with seasonal fluctuations show an annual periodicity with seasonal fluctuations.

摘要: 在长安大学渭水校区空旷地按设计、施工标准要求搭建一个独立小屋, 对其外围护结构安装温度、湿度跟踪检测系统, 进行历时 897 d 的连续检测。在此基础上, 应用 CHAMPS 软件建立该围护结构的热湿耦合动态仿真计算模型并进行试验验证。通过试验和数值仿真研究该新建建筑外围护结构含湿量随时间的变化规律, 并通过仿真对房屋竣工后 8 a 中的钢筋混凝土北墙的总体积含湿率变化进行预测。结果表明: 房屋竣工后近 807 d, 预测钢筋混凝土北墙已达到干状态, 随后体积含湿率随季节波动呈年周期变化。

入藏号: CSCD:6478909

地址: Tao Danyu, School of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Guan Yanling, School of Environmental Science and Engineering, Chang'an University, Xi'an,

Shaanxi 710064, China.

Gao Yanli, School of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Tian Anmin, School of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Guangyin, Detection Center of Xinxing Building Energy Conservation at Baoji, Baoji, Shaanxi 721000, China.

Zhang Lei, Detection Center of Xinxing Building Energy Conservation at Baoji, Baoji, Shaanxi 721000, China.

地址: 陶丹玉, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

官燕玲, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

高艳丽, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

田安民, 长安大学环境科学与工程学院, 西安, 陕西 710064, 中国.

赵广印, 宝鸡市新星建筑节能检测中心, 宝鸡, 陕西 721000, 中国.

张雷, 宝鸡市新星建筑节能检测中心, 宝鸡, 陕西 721000, 中国.

电子邮件地址: guanyl@chd.edu.cn

电子邮件地址: guanyl@chd.edu.cn

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作者: Ma Lianjing; Zhao Baofeng; Cao Haidong

作者: 马莲净; 赵宝峰; 曹海东

标题: Probe into the failure trend of the loosely overlying strata with the fully-mechanized sub-level caving in the ultra-thick coal seam

标题: 特厚煤层分层综放开采软弱覆岩破坏规律研究

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作者关键词: safety engineering; weak overlying strata; caving zone; water-conductive fracture zone; numerical simulation; similar material simulation

作者关键词: 安全工程; 软弱覆岩; 冒落带; 导水裂缝带; 数值模拟; 相似材料模拟

摘要: The given paper takes it as its research goal the "2-belts" development regularity under the condition of the weak overlying at the fully-mechanized sublevel caving of the ultra-thick coal seam. For the said research goal, we have managed to analyze and determine the plastic belt failure of the overburdened situation by using a numerical simulation software named as UDEC based on the analysis of the geo-structural and mining condition of the working faces No. 68002 and No. 73003 in the profile 6250 in Laohutai coal mine, Liaoning. As a result, we have gained the evolving or developing height of the caving belt and the water decomposing fracture belt respectively. At the same time, we have also managed to simulate the heights of the "2-belts" development in the different overburdened strata with the river sand, gypsum and talcum powder by using the similar material model. What is more, we have also confirmed the development height of the water-conducive fracture belt by using the method of flush fluid loss observation. It is just based on the aforementioned flush fluid loss observation and the similar material simulation as well as the numerical simulation, we have successfully discovered the failure regularity of the weak overburdened situation with the fully-mechanized sublevel caving of the said coal seam, whose ratio of water-conducive fracture belt height to the mining height should be equal to 4.98-5.42, whereas the ratio of the caving belt height to the mining height should be equal to 7.10-7.30. Furthermore, the failure range of the weak overburden should be less than that with the hard and medium hard one. Thus, the "2-belt" development regularity under the condition of the weak overburden can be forecast and predicted from the fully-mechanized sublevel caving of the coal seam through the numerical simulation, the similar material simulation and the flush fluid loss observation. The results of the said observation and simulations prove to be consistent with the objectively existing situations, which have been found influenced by the geographical faults above the working face and the height of the "2-belts" of the weak overburden, if they were lower than that of the hard overburdened layers. Hence, the research results can be expected to provide a scientific base for the mining water disaster prevention and control, which is qualified enough to provide a reference to the prediction and forecast of the "2 belts" development height of the working face in the similar conditons.

摘要: 为了研究软弱覆岩条件下特厚煤层分层综放开采的"两带"发育规律,在分析了老虎台井田地质、构造和开采条件的基础上,将 6250 剖面的 68002 和 73003 工作面作为研究对象,采用数值模拟和相似材料模拟两种方法,对特厚煤层分层综放开采工作面"两带"发育规律进行了研究,并利用冲洗液消耗量观测法对导水裂缝带发育高度进行了验证。基于数值模拟、相似材料模拟和冲洗液消耗量观测,查明了特厚煤层分层综放开采软弱覆岩破坏规律,冒采比为 4.98~5.42,裂采比为 7.10~7.30,破坏范围相对于坚硬、中硬覆岩较小。

入藏号: CSCD:6481422

地址: Ma Lianjing, School of Environmental Science and Engineering, Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Zhao Baofeng, Xi'an Research Institute of China Coal Technology & Engineering Group Corp., Xi'an, Shaanxi 710054, China.

Cao Haidong, Xi'an Research Institute of China Coal Technology & Engineering Group Corp., Xi'an, Shaanxi 710054, China.

地址: 马莲净, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

赵宝峰, 中煤科工集团西安研究院有限公司, 西安, 陕西 710054, 中国.

曹海东, 中煤科工集团西安研究院有限公司, 西安, 陕西 710054, 中国.

电子邮件地址: sunman1220@163.com

电子邮件地址: sunman1220@163.com

使用次数 (最近 180 天): 0

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作者: Liu Yuanyuan; Gao Bai; Zhou Weibo; Zeng Hua

作者: 刘媛媛; 高柏; 周维博; 曾华

标题: Uranium pollutant distribution regularity and health risk assessment in different water-type areas around uranium tailing pond in Xiangshan

标题: 相山铀尾矿库周边不同水体中铀分布规律及健康风险评价

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作者关键词: 环境工程学; 铀尾矿库; 铀; 水; 健康风险评价

摘要: The present paper is to set its study focus on the different water types around a uranium tailing pond in Xiangshan. The purpose of the paper is to clarify and work out the relationship between the uranium mass concentration and the hydrochemical parameters in the water through the status-in-situ and laboratory tests by tracing the special distribution features of the uranium pollutants, and, then, to realize the radiological health risk assessment. In our research activities, we have so far collected 15 indicative water samples, which are registered by the numerical form from the samples as P-1 to P-15. Due to the restriction of the terrain conditions and the technical levels, the tailing pond and its surrounding areas have been chosen including 6 points from the discharge water, 4 ones from the groundwater and 5 ones from the surface water, correspondingly and respectively. At the same time, the uranium mass concentration test has been done by the way of the ICP-MS. The result of the uranium mass concentration helps us to conclude that the spatial distribution of uranium in the water around the study area doesn't seem to be uniform. Rather, almost all the uranium mass concentrations of the samples prove to be up to the expected standards except P-1, which exceeds the recommended value of "the Regulation on the Radiation

Protection and Environmental Protection of the Uranium Mining and Metallurgy (GB 23727-2009)". It has also shown that there may exist various distribution patterns of uranium mass concentrations in the different water types, which implies that the distribution of the uranium mass concentration in the groundwater tends to be uniform, but not in the discharge water. It suggests that such distribution mode of the uranium mass concentration in the surface water stands just in between. In addition, it is also necessary to measure and work out such parameters on-site, as the water temperature, the pH value and the electric conductivity by portable measuring instrument. Thus, it can be made clear that there may lie a positive correlated relation among the above mentioned factors. As a result of study, the Pearson coefficients among the above said 3 factors: the uranium content and, the pH value and the electric conductivity, can be found equal to 0.803 6 and 0.549 8, respectively, which implies that the pH value and electric conductivity are the significant factors responsible for affecting the uranium enrichment in the drinking water. The health risk assessment thus proves that the risk of the health hazards likely to be caused by the uranium through drinking water doesn't exceed the maximally acceptable level recommended by the International Commission on the Radiation Protection (ICRP), the Swedish Environmental Protection Agency and the Netherland Construction and Environment Agency. And, so it wouldn't be possible for the uranium in the drinking water in such a rate(the surface water and groundwater included) to bring about any risk to the health of the local residents.

摘要: 选取相山某铀尾矿库周边不同水体作为研究对象,通过现场和室内检测,分析周边水体中铀的分布规律、铀质量浓度与水化学参数间的关系,并进行放射性健康风险评价。结果表明,研究区周边水体中铀质量浓度空间分布不均匀,除点 P-1 铀质量浓度超出国家标准 GB 23727-2009《铀矿冶辐射防护和环境保护规定》规定值外,其他样品中铀质量浓度均符合标准;不同水体中铀质量浓度差别较大,地下水中铀质量浓度分布较均匀,排放水分布不均匀,地表水介于两者之间。同时,对水温、pH、电导率等参数进行现场测定,得出水体中铀质量浓度与 pH 值、电导率存在正相关关系,铀和 pH 值、电导率间的皮尔逊系数分别为 0.803 6 和 0.549 8,表明 pH 值和电导率是影响水体中铀富集的重要因素。健康风险评价表明,通过饮用水途径铀所致的健康危害风险度均未超过国际辐射防护委员会(ICRP)推荐的最大可接受限值和瑞典环境保护署、荷兰建设和环境署推荐值,表明在研究区饮用水(地表水和地下水)中检测出的铀可能不会对人体健康产生风险。

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地址: Liu Yuanyuan, College of Environmental Science and Engineering, Chang'an University;;School of Water Resource and Environmental Engineering, East China University of Technology;;Chang'an University, ;;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Nanchang;;Xi'an, ;;;710054;;330013;;710054.

Gao Bai, School of Water Resource and Environmental Engineering, East China University of Technology, Nanchang, Jiangxi 330013, China.

Zeng Hua, School of Water Resource and Environmental Engineering, East China University of Technology, Nanchang, Jiangxi 330013, China.

Zhou Weibo, College of Environmental Science and Engineering, Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

地址: 刘媛媛, 长安大学环境科学与工程学院;;东华理工大学水资源与环境工程学院;;长安大学, ;;;旱区地下水文与生态效应教育部重点实验室, 西安;;南昌;;西安, ;;;

710054;;330013;;710054.

高柏, 东华理工大学水资源与环境工程学院, 南昌, 江西 330013, 中国.

曾华, 东华理工大学水资源与环境工程学院, 南昌, 江西 330013, 中国.

周维博, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

电子邮件地址: zwbzyz823@163.com

电子邮件地址: zwbzyz823@163.com

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作者: Zhu Yaqi; Wang Shan; Liu Yong; Chen Yinglong; Kariman Khalil; Liang Jinming; Wen Yuanming; Zhou Dingzhi; Chen Zhanhao; Zhang Mu; Yi Xiu

作者: 朱雅琪; 王珊; 柳勇; 陈应龙; Kariman Khalil; 梁金明; 温元明; 周定志; 陈展豪; 张木; 易秀

标题: Effect of Decomposition Agent Dosage, Moisture Content, and Initial C/N Ratio on Decomposition of Rice Straw

标题: 腐秆剂用量、含水量及初始碳氮比对水稻秸秆腐解性能的影响初探

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作者关键词: decomposition agent dosage; moisture content; initial C/N ratio; rice straw; decomposition

作者关键词: 腐秆剂用量; 含水量; 初始 C/N 比; 水稻秸秆; 腐解

摘要: In the present study, the effect of different Jinkuizi decomposition agent dosages (Factor A: A₀, A_(0.5), and A_(1.0); %), moisture contents (Factor B: B₍₅₀₎, B₍₆₀₎, and B₍₇₀₎; %), and initial C/N ratios (Factor C: C₍₂₀₎, C₍₂₂₎, and C₍₂₅₎) on rice straw decomposition was investigated using an orthogonal test design, in order to find out the best initial conditions for decomposing straw and provide a scientific basis for decomposed straw returning to the fields. Decomposition indicators such as pH, germination index (GI), C/N ratio, decomposing ratio (DR), dissolved organic carbon (DOC), and ultraviolet spectral parameters (SUVA₍₂₈₀₎, E_{2/E3}, and A₍₂₂₆₋₄₀₀₎) were analyzed. Results showed that during the decomposition period, the GI and

DR values for all treatments gradually increased as the decomposition progressed. The C/N ratios for the A_0B_(70)C_(25) and A_(0.5)B_(70)C_(22) treatments continuously decreased, while those for the other treatments first increased and then decreased. The DOC contents for the A_0B_(50)C_(20) and A_(1.0)B_(70)C_(20) treatments first increased and then decreased, while there was an increasing trend for the other treatments. The variation of aromatic structure and humification degree of dissolved organic matter was well linked to the variations of ultraviolet spectral parameters obtained from the rice straw compost. At the end of the decomposition period, the pH, GI, and DR values (7.05, 34.9%, and 30.7%, respectively) declined dramatically, whereas the C/N ratio (25.7) was very high in the incompletely decomposed A_0B_(50)C_(20) treatment. For all the employed treatments (except A_0B_(50)C_(20)), the pH values were found in accordance with the required standard of compost maturity (8.00-9.00), while the higher GI values indicated low toxicity ($\geq 50\%$) or fully decomposed state ($\geq 80\%$). The C/N ratios for the A_0B_(70)C_(25), A_(0.5)B_(70)C_(22), and A_(1.0)B_(60)C_(25) (13.1, 14.4, and 16.4, respectively) treatments were consistent with the best-fit value (15.0), and the highest DR value (47.1%) was found in the A_(0.5)B_(70)C_(22) treatment. The GI value could be inferred from ultraviolet spectral parameter detection, which provided an alternative evaluation method for determining whether the rice straw compost was fully decomposed. Under such controlled experimental conditions, the optimal initial requirements for rice straw decomposition were determined to be a decomposition agent dosage of 0.5%, moisture content of 70%, and initial C/N ratio of 25. Further analysis showed that the decomposition agent dosage had the greatest influence on the DOC content; the moisture content had the greatest influences on the C/N ratio, DR, SUVA_(280), E_2/E_3, and A_(226-400) values; and the initial C/N ratio had the greatest influences on the pH and GI values.

摘要: 为了探明秸秆腐解的最佳初始条件,为腐熟秸秆还田提供科学依据,以水稻秸秆为腐解对象,设置不同的金葵子腐剂用量(因素 A:A_0、A_(0.5)、A_(1.0);%)、含水量(因素 B:B_(50)、B_(60)、B_(70);%)及初始碳氮(C/N)比(因素 C:C_(20)、C_(22)、C_(25))等初始条件,进行正交试验,研究水稻秸秆腐解过程中 pH、种子发芽指数(GI)、C/N 比、腐解率(DR)、水溶性有机碳(DOC)及紫外光谱参数(SUVA_(280)、E_2/E_3 和 A_(226-400))等指标的动态变化,以确定这些初始条件对水稻秸秆腐解性能的影响。结果表明,(1)在腐解过程中,所有处理 GI 和 DR 值均随着腐解的进行逐渐升高;A_0B_(70)C_(25)和 A_(0.5)B_(70)C_(22)处理 C/N 比持续下降,其他处理先升高后下降;A_0B_(50)C_(20)和 A_(1.0)B_(70)C_(20)处理 DOC 含量先升高后下降,其他处理持续升高,紫外光谱参数的变化反映了水溶性有机物芳香性结构和腐殖化程度变化情况。(2)腐解结束时,未腐熟完全的 A_0B_(50)C_(20)处理 pH、GI 和 DR 值(分别为 7.05、34.9%和 30.7%)明显较低,其 C/N 比(25.7)则明显较高,而大多数处理 pH 值符合腐熟堆肥标准(8.00-9.00),GI 值符合毒性较低($\geq 50\%$)或完全腐熟状态($\geq 80\%$);A_0B_(70)C_(25)、A_(0.5)B_(70)C_(22)和 A_(1.0)B_(60)C_(25)处理 C/N 比(分别为 13.1、14.4、16.4)基本符合腐解产物最佳 C/N 比标准(15.0);A_(0.5)B_(70)C_(22)处理 DR 值(47.1%)最高。通过紫外光谱参数测定来预测 GI 值大小,为判断秸秆是否腐熟完全提供了一种替代性评价方法。直观分析法表明,水稻秸秆腐解最佳初始条件为金葵子腐剂 0.5%、含水量 70%、初始 C/N 比 25;腐剂用量对 DOC 含量影响最大,含水量对 C/N 比、DR、SUVA_(280)、E_2/E_3 和 A_(226-400)值影响最大,初始 C/N 比对 pH 和 GI 值影响最大。

入藏号: CSCD:6478062

地址: Kariman Khalil, 西澳大学农业与环境学院/澳大利亚西澳大学农业研究院, 珀斯, 西澳大利亚 6009.

Zhu Yaqi, School of Environmental Science and Engineering, Chang'an University;;Key Laboratory of Plant Nutrition and Fertilizer in South Region, Ministry of Agriculture/Guangdong Key Laboratory of Nutrient Cycling and Farmland Conservation;;Guangdong Institute of Eco-Environmental Science & Technology, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education;;Key Laboratory of Plant Nutrition and Fertilizer in South Region, Ministry of Agriculture;;Guangdong Key Laboratory of Nutrient Cycling and Farmland Conservation;;Guangdong Key Laboratory of Integrated Agro-Environmental Pollution Control and Management, Xi'an;;Guangzhou;;Guangzhou, ;;; 710054;;510640;;510650.

Wang Shan, Key Laboratory of Plant Nutrition and Fertilizer in South Region, Ministry of Agriculture/Guangdong Key Laboratory of Nutrient Cycling and Farmland Conservation;;Guangdong Institute of Eco-Environmental Science & Technology, Key Laboratory of Plant Nutrition and Fertilizer in South Region, Ministry of Agriculture;;Guangdong Key Laboratory of Nutrient Cycling and Farmland Conservation;;Guangdong Key Laboratory of Integrated Agro-Environmental Pollution Control and Management, Guangzhou;;Guangzhou, ; 510640;;510650.

Liu Yong, Key Laboratory of Plant Nutrition and Fertilizer in South Region, Ministry of Agriculture/Guangdong Key Laboratory of Nutrient Cycling and Farmland Conservation;;Guangdong Institute of Eco-Environmental Science & Technology, Key Laboratory of Plant Nutrition and Fertilizer in South Region, Ministry of Agriculture;;Guangdong Key Laboratory of Nutrient Cycling and Farmland Conservation;;Guangdong Key Laboratory of Integrated Agro-Environmental Pollution Control and Management, Guangzhou;;Guangzhou, ; 510640;;510650.

Chen Yinglong, The UWA Institute of Agriculture/UWA School of Agriculture and Environment, The University of Western Australia, Perth, Western Australia 6009, Australia.

Kariman Khalil, The UWA Institute of Agriculture/UWA School of Agriculture and Environment, The University of Western Australia, Perth, Western Australia 6009, Australia.

Liang Jinming, Zhongshan Agricultural Science and Technology Extension Center, Zhongshan, Guangdong 528400, China.

Wen Yuanming, Zhongshan Agricultural Science and Technology Extension Center, Zhongshan, Guangdong 528400, China.

Zhou Dingzhi, Shaxi Agricultural Service Center of Zhongshan City, Zhongshan, Guangdong 528471, China.

Chen Zhanhao, Shaxi Agricultural Service Center of Zhongshan City, Zhongshan, Guangdong 528471, China.

Zhang Mu, Key Laboratory of Plant Nutrition and Fertilizer in South Region, Ministry of Agriculture/Guangdong Key Laboratory of Nutrient Cycling and Farmland Conservation, Key Laboratory of Plant Nutrition and Fertilizer in South Region, Ministry of Agriculture;;Guangdong Key Laboratory of Nutrient Cycling and Farmland Conservation, Guangzhou, Guangdong 510640, China.

Yi Xiu, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710054, China.

地址: 朱雅琪, 长安大学环境科学与工程学院;;广东省养分资源循环利用与耕地保育重点实

实验室;;农业部南方植物营养与肥料重点实验室;;广东省生态环境技术研究所,旱区地下水文与生态效应教育部重点实验室;;广东省养分资源循环利用与耕地保育重点实验室;;农业部南方植物营养与肥料重点实验室;;广东省农业环境综合治理重点实验室,西安;;广州;;广州,陕西;;广东;;广东 710054;;510640;;510650, 中国.

王珊,广东省养分资源循环利用与耕地保育重点实验室;;农业部南方植物营养与肥料重点实验室;;广东省生态环境技术研究所,广东省养分资源循环利用与耕地保育重点实验室;;农业部南方植物营养与肥料重点实验室;;广东省农业环境综合治理重点实验室,广州;;广州,广东;;广东 510640;;510650, 中国.

柳勇,广东省养分资源循环利用与耕地保育重点实验室;;农业部南方植物营养与肥料重点实验室;;广东省生态环境技术研究所,广东省养分资源循环利用与耕地保育重点实验室;;农业部南方植物营养与肥料重点实验室;;广东省农业环境综合治理重点实验室,广州;;广州,广东;;广东 510640;;510650, 中国.

陈应龙,西澳大学农业与环境学院/澳大利亚西澳大学农业研究院,珀斯,西澳大利亚 6009.

梁金明,中山市农业科技推广中心,中山,广东 528400, 中国.

温元明,中山市农业科技推广中心,中山,广东 528400, 中国.

周定志,中山市沙溪镇农业服务中心,中山,广东 528471, 中国.

陈展豪,中山市沙溪镇农业服务中心,中山,广东 528471, 中国.

张木,广东省养分资源循环利用与耕地保育重点实验室;;农业部南方植物营养与肥料重点实验室,广东省养分资源循环利用与耕地保育重点实验室;;农业部南方植物营养与肥料重点实验室,广州,广东 510640, 中国.

易秀,长安大学环境科学与工程学院,旱区地下水文与生态效应教育部重点实验室,西安,陕西 710054, 中国.

电子邮件地址: 244332534@qq.com; yongliu@soil.gd.cn; yixiu@chd.edu.cn

电子邮件地址: 244332534@qq.com; yongliu@soil.gd.cn; yixiu@chd.edu.cn

作者识别号:

作者 Web of Science ResearcherIDORCID 号

Chen, Yinglong D-2104-2011 0000-0003-0798-8683

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作者: Zhang Yaoyao; Ai Chaoqian; Du Yifan; Ma Xuedong; Wang Wei

作者: 张瑶瑶; 艾超前; 杜毅帆; 马雪冬; 王伟

标题: Study on Activation-Modification of Silicon Carbide Porous Ceramics and Its Adsorption of

Pb(II)

标题: 碳化硅多孔陶瓷表面活化改性及其吸附 Pb(II)的研究

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作者关键词: Pb~(2+); SiC porous ceramics; Silane coupling agent; Surface modification; Pb~(2+); Adsorption

作者关键词: 碳化硅多孔陶瓷; 硅烷偶联剂; 表面改性; 吸附

摘要: Silicon carbide porous ceramic was activated and then was modified by gamma-aminopropyltriethoxysilane (KH550) to prepare a porous ceramic adsorbent with the capable of effectively adsorbing Pb(II) in the solution. Scanning electron microscopy(SEM) and fourier transform infrared spectroscopy (FTIR) were adopted to characterize and analyze the unmodified and modified SiC porous ceramics. The FTIR results indicated that the silane coupling agent KH550 was successfully grafted onto the surface of the SiC porous ceramic. The variation of Pb(II) concentration before and after adsorption was measured by atomic absorption spectrophotometer in the solution. The effects of pH value, dosage of adsorbent, reaction temperature, reaction time, and initial concentration of Pb~(2+) were investigated on the performance of the adsorbent. The optimum conditions were obtained, as follow: initial concentration of Pb~(2+) 10 mg/L, reaction time of 180 min, pH=5, and the adsorption rate reaches 92%.

摘要: 碳化硅多孔陶瓷经过活化,然后采用 gamma-氨丙基三乙氧基硅烷(KH550)对碳化硅多孔陶瓷进行表面改性处理,制备出能够有效吸附溶液中 Pb(II)的多孔陶瓷材料。通过扫描电镜(SEM)和红外光谱(FTIR)对材料的微观结构进行了分析表征,FTIR 结果表明硅烷偶联剂 KH550 成功的接枝到了碳化硅多孔陶瓷的表面。采用原子吸收分光光度计测定了吸附前后溶液中 Pb(II)浓度的变化,考察了 pH 值、吸附剂投加量、反应温度、反应时间以及 Pb~(2+) 初始浓度等对吸附剂性能的影响。研究表明,在初始浓度 10 mg/L、反应时间 180 min、pH=5 时吸附效率最佳,吸附率达到 92%。

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地址: Zhang Yaoyao, Department of Chemical Engineering,College of Environment Science and Engineering,Chang'an University, Key Laboratory of Underground Hydrology and Ecological Effects in Arid Region, Xi'an, Shaanxi 710054, China.

Ai Chaoqian, Department of Chemical Engineering,College of Environment Science and Engineering,Chang'an University, Key Laboratory of Underground Hydrology and Ecological Effects in Arid Region, Xi'an, Shaanxi 710054, China.

Du Yifan, Department of Chemical Engineering,College of Environment Science and Engineering,Chang'an University, Key Laboratory of Underground Hydrology and Ecological Effects in Arid Region, Xi'an, Shaanxi 710054, China.

Ma Xuedong, Department of Chemical Engineering,College of Environment Science and Engineering,Chang'an University, Key Laboratory of Underground Hydrology and Ecological Effects in Arid Region, Xi'an, Shaanxi 710054, China.

Wang Wei, Department of Chemical Engineering,College of Environment Science and

Engineering, Chang'an University, Key Laboratory of Underground Hydrology and Ecological Effects in Arid Region, Xi'an, Shaanxi 710054, China.

地址: 张瑶瑶, 长安大学环境科学与工程学院化工系, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

艾超前, 长安大学环境科学与工程学院化工系, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

杜毅帆, 长安大学环境科学与工程学院化工系, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

马雪冬, 长安大学环境科学与工程学院化工系, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

王伟, 长安大学环境科学与工程学院化工系, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

电子邮件地址: wwchem@chd.edu.cn

电子邮件地址: wwchem@chd.edu.cn

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作者: Zuo You; Ma Ruixue; Yu Ziling; Lin Bigui; Yu Yunjiang; Liu Shan

作者: 左优; 马瑞雪; 于紫玲; 林必桂; 于云江; 刘珊

标题: Enantiomeric separation and thermodynamic investigation of three nonsteroidal anti-inflammatory drugs (NSAIDs) by reverse-phase high-performance liquid chromatography

标题: 反相高效液相色谱法拆分三种非甾体抗炎药物对映体

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作者关键词: Reverse-phase high-performance liquid chromatography; Chiral separation; Nonsteroidal anti-inflammatory drugs; Enantiomer

作者关键词: 反相高效液相色谱; 手性拆分; 非甾体抗炎药物; 对映体

摘要: The enantiomers of three nonsteroidal anti-inflammatory drugs (NSAIDs) (ibuprofen, flurbiprofen, naproxen) were separated by reverse-phase high-performance liquid chromatography

on a chiral column with amylose-tris-(3, 5-dimethylphenylcarbamate) (ADMPC) as chiral stationary phase. The effects of different mobile phase compositions, column temperatures as well as flow rates on the retention and resolution were investigated with optimal conditions as follows: mobile phase consisting of acetonitrile-water (pH 4, formic acid adjusted) 45:55 (V/V), flow rate of 0.6 mL/min and column temperature of 15°C. The results showed the polarity of mobile phase would play a key role in the enantioseparation and lower column temperature was more helpful for the separation of enantiomers. This method expands the application of reversed-phase chromatography in the separation of enantiomers of chiral drugs.

摘要: 采用淀粉-三(3,5-二甲基苯基氨基甲酸酯)(ADMPC)手性固定相,在反相液相色谱下研究了三种非甾体抗炎药物-布洛芬(IBU)、萘普生(NAP)和氟比洛芬(FLB)对映体的拆分特性。研究了不同流动相比例,柱温及流速对手性分离的影响,并通过热力学参数探讨了拆分机理。结果表明:优化的色谱条件以乙腈-水(pH 4)= 45/55(V/V)作为流动相,流速为 0.6 mL/min,柱温 15°C,3 种药物对映体均可得到快速分离。较低的柱温有利于对映体分离,且流动相的极性对分离效果起到关键作用。该方法进一步拓展了反相色谱在手性药物对映体分离上的应用。

入藏号: CSCD:6473809

地址: Zuo You, School of Environmental Science and Engineering, Chang'an University;; South China Institute of Environmental Sciences, Ministry of Environmental Protection, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education;; State Environmental Protection Key Laboratory of Environmental Pollution Health Risk Assessment, Xi'an;; Guangzhou, ;; 710064;; 510655.

Ma Ruixue, South China Institute of Environmental Sciences, Ministry of Environmental Protection, State Environmental Protection Key Laboratory of Environmental Pollution Health Risk Assessment, Guangzhou, Guangdong 510655, China.

Yu Ziling, South China Institute of Environmental Sciences, Ministry of Environmental Protection, State Environmental Protection Key Laboratory of Environmental Pollution Health Risk Assessment, Guangzhou, Guangdong 510655, China.

Lin Bigui, South China Institute of Environmental Sciences, Ministry of Environmental Protection, State Environmental Protection Key Laboratory of Environmental Pollution Health Risk Assessment, Guangzhou, Guangdong 510655, China.

Yu Yunjiang, South China Institute of Environmental Sciences, Ministry of Environmental Protection, State Environmental Protection Key Laboratory of Environmental Pollution Health Risk Assessment, Guangzhou, Guangdong 510655, China.

Liu Shan, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 左优, 长安大学环境科学与工程学院;; 环境保护部华南环境科学研究所, 旱区地下水文与生态效应教育部重点实验室;; 国家环境保护环境污染健康风险评估重点实验室, 西安;; 广州, ;; 710064;; 510655.

马瑞雪, 环境保护部华南环境科学研究所, 国家环境保护环境污染健康风险评估重点实验室, 广州, 广东 510655, 中国.

于紫玲, 环境保护部华南环境科学研究所, 国家环境保护环境污染健康风险评估重点实验室, 广州, 广东 510655, 中国.

林必桂, 环境保护部华南环境科学研究所, 国家环境保护环境污染健康风险评估重点实验室, 广州, 广东 510655, 中国.

于云江, 环境保护部华南环境科学研究所, 国家环境保护环境污染健康风险评价重点实验室, 广州, 广东 510655, 中国.

刘珊, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: maruixue@scies.org

电子邮件地址: maruixue@scies.org

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Ma Xiongde; Huang Jinting; Li Jixiang; Ning Shixiong

作者: 马雄德; 黄金廷; 李吉祥; 宁世雄

标题: Groundwater level threshold under the constrain of ecology security in mining area

标题: 面向生态的矿区地下水位阈限研究

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作者关键词: Yushen coal mine area; ecology orientated; maximum capillary height; groundwater level threshold; waterpreserved coal mining

作者关键词: 榆神矿区; 面向生态; 最大毛细高度; 水位阈值; 保水采煤

摘要: Vegetation distributed in arid and semi-arid regions, due to insufficient precipitation to maintain long-term survival, requires groundwater to provide part or all of its water demand, and thus is phreatophyte. When the underground mining destroys the aquifer, the groundwater level will drop significantly, which will cause water stress to phreatophyte, and control the ecosystem evolution process. In this paper, the authors investigated the basic characteristics of groundwater level change caused by coal seam mining in Yushen mining area, and proposed a method to determine groundwater level threshold under ecological constraints in mining area. As long as the roots are in contact with the groundwater capillary rise zone, the groundwater can be utilized by plants. Therefore, the sum of the maximum capillary rise height and the root length is regarded as the maximum critical depth of the groundwater. Under the guidance of capillary flow theory, the formula to calculate maximum capillary rise height is established by the relationship between particle arrangement and pore diameter, and the method of determining the maximum capillary rise

height by particle gradation curve is given. According to the calculation, the maximum capillary rise height of the Mu Us aeolian sand is 0.7-2.0 m and the lower limit of the water level under the ecological constraints in the mine area is 4.0 m. Based on the groundwater flow field in 2016, the Yushen mining area is divided into ecologically restricted areas and unconstrained areas with a water depth of 4.0 m. Vegetation with a water depth of less than 4.0 m is highly dependent on groundwater and belongs to the ecological confinement zone. The decline of groundwater level caused by coal seam mining is very likely to cause water stress on vegetation, which is the focus of ecological environment protection in mining areas. This illuminates the limitations of ecology and water level on coal mining in Yushen mining area, which lays a theoretical foundation for further promoting water-preserved coal mining technology.

摘要: 分布在干旱半干旱地区的植被,由于降水不足以维持其长期生存,需要地下水提供部分或全部水源,因而对地下水有一定的依赖性。煤层开采破坏含水层后地下水位会大幅降落,这在一定程度上会给依赖地下水植被造成水分胁迫,进而控制生态系统演化过程。针对榆神矿区煤层开采引起地下水位变化的基本特征,提出了生态安全约束下矿区地下水位控制阈值的确定方法。研究表明,植物根系与地下水毛细上升带保持接触时,植物就可以吸收利用地下水,因此本文将最大毛细上升高度与根系长度之和作为植被利用地下水的最大临界埋深。在毛管流理论指导下,以颗粒排列方式与孔隙直径大小的关系建立了最大毛细上升高度计算公式,并给出了通过颗粒级配曲线确定最大毛细上升高度的方法。据此计算的毛乌素风积沙最大毛细上升高度的取值区间为 0.7~2.0 m,进一步确定了榆神矿区生态安全约束下的矿区水位控制下限为 4.0 m。在此基础上,以 2016 年地下水流场基准,以水位埋深 4.0 m 为界将榆神矿区划分为生态约束区和无约束区。水位埋深小于 4.0 m 的区域植被对地下水依赖程度高,属于生态约束区,煤层开采造成地下水位下降极易使植被遭受水分胁迫,因而是矿区生态环境保护的重点。研究成果阐明了榆神矿区生态环境及地下水位对煤层开发的限制条件,为进一步推进保水采煤技术的发展奠定了理论基础。

入藏号: CSCD:6473221

地址: Ma Xiongde, College of Environmental Science and Engineering, Changan University, ; Changan University, ; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an, ; Xi'an, ; 710054; 710054.

Huang Jinting, Xian Center of Geological Survey, CGS, Xi'an, Shaanxi 710054, China.

Li Jixiang, College of Geology and Environment, Xian University of Science and Technology, Xi'an, Shaanxi 710054, China.

Ning Shixiong, College of Geology and Environment, Xian University of Science and Technology, Xi'an, Shaanxi 710054, China.

地址: 马雄德, 长安大学环境科学与工程学院; 长安大学, ; 旱区地下水文与生态效应教育部重点实验室, 西安; 西安, 陕西; 陕西 710054; 710054, 中国.

黄金廷, 中国地质调查局西安地质调查中心, 西安, 陕西 710054, 中国.

李吉祥, 西安科技大学地质与环境学院, 西安, 陕西 710054, 中国.

宁世雄, 西安科技大学地质与环境学院, 西安, 陕西 710054, 中国.

电子邮件地址: hgmxd@chd.edu.com; 59280431@qq.com

电子邮件地址: hgmxd@chd.edu.com; 59280431@qq.com

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作者: Jiang Cuiting; Liu Shan; Zhang Yue; Sun Zhaohui; Tian Xincheng; Li Tao

作者: 蒋翠婷; 刘珊; 张悦; 孙朝辉; 田薪成; 李涛

标题: Enhanced adsorption of the Cu~(2+) by chemically modified aluminum sludge

标题: 化学改性铝污泥强化 Cu~(2+)的吸附

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作者关键词: 铝污泥; 资源化; 壳聚糖; 铁(氢)氧化物; 二价铜; 吸附

摘要: The composite adsorbent AIS-Fe-CS was obtained from the aluminum sludge(AIS) of the water purification plant, which was successively immersed in iron salt solution and coated with chitosan(CS), and the adsorption characteristics of Cu~(2+) were studied. The results showed that the iron(hydr) oxide and CS were successfully compounded on the AIS after the chemical modification; The optimum adsorption pH was 5.5, the adsorption equilibrium time was 20 h, the maximum adsorption capacity of modified AIS-Fe-CS for Cu~(2+) removal in the experimental concentration range was 72.36 mg /g, which was twice higher than pure AIS, and increasing temperature was conducive to the adsorption; the adsorption process conformed to the pseudo-second-order kinetics model and the Freundlich adsorption isotherm model.

摘要: 以净水厂铝污泥(AIS)为主要原料,依次经过铁盐浸渍和壳聚糖(CS)包覆,制得复合吸附剂 AIS-Fe-CS,研究其对 Cu~(2+)的吸附。结果表明,化学改性后,铁(氢)氧化物和 CS 复合在铝污泥上;最优吸附 pH 为 5.5,吸附平衡时间为 20 h,对 Cu~(2+)的最大吸附量为 72.36 mg/g,相比纯 AIS 性能提高了约 1 倍,且温度升高有利于吸附反应的进行;吸附过程符合拟二级动力学和 Freundlich 吸附等温线。

入藏号: CSCD:6470732

地址: Jiang Cuiting, School of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Liu Shan, School of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Zhang Yue, School of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of

Ministry of Education, Xi'an;Xi'an, ;; 710054;;710054.

Sun Zhaohui, School of Environmental Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;Xi'an, ;; 710054;;710054.

Tian Xincheng, School of Environmental Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;Xi'an, ;; 710054;;710054.

Li Tao, School of Environmental Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;Xi'an, ;; 710054;;710054.

地址: 蒋翠婷, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

刘珊, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

张悦, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

孙朝辉, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

田薪成, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

李涛, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: jct1205@163.com; 534148120@qq.com

电子邮件地址: jct1205@163.com; 534148120@qq.com

使用次数 (最近 180 天): 0

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作者: Wang Xueping; Chen Aixia; Chen Bei; Meng Jianhao; Hu Weixing

作者: 王雪平; 陈爱侠; 陈贝; 孟建昊; 胡卫星

标题: Competitive adsorption of phenol and bisphenol A on sediment by site energy distribution theory

标题: 基于位点能量分布理论对苯酚和双酚 A 在沉积物中的竞争吸附研究

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作者关键词: competitive adsorption; site energy distribution; phenol; bisphenol A; sediments

作者关键词: 竞争吸附; 位点能量分布; 苯酚; 双酚 A; 沉积物

摘要: Phenolic EDCs have been driving extensive research interests due to their prevalence and persistence in water and sediments. In this study, the static adsorption experiments, which contained single or dual species of phenol and bisphenol A (BPA) in the system, were carried out to characterize the isotherms of adsorption of the two pollutants on the surface sediments in Ba River. The theory of site energy distribution was employed to interpret the experimental data, so as to understand the mechanisms underlying the competitive adsorption of the two contaminants. In the system that contained the same concentration ($1 \sim 50 \text{ mg} \cdot \text{L}^{-1}$) of single contaminant, the adsorption sites of phenol were mainly in the high energy level, whereas the adsorption sites of bisphenol A were mainly in the low energy region. Compared to phenol, BPA had priority during the process of adsorption on sediments. In the system containing the same concentration ($1 \sim 50 \text{ mg} \cdot \text{L}^{-1}$) of dual contaminants, exponential decrease was found for the distribution functions of both substances with the increasing site energy. The decline trend of phenol was more moderate, and the distribution of adsorption sites was more homogeneous. When compared to the single-contaminant system, the average site energy and site energy heterogeneity of phenol in the dual-contaminant system decreased by 0.867% and 3.473%, respectively, and the number of adsorption sites decreased by 1.230%. When compared to the single-contaminant system, the average site energy and site energy heterogeneity of BPA increased by 6.074% and 14.992%, and the number of adsorption sites increased by 6.389%. The results suggest that there is competition between phenol and BPA during the process of adsorption on the sediments, and the bisphenol A was in an advantage position.

摘要: 河流水体和沉积物中酚类 EDCs 因其广泛存在和危害持久受到广泛关注, 为研究自然条件下河流沉积物上多种酚类 EDCs 共存的吸附行为, 本文以苯酚(phenol)和双酚 A(bisphenol A, BPA)为目标污染物, 灞河表层沉积物为吸附剂, 通过静态吸附实验研究二者在单溶质和双溶质体系下的吸附等温特性, 在此基础上, 采用位点能量分布理论分析污染物之间的竞争吸附机理. 结果表明, 相同浓度($1 \sim 50 \text{ mg} \cdot \text{L}^{-1}$)条件下, 单溶质体系的苯酚吸附位点主要集中于高能量位; 双酚 A 吸附位点主要分布于低能量区. 双溶质体系下, 相同浓度的两种物质位点分布函数均随着位点能量的增大而呈指数降低, 苯酚下降趋势较为平缓, 吸附位点分布更均匀. 两种体系相比较, 双溶质体系下苯酚平均位点能量和位点能量非均质性分别降低 0.867% 和 3.473%, 吸附位点数量降低 1.230%; 双酚 A 平均位点能量和位点能量非均质分别增大了 6.074% 和 14.992%, 吸附位点数量增大 6.389%. 即双溶质体系下, 二者之间存在一定的竞争吸附, 双酚 A 处于竞争优势.

入藏号: CSCD:6466916

地址: Wang Xueping, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Chen Aixia, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of

Education, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Meng Jianhao, School of Environmental Science and Engineering,Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Hu Weixing, School of Environmental Science and Engineering,Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Chen Bei, Haiwei Environmental Technology Company,Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 王雪平, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

陈爱侠, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

孟建昊, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

胡卫星, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

陈贝, 长安大学海威环境技术公司, 西安, 陕西 710054, 中国.

电子邮件地址: wxp1167@163.com; 489520939@qq.com

电子邮件地址: wxp1167@163.com; 489520939@qq.com

使用次数 (最近 180 天): 0

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作者: Ma Lianjing; Zhao Baofeng

作者: 马莲净; 赵宝峰

标题: Calculation method of borehole specific capacity based on dewatering tests of roof aquifer

标题: 顶板含水层放水试验的钻孔单位涌水量计算方法

来源出版物: 中国安全生产科学技术 卷: 15 期: 3 页: 49-54 出版年: 2019

文献号: 1673-193X(2019)15:3<49:DBHSCF>2.0.TX;2-H

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文献号: 1673-193X(2019)15:3<49:DBHSCF>2.0.TX;2-H

语言: Chinese

文献类型: Article

作者关键词: dewatering test; specific capacity; drawdown; analytical method; graphical method

作者关键词: 放水试验; 单位涌水量; 水位降深; 解析法; 图解法

摘要: In order to obtain the borehole specific capacity of roof aquifer by using the underground water dewatering tests, combined with the drawdown of observation borehole, a calculation method for the drawdown of dewatering borehole was presented by using the groundwater dynamic calculation formula in the pumping tests. A graphical method for the drawdown of dewatering borehole was put forward by using the logarithmic curve chart of the drawdown of observation borehole and the distance between observation borehole and dewatering borehole. For the confined aquifer, the borehole specific capacity was obtained through the permeability coefficient of aquifer based on the linear correlation between the borehole specific capacity and the permeability coefficient of aquifer. Through a case study, the specific capacity of dewatering borehole obtained by the analytical method was close to that by the graphical method, then the reliability of specific capacity of dewatering borehole was analyzed by combining with the situation of on-site dewatering tests, and the application conditions of three methods were discussed. The results showed that the specific capacity of dewatering borehole obtained by the dewatering tests was in line with the actual situation, which can be used as the basis for the water-abundance evaluation of aquifer and analysis of mine hydrogeological conditions.

摘要: 为了实现利用井下放水试验获取顶板含水层的钻孔单位涌水量,采用抽水试验中的地下水动力学计算公式,结合观测孔的水位降深,给出了放水孔水位降深的计算方法;利用观测孔水位降深和观测孔与放水孔之间距离的对数曲线图,提出了放水孔水位降深的图解法;对于承压含水层,基于钻孔单位涌水量与含水层渗透系数之间的线性相关关系,可以通过含水层的渗透系数获取钻孔单位涌水量;通过实例分析,解析法和图解法计算得到的放水孔单位涌水量相近,结合现场放水试验情况,分析了放水孔单位涌水量的可靠性,并对3种方法的适用条件进行了讨论。研究结果表明:利用放水试验获取的放水孔单位涌水量符合实际情况,可以作为含水层富水性评价和矿井水文地质条件分析的依据。

入藏号: CSCD:6466645

地址: Ma Lianjing, School of Environmental Science and Engineering, Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Zhao Baofeng, Xi'an Research Institute of China Coal Technology & Engineering Group, Xi'an, Shaanxi 710054, China.

地址: 马莲净, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

赵宝峰, 中煤科工集团西安研究院有限公司, 西安, 陕西 710054, 中国.

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作者: Qu Wengang; Xu Panpan; Qian Hui

作者: 屈文岗; 徐盼盼; 钱会

标题: Analysis of Precipitation Characteristics and Forecast of Annual Precipitation in Huashan Region

标题: 华山地区降水特征分析与年降水量预测

来源出版物: 水土保持研究 卷: 26 期: 3 页: 128-134 出版年: 2019

文献号: 1005-3409(2019)26:3<128:HSDQJS>2.0.TX;2-K

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语言: Chinese

文献类型: Article

作者关键词: precipitation characteristics analysis; forecast; moving average Markov prediction model; cloud model; Huashan region

作者关键词: 降水特征分析; 预测; 滑动马尔可夫预测模型; 云模型; 华山地区

摘要: The precipitation data from 1953 to 2013 in Huashan station were used in this paper, and the Mann-Kendall test method, ordered clustering method, cloud model and the moving average Markov prediction model were used to analyze and predict the precipitation characteristics of Huashan region. The results showed that monthly precipitation distribution was extremely uneven, mainly concentrated in July, August and September in Huashan region. The precipitation in winter and spring was small, the distribution was uniform, and the stability was high, but in summer and autumn, the precipitation was more, the distribution was uneven, and the stability was low. The changes of precipitation in summer and autumn directly lead to the uneven distribution of annual precipitation. The annual precipitation and the 3-year moving average annual precipitation showed the decreasing trend, and they all passed the 99% significance test. The trend of precipitation over the next 10 years will increase based on the prediction by the moving average Markov prediction model. The mean precipitation in 2014-2023 is 767.32 mm, the linear change rate is 29.3 mm/decade, and the forecast of 2019 is the smallest, 634.3 mm, the forecast of 2023 is the largest, 883.31 mm. This study can provide guidance for the prevention and control of natural disasters such as soil erosion and landslide in Huashan region.

摘要: 该文依据华山地区 1953-2013 年降水资料, 利用 Mann-Kendall 检验方法、有序聚类法、云模型等方法, 结合滑动马尔可夫预测模型分析并预测了华山地区的降水特征。结果表明: 华山地区月降水分布极度不均, 主要集中在 7 月、8 月、9 月。冬春季降水量少, 分布均匀, 稳定性高; 夏秋季节降水量多, 分布不均匀, 稳定性低; 夏秋两季降水量的变化直接导致年降水量的分布不均。年降水量与 3a 滑动平均年降水量均呈递减趋势, 通过了 99% 显著性检验。滑动马尔可夫预测模型预测未来 10 年降水量呈增加趋势, 2014-2023 年预测降水量均值 767.32 mm, 增加幅度为 29.3 mm/10a, 2019 年预测值最小, 为 634.3 mm; 2023 年预测值最大, 为 883.31 mm。该研究可为华山地区水土流失、滑坡等自然灾害防治提供指导性建议。

入藏号: CSCD:6463843

地址: Qu Wengang, School of Environmental Science and Engineering, Chang'an University;; Key

Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Xu Panpan, School of Environmental Science and Engineering, Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Qian Hui, School of Environmental Science and Engineering, Chang'an University;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, ;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

地址: 屈文岗, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

徐盼盼, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

钱会, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

电子邮件地址: wengang_qu@163.com; qianhui@chd.edu.cn

电子邮件地址: wengang_qu@163.com; qianhui@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Du Wei; Ai Chaoqian; Du Yifan; Wang Wei; Zhang Ronglan

作者: 杜炜; 艾超前; 杜毅帆; 王伟; 张荣兰

标题: Preparation and Characterization of Mullite Whiskers from alpha-Si₃N₄ Powders by Molten Salt Synthesis

标题: 熔盐反应氧化 Si₃N₄ 粉制备莫来石晶须的研究

来源出版物: 中国陶瓷 卷: 55 期: 1 页: 10-14 出版年: 2019

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来源出版物: China's Ceramics 卷: 55 期: 1 页: 10-14 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: Whiskers; Molten salt synthesis; Ceramics; Scanning electron microscopy (SEM)

作者关键词: 晶须; 熔盐合成; 陶瓷; 扫描电镜

摘要: Mullite whiskers were prepared through chemical reactions between molten salts ($\text{Al}_2(\text{SO}_4)_3 + \text{Na}_2\text{SO}_4$) and Si_3N_4 powders. The resulting whiskers, as well as the conversion mechanism, have been investigated by Scanning electron microscopy (SEM), High resolution transmission electron microscopy (HRTEM), X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FT-IR), and thermogravimetric analysis (TG-DSC) techniques. SEM studies show that diameter of the mullite whiskers was in the range of 100 ~ 300 nm and their length was several microns. HRTEM studies revealed these whiskers with lattice spacing about 0.27 nm corresponding to the growth direction of [220] crystal plane spacing of mullite. The whiskers growth can be explained by the oxidation-dissolution process, in which both the formation of SO_3 and the etching of SiO_2 play key roles.

摘要: 通过熔盐($\text{Al}_2(\text{SO}_4)_3 + \text{Na}_2\text{SO}_4$)和 Si_3N_4 粉体之间的化学反应合成了莫来石晶须,采用扫描电子显微镜(SEM)、高分辨透射电子显微镜(HRTEM)、X射线粉末衍射(XRD)、傅里叶变换红外光谱(FT-IR)和热重分析(TG-DSC)对合成的莫来石晶须进行了研究.SEM的观测结果表明,莫来石晶须的直径 100 ~ 300 nm,长度可到达几个微米. HRTEM 的研究显示,晶须的晶面间距为 0.27 nm,与莫来石相[220]晶面上的晶面间距正好符合.莫来石晶须的生长可用循环氧化-溶解机理进行解释,在此过程中 SO_3 对 SiO_2 表面层的刻蚀起着至关重要的作用.

入藏号: CSCD:6414506

地址: Du Wei, Chang'an University, College of Environment Science and Engineering, Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an, Shaanxi 710054, China.

Ai Chaoqian, Chang'an University, College of Environment Science and Engineering, Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an, Shaanxi 710054, China.

Du Yifan, Chang'an University, College of Environment Science and Engineering, Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an, Shaanxi 710054, China.

Wang Wei, Chang'an University, College of Environment Science and Engineering, Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an, Shaanxi 710054, China.

Zhang Ronglan, Key Laboratory of Synthetic and Natural Functional Molecule Chemistry of Ministry of Education, Xi'an, Shaanxi 710127, China.

地址: 杜炜, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

艾超前, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

杜毅帆, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

王伟, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

张荣兰, 西北大学, 合成与功能分子化学教育部重点实验室, 西安, 陕西 710127, 中国.

电子邮件地址: wwchem@chd.edu.cn

电子邮件地址: wwchem@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Ding Zhan; Zhao Junkai; Zhang Jing; Yue Xiangjing; Li Peilong

作者: 丁湛; 赵浚凯; 张静; 岳向京; 栗培龙

标题: Preparation of bio-asphalt by synthetic resin from liquefied wood

标题: 液化木屑合成树脂制备生物沥青研究

来源出版物: 化工新型材料 卷: 47 期: 1 页: 239-242 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: liquefaction; synthetic resin; bio-asphalt

作者关键词: 液化; 合成树脂; 生物沥青

摘要: To promote the recycling of waste and development of green road material,liquefied wood was made into the synthetic resin.And then the synthetic resin was added to the road asphalt for the preparation of bio-asphalt. According to the synthetic resin content,preparation temperature,preparation time and developing temperature, orthogonal tests were designed to determine the reasonable ratio of raw material and the technology condition by penetration,ductility,softening point and viscosity.Test results and analysis indicated that the preparation time was the most significant factor on the performance of bio-asphalt.The preparation temperature and development time were second,the influence of synthetic resin content was minimum.When the preparation temperature was 140 °C,the synthetic resin content was 10%,the time was 80 min,the development temperature was 160 °C ,the performance of bioasphalt was relatively best.

摘要: 为促进废物利用及绿色道路材料开发,将木屑液化后进行树脂合成,再将合成的热塑性酚醛树脂加入到路用基质沥青中制备生物沥青。以树脂掺量、制备温度、制备时间、发育温度为影响因素,进行四因素三水平正交试验,考察生物沥青针入度、延度、软化点、黏度的变化。结果表明,制备时间对生物沥青的性能影响最显著;制备温度和发育温度次之;树脂掺量影响最小。当制备温度为 140℃、树脂掺量为 10%(质量分数)、制备时间为 80 min、发育温度为 160℃时,生物沥青各项指标最好。

入藏号: CSCD:6421933

地址: Ding Zhan, School of Environmental Science and Engineering,Chang'an University, Key

Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710054, China.

Zhao Junkai, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710054, China.

Zhang Jing, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710054, China.

Yue Xiangjing, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710054, China.

Li Peilong, Chang'an University, Key Laboratory of Road Structure & Material Ministry of Transport, Xi'an, Shaanxi 710064, China.

地址: 丁湛, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

赵浚凯, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

张静, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

岳向京, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

栗培龙, 长安大学, 道路结构与材料交通行业重点实验室, 西安, 陕西 710064, 中国.

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作者: Xu Bin; Wang Jinfeng; Zhang Yan; Jin Lan; Li Huanhuan; Xiong Yuqing

作者: 徐斌; 王金凤; 张艳; 金岚; 李换换; 熊玉晴

标题: Groundwater dynamic analysis based on hypsometric integral: a case study of Jinghuiqu irrigation district, China

标题: 基于面积-高程积分的地下水动态分析以泾惠渠灌区为例

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作者关键词: hypsometric integral; groundwater; dynamic; analysis; Jinghuiqu irrigation district

作者关键词: 面积-高程积分; 地下水; 动态; 分析; 泾惠渠灌区

摘要: Background, aim, and scope Groundwater is an important water resources and a significant factor in maintaining regional environmental health and ecological balance. The combined effect of human activities and climate change has led to changes in the groundwater environment that inevitably have a corresponding impact on groundwater dependent ecosystems. Therefore, an accurate analysis of the dynamic characteristics of groundwater has important practical significance for making rational strategies of groundwater exploitation, the protection of ecological balance and the sustainable development of society and economy. The hypsometric integral is a quantitative index to study the relationship between the horizontal cross-sectional area and its elevation, which is a kind of the quantitative analysis to reflect the status and erosion trend of the geomorphology. It is widely used in the research of geomorphic evolution, evaluation of lithology and tectonics, hydrological characteristics analysis of drainage basin. From the perspective of spatial data model representation of ground objects, both the shallow groundwater surface and the drainage basin topography surface can be described by digital elevation model and have the same mathematical basis for the hypsometric integral analysis. By analyzing the variation characteristics of groundwater surface, the hypsometric integral analysis provides an applicable method for studying groundwater dynamics. Jinghuiqu irrigation district is an important food and vegetable production base in Shaanxi Province where residents mainly rely on groundwater. In recent years, the groundwater level and storage in the region has been impacted by industrial and agricultural activities.

摘要: 为了研究泾惠渠灌区的地下水动态特征,探讨面积-高程积分在地下水动态分析中的可行性,利用 ArcGIS 空间分析工具计算了灌区地下水面积-高程积分数据,绘制了不同时期的地下水面积-高程积分曲线,分析了灌区地下水水位与储存量动态特征。结果显示:1978 2012 年,泾惠渠灌区地下水面积-高程积分为 0.46、0.44、0.38、0.39,表明地下水水位与储存量整体呈下降趋势;1991 2012 年,410.00 446.19 m 水位区间面积由 1978 年的 2.54 下降为 0.342.51 360.00 m 水位区间面积多年持续增加,中等水位区间存在演化差异性,反映出不同时期地下水开发强度具有空间变异性;以 1978 年为基准,至 2012 年地下水储存量减少约 $7.08 \times 10^8 \text{ m}^3$;降水、地表水引水量、人工开采是影响泾惠渠灌区地下水动态的重要因素,补排失衡是引起灌区地下水储存量下降的主要原因。研究表明:面积-高程积分曲线可以表征地下水水位空间结构特征和储存量的变化情况,利用面积-高程积分值能够近似估算地下水储存量变化量,证明了面积-高程积分在地下水动态研究中具有一定的实用性。

入藏号: CSCD:6441045

地址: Xu Bin, School of Environmental Science and Engineering, Chang'an University;;Research Institute for Water and Developments, Chang'an University;;Chang'an University, ;;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;;Xi'an;;Xi'an, ;;; 710054;;710054;;710054.

Wang Jinfeng, School of Environmental Science and Engineering, Chang'an University;;Research Institute for Water and Developments, Chang'an University;;Chang'an University, ;;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;;Xi'an;;Xi'an, ;;; 710054;;710054;;710054.

Zhang Yan, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054,

China.

Jin Lan, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Huanhuan, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Xiong Yuqing, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 徐斌, 长安大学环境科学与工程学院;;长安大学水与发展研究院;;长安大学, ;;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安;;西安, ;;; 710054;;710054;;710054.

王金凤, 长安大学环境科学与工程学院;;长安大学水与发展研究院;;长安大学, ;;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安;;西安, ;;; 710054;;710054;;710054.

张艳, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

金岚, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李换换, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

熊玉晴, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

电子邮件地址: xubin@chd.edu.cn

电子邮件地址: xubin@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Fu Wanchen; Li Qian; Feng Dongdong; Wang Wei

作者: 符婉琛; 李倩; 冯冬冬; 王伟

标题: Synthesis and Electrochemical Properties of NiO Nanomaterials with Different Morphologies

标题: 不同形貌氧化镍纳米材料的合成及其电化学性能

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作者关键词: solvothermal; NiO nanomaterials; supercapacitors; capacitive performance

作者关键词: 溶剂热; NiO 纳米材料; 超级电容器; 电容性能

摘要: NiO nanosheets have been synthesized via a facile solvothermal route using water-ethylene glycol as solvent and polyvinyl pyrrolidone(PVP) as surfactant. These NiO nanosheets were interweaved with each other to form hierarchical flower-shaped structures. Nanocubes and nanospheres were also obtained through changing the reaction temperature and solvent. The electrochemical tests were conducted using a three-electrode system in 6 mol /L KOH with the as-synthesized NiO as the working electrode. Electrochemical properties were characterized by cyclic voltammetry, galvanostatic charge /discharge measurements, and electrochemical impedance spectroscopy. NiO nanosheets exhibit the highest specific capacitance(402 F /g at current density of 0. 5 A/g) and the best rate capability (80. 1% capacitance retention from 0. 5 A/g to 4 A/g) . NiO nanosheets also show excellent cycle stability,only lost 9. 7% after 1000 cycles.

摘要: 以水-乙二醇为溶剂,以聚乙烯吡咯烷酮(PVP)为表面活性剂,采用溶剂热法合成了 NiO 纳米片,NiO 纳米薄片通过自组装形成花状结构。改变反应温度和溶剂,制备了 NiO 纳米立方体颗粒和 NiO 纳米球形颗粒。用合成的 NiO 纳米材料制备工作电极,在 6 mol/L 的 KOH 溶液中利用三电极体系进行了电化学性能测试。在电化学性能测试中进行了循环伏安测试、恒电流充放电测试和电化学阻抗谱(EIS)测试。结果表明, NiO 纳米片的比电容最高(在电流密度为 0. 5 A/g 时比电容值为 402 F/g),倍率性能最佳(0. 5 A/g 增加至 4 A/g 时有 80. 1%的电容保持率)。在电流密度为 4 A/g 时对 NiO 纳米片进行 1000 次恒流充放电循环测试,比电容损失了 9. 7%。

入藏号: CSCD:6413226

地址: Fu Wanchen, Department of Chemical Engineering,College of Environment Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region,Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Li Qian, Department of Chemical Engineering,College of Environment Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region,Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Feng Dongdong, Department of Chemical Engineering,College of Environment Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region,Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Wang Wei, Department of Chemical Engineering,College of Environment Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region,Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

地址: 符婉琛, 长安大学环境科学与工程学院化学工程系;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

李倩, 长安大学环境科学与工程学院化学工程系;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

冯冬冬, 长安大学环境科学与工程学院化学工程系;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

王伟, 长安大学环境科学与工程学院化学工程系;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, ;; 710054;;710054.

电子邮件地址: wwchem@chd.edu.cn

电子邮件地址: wwchem@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Tian Xincheng; Liu Shan; Feng Ting; Liu Danrong; Jiang Cuiting; Sun Zhaohui

作者: 田薪成; 刘珊; 冯婷; 刘丹荣; 蒋翠婷; 孙朝辉

标题: The study of SDS modify chitosan to Cu(II) adsorption

标题: SDS 改性壳聚糖对 Cu(II) 的吸附研究

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作者关键词: chitosan; SDS; Cu(II); adsorption

作者关键词: 壳聚糖; 十二烷基磺酸钠; 二价铜离子; 吸附

摘要: The chitosan was modified by SDS (sodium dodecyl sulfonate). The effects of pH, initial adsorption concentration, adsorption time and temperature on the adsorption process were described. The results show that the adsorption effect is the best when pH = 5.5. The adsorption equilibrium achieved in 30 min, maximum adsorption quantity of Cu(II) is 219.22 mg/g; At the same time, the influence of temperature on the material of the adsorption is small. Compare with CS, this method shortens the balance time by 3.5 h and increases the maximum adsorption amount by nearly one time. It shows that this modification can greatly improve the adsorption rate and adsorption capacity of this material. The FTIR results showed that the sulfonate ions of SDS were combined with hydroxyl (-OH) in chitosan.

摘要: 利用 SDS(十二烷基磺酸钠)对壳聚糖进行改性,用于吸附水中的 Cu(II)。阐述了 pH、初始吸附浓度、吸附时间以及温度等对吸附的影响。结果表明,在 pH = 5.5 时吸附效果最佳;对 Cu(II) 的吸附过程在 30 min 达到平衡,最大吸附量为 219.22 mg/g;温度对材料的吸附量的影响较小。此方法比用 CS 材料达到平衡时间缩短 3.5 h,最大吸附量增加近 1 倍。表明通过此方法改性壳聚糖能有效的提高材料对 Cu(II) 的吸附速率和吸附量。红外表征结果表明,SDS 的磺酸根离子与 CS 中的羟基(-OH)进行了结合。

入藏号: CSCD:6434556

地址: Tian Xincheng, College of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of

Education, Xi'an, Shaanxi 710054, China.

Liu Shan, College of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710054, China.

Feng Ting, College of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710054, China.

Liu Danrong, College of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710054, China.

Jiang Cuiting, College of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710054, China.

Sun Zhaohui, College of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Shaanxi 710054, China.

地址: 田薪成, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

刘珊, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

冯婷, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

刘丹荣, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

蒋翠婷, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

孙朝辉, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

电子邮件地址: tianxincheng@vip.qq.com; 534148120@qq.com

电子邮件地址: tianxincheng@vip.qq.com; 534148120@qq.com

使用次数 (最近 180 天): 0

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作者: Yang Tong; Zhang Hetian; Guo Jifeng; Wu Shihong

作者: 杨彤; 张和田; 郭冀峰; 吴世红

标题: The research progress of hydrophilic modification and antifouling properties of PVDF membrane

标题: PVDF 膜的亲水改性及其抗污染性能的研究新进展

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作者关键词: PVDF 膜; 表面改性; 共混改性; 膜污染

摘要: Attributed to the strong hydrophobic properties of PVDF, it requires a strong driving force in water treatment applications, resulting in increased operating costs. At the same time, membrane hydrophobicity also causes membrane fouling and membrane clogging making a dramatic decrease in membrane water flux. Therefore, in order to solve the issues, the paper presents the modification of PVDF membrane so as to improve the performance of the membrane. The research progress of hydrophilic modification of PVDF membrane in recent years is introduced. The modification of PVDF membrane mainly includes surface modification mainly divided into surface grafting and surface coating, and blend modification, the blend materials are hydrophilic polymers, inorganic nanoparticles and amphiphilic polymers etc. It found that anti-pollution performance and membrane mechanical properties of PVDF membrane have increased after modification, which provides a practical solution to the problem of contamination of PVDF membranes and reduces operating costs by increasing their hydrophilicity.

摘要: PVDF 膜由于其较强的疏水性能,在水处理应用中需要较强的驱动力,使得运行费用增加;同时膜的疏水性也会导致膜污染、膜堵塞,从而造成膜水通量的降低。因此,针对此问题,提出了 PVDF 膜的改性,通过对 PVDF 膜进行改性来提高它的亲水性能从而改善膜的性能。介绍了近年来 PVDF 膜亲水改性的研究新进展, PVDF 膜的改性主要有表面改性和共混改性,表面改性主要有表面接枝与表面涂覆,共混改性主要的共混物质有亲水聚合物、无机纳米粒子以及碳基纳米材料等。研究发现,通过改性后的 PVDF 膜亲水性能、抗污染性能以及膜的机械性能都有所提高。这为解决 PVDF 膜的污染问题提供了一种实际可行的方法,并通过提高其亲水性而降低了运行成本。

入藏号: CSCD:6434596

地址: Yang Tong, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an, Shaanxi 710054, China.

Zhang Hetian, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an, Shaanxi 710054, China.

Guo Jifeng, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas, Ministry of Education, Xi'an, Shaanxi 710054, China.

Wu Shihong, Tianjin Research Institute for Water Transport Engineering, Ministry of Transportation, Environmental Technology Development of Tiwte (Tianjin) Co., Ltd., Tianjin

300456, China.

地址: 杨彤, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

张和田, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

郭冀峰, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

吴世红, 交通运输部天津水运工程科学研究所天科院环境科技发展(天津)有限公司, 天津 300456, 中国.

电子邮件地址: 18315912685@163.com; 674953146@qq.com

电子邮件地址: 18315912685@163.com; 674953146@qq.com

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作者: Li Meng; Chen Aixia; Chen Bei; Hu Weixing; Meng Jianhao; Han Rong

作者: 李萌; 陈爱侠; 陈贝; 胡卫星; 孟建昊; 韩融

标题: Study on removal efficiency of fly ash to DMP in simulated river

标题: 粉煤灰对模拟河流中 DMP 的吸附实验研究

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作者关键词: 邻苯二甲酸二甲酯; 模拟河流; 粉煤灰; 吸附

摘要: Dimethyl phthalate (DMP) was used to investigate the river pollution caused by pollutant leakage, with fly ash as the adsorbent and plexiglass reaction tank as the reaction device, DMP solution with the same initial concentration was injected into the reaction tank, and the adsorption kinetic equation was used to fit this reaction results. Moreover, the relations between the DMP initial concentration, water flow rate and adsorbent dosing method and removal efficiency of DMP on fly ash were analyzed. The results showed that the Elovich equation was more precise to fit the adsorption behavior of DMP on fly ash. The removal rate of DMP on fly ash and the adsorption

amount increased with the water flow rate increasing, and the adsorption capacity of DMP on fly ash reached a maximum 27.50 mug /g when the velocity was 0.42 m/s. Adding the same mass of fly ash, the initial concentration of the solution was smaller and the higher percent of the active site on adsorption and removal rate. However, the mass transfer driving force between the DMP molecules was reduced, the adsorption amount was reduced at the same time. Furthermore, the largest contact area between the fly ash and DMP was achieved with the fly ash lying on the bottom of the tank completely, the adsorption and removal rate was improved consequently, and 69.38% maximum removal rate was realized.

摘要: 以邻苯二甲酸二甲酯(DMP)为研究对象,以粉煤灰作为吸附剂,有机玻璃反应槽作为反应装置,向其持续注入初始浓度相同的DMP溶液,并对该反应进行吸附动力学方程拟合;同时,分析了DMP初始浓度、水流速度及吸附剂投加方式3种因素对粉煤灰去除DMP效率的影响.结果表明:①Elovich方程能较好地拟合粉煤灰对DMP的吸附行为;②随着水流速度的增加,粉煤灰对DMP的去除率升高,吸附量增加,在水流速度为0.42 m/s时,粉煤灰对DMP的最大吸附量为27.50 mug /g;③溶液的初始浓度越小,投加相同质量的粉煤灰,其上可供吸附的活性点位比例越高,去除率升高.但是污染液之间的传质推动力减小,相同时间的吸附量会降低;④将粉煤灰全部平铺在槽子底部时,粉煤灰与DMP之间的接触面积最大,吸附速率增大,去除率升高,最高可达69.38%.

入藏号: CSCD:6451323

地址: Li Meng, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Chen Aixia, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Hu Weixing, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Meng Jianhao, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Han Rong, School of Environmental Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Chen Bei, Chang'an University Haiwei Environmental Technology Company, Xi'an, Shaanxi 710054, China.

地址: 李萌, 长安大学环境科学与工程学院;; 旱区地下水文与生态效应教育部重点实验室, ;; 旱区地下水文与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

陈爱侠, 长安大学环境科学与工程学院;; 旱区地下水文与生态效应教育部重点实验室, ;; 旱区

地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
胡卫星, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
孟建昊, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
韩融, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
陈贝, 长安大学海威环境技术公司, 西安, 陕西 710054, 中国.
电子邮件地址: liuqingyun19@126.com; mamatao1982@163.com
电子邮件地址: liuqingyun19@126.com; mamatao1982@163.com
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作者: Li Xin; Lu Yudong; Fan Wen; Pan Wangsheng; Zhang Xiaozhou; Lu Yangchun

作者: 李鑫; 卢玉东; 范文; 潘网生; 张晓周; 卢阳春

标题: Current Status and Prospects of Research on Mechanism of Preferential Flow-induced Sliding in Loess Slope

标题: 黄土斜坡优先流促滑机理研究现状及展望

来源出版物: 水土保持通报 卷: 39 期: 1 页: 294-301,324 出版年: 2019

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作者关键词: preferential flow; loess landslide; slope stability; landslide inducing mechanism

作者关键词: 优先流; 黄土滑坡; 斜坡稳定性; 促滑机理

摘要: [Objective]Summary and review of the research status on the preferential flow-induced sliding effects developed by the existence of dominant channels such as joints,fissures and holes in the slope were conducted,in order to draw the attention of scholars to the application of preferential flow theory in the study of slope geological hazards and provide scientific basis for accurate forecasting and early warning of landslides. [Methods]According to the definition and types of preferential flow,the influential factors of preferential flow were analyzed,and the current status of the influence of preferential flow on slope stability,the preferential flow detection

technology and the stability evaluation model of slope were reviewed and evaluated emphatically. The developing process of preferential flow-induced landslide effect on loess slope was summarized as four stages, and the typical landslides were taken as examples. Finally, the issues of the preferential flow-induced sliding mechanism were clarified. [Results] The preferential flow widely developed in the dominant seepage channels of the loess slope is a reasonable explanation for slope instability under the condition of limited rainfall depth. However, the theory and application of preferential flow in landslide hazards prediction still need more practical tests. [Conclusion] Slope preferential flow is an important theory in hillslope hydrology, unsaturated soil mechanics, geo-hazards science and other related disciplines. Many achievements have been made over the years. In the future, it is necessary to further study the effect of preferential flow-induced sliding on loess slopes, and strengthen the application of multidisciplinary and new technologies to improve the level on scientific prediction and prevention of geo-hazards.

摘要: [目的]对斜坡中因节理、裂隙、孔洞等优势通道的存在而发育的优先流所产生的促滑效应研究现状进行总结,以期引起学者重视优先流理论在斜坡地质灾害研究中的应用,为准确开展滑坡预测预警提供科学依据。[方法]从优先流的定义与类型出发,分析了优先流的众多影响因素,重点综述和评价了优先流对斜坡稳定性的影响、斜坡优先流探测技术以及稳定性评价模型方面的研究现状,总结了黄土斜坡优先流促滑致灾的4个发展阶段,并以典型滑坡作为实证,最后分析了优先流促滑作用机理研究中存在的问题。[结果]黄土斜坡优势渗流通道中普遍发育的优先流是有限降雨影响深度条件下斜坡失稳的合理解释,然而,优先流在滑坡致灾规律理论及应用上仍需更多实践检验。[结论]斜坡优先流是斜坡水文学、非饱和土力学、地质灾害学等相关学科方面一项重要的理论,多年来已取得不少成果,今后还需继续深入开展黄土斜坡优先流促滑效应研究,加强多学科交叉和新技术应用,来提高地质灾害科学预测与防治水平。

入藏号: CSCD:6441863

地址: Li Xin, School of Environment Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710054;; 710054.

Lu Yudong, School of Environment Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710054;; 710054.

Zhang Xiaozhou, School of Environment Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710054;; 710054.

Lu Yangchun, School of Environment Science and Engineering, Chang'an University;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710054;; 710054.

Fan Wen, School of Geological Engineering and Surveying, Chang'an University, Xi'an, Shaanxi 710054, China.

Pan Wangsheng, Qiannan Normal University for Nationalities, Duyun, Guizhou 558000, China.

地址: 李鑫, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室,;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

卢玉东, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室,;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

张晓周, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室,;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

卢阳春, 长安大学环境科学与工程学院;;旱区地下水文与生态效应教育部重点实验室,;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

范文, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

潘网生, 黔南民族师范学院, 都匀, 贵州 558000, 中国.

电子邮件地址: lixin@chd.edu.cn; luyudong@chd.edu.cn

电子邮件地址: lixin@chd.edu.cn; luyudong@chd.edu.cn

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作者: Li Tao; Liu Shan; Zhao Chunpeng; Zhang Yue; Feng Ting; Liu Danrong

作者: 李涛; 刘珊; 赵春鹏; 张悦; 冯婷; 刘丹荣

标题: Flocculation for Cu~(2+) Removal by Cysteine-Modified Chitosan Sol

标题: 半胱氨酸改性壳聚糖溶胶絮凝去除 Cu~(2+)研究

来源出版物: 水处理技术 卷: 45 期: 3 页: 89-92 出版年: 2019

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作者关键词: Cu~(2+); chitosan; cysteine; modification; sol flocculant; Cu~(2+)

作者关键词: 壳聚糖; 半胱氨酸; 改性; 溶胶絮凝剂

摘要: Cysteine-modified chitosan sol flocculant (Cy-Cs) was prepared by mild ion crosslinking method. The effect of cysteine content, Cy-Cs dosage, pH and state of flocculant on the performance of flocculation for Cu~(2+) removal was studied. The results showed that, the flocculation performance of Cy-Cs sol after modification was significantly improved compared with that of cysteine solution and pure chitosan sol; The optimum flocculation pH was 4.0~5.5, and the removal rate was 98.63% when the cysteine mass was 1.85 g and the Cy-Cs dosage was 6.5 mL; The performance of Cy-Cs for flocculation and removal of Cu~(2+) in sol state was better than that in

aqueous state. It provided a new idea for the preparation of other chitosan-based flocculants.

摘要: 采用温和的离子交联法制得半胱氨酸(Cy)改性壳聚糖(CS)溶胶絮凝剂(Cy-CS)。研究了 Cy 含量、Cy-CS 投加量、pH、絮凝剂状态对絮凝除 Cu²⁺性能的影响。结果表明,改性后 Cy-CS 溶胶的絮凝性能较 Cy 溶液、纯 CS 溶胶显著提升;优化的絮凝 pH 为 4.0~5.5,当 Cy 的质量为 1.85 g,Cy-CS 絮凝剂投加量 6.5 mL 时,去除率最高为 98.63%;溶胶态 Cy-CS 絮凝除 Cu²⁺性能优于水溶液态 Cy-CS。可为其它 CS 基絮凝剂的制备提供新的思路。

入藏号: CSCD:6449089

地址: Li Tao, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid region, Ministry of Education, Xi'an, Shaanxi 710054, China.

Liu Shan, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid region, Ministry of Education, Xi'an, Shaanxi 710054, China.

Zhao Chunpeng, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid region, Ministry of Education, Xi'an, Shaanxi 710054, China.

Zhang Yue, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid region, Ministry of Education, Xi'an, Shaanxi 710054, China.

Feng Ting, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid region, Ministry of Education, Xi'an, Shaanxi 710054, China.

Liu Danrong, School of Environmental Science and Engineering, Chang'an University, Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid region, Ministry of Education, Xi'an, Shaanxi 710054, China.

地址: 李涛, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

刘珊, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

赵春鹏, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

张悦, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

冯婷, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

刘丹荣, 长安大学环境科学与工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

电子邮件地址: 2500721668@qq.com; 534148120@qq.com

电子邮件地址: 2500721668@qq.com; 534148120@qq.com

使用次数 (最近 180 天): 0

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作者: Liu Mengru; Cheng Dawei; Lu Yudong

作者: 刘梦茹; 程大伟; 卢玉东

标题: Analytical solution of one dimensional fluid phase motion equation in unsaturated zone considering evaporation front

标题: 考虑蒸发锋面的包气带一维液相运动方程解析解

来源出版物: 水资源与水工程学报 卷: 30 期: 1 页: 40-45 出版年: 2019

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作者关键词: 包气带; Gardner 模型; 蒸发锋面; 液相运动方程; 解析解

摘要: To effectively analyze characteristics of fluid phase in unsaturated zone, this paper solved the diffusance based on Gardner model for relative hydraulic conductivity, deduced the analytical solution for one dimensional fluid phase motion equation in unsaturated zone, and proposed the evaporation front depth model, the effective saturation profile model of hydraulic connection area between the homogeneous and layered soils, and the hydraulic parameters inversion calculation model. The results showed that the effective saturation profile of unsaturated soil under steady flow is affected by specific discharge q , Gardner model parameters α and the variabilities of water head of the lower boundary h . The effective saturation profile and evaporative front depth of upper soil in stratified soil are affected by the permeability of lower soil. Parameter inversion analysis verifies the reliability of analytical solution of liquid phase motion equation.

摘要: 为分析包气带中液态水运移的基本规律, 基于相对渗透系数模型中的 Gardner 模型求解扩散度, 在考虑蒸发锋面的基础上推导了包气带一维液相运动方程的解析解, 建立了蒸发锋面深度模型、均质土及成层土的水力连续区有效饱和度剖面模型、水力参数反演模型。研究表明: 稳态流下非饱和土的有效饱和度剖面受比流量 q 、Gardner 模型参数 α 及下边界负压水头 h 的影响; 在成层土中上层土的有效饱和度剖面及蒸发锋面深度受下部土层透水性的影响; 参数反演分析证明了液相运动方程解析解的可靠性。

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地址: Liu Mengru, School of Environment Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Cheng Dawei, School of Environment Science and Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region of

Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Lu Yudong, School of Environment Science and Engineering,Chang'an University;;Chang'an University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region of Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

地址: 刘梦茹, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

程大伟, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

卢玉东, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

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作者: Li Wenyi; Yang Amin; Zhou Weibo

作者: 李文溢; 杨阿敏; 周维博

标题: Seepage field simulation and leakage calculation in plain reservoir: Taking the test section of Doumen Reservoir as an example

标题: 平原水库渗流场模拟及渗流量计算以斗门水库试验段为例

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作者关键词: plain reservoir; numerical simulation; groundwater seepage field; leakage amount; leakage strength

作者关键词: 平原水库; 数值模拟; 地下水渗流场; 渗流量; 渗漏强度

摘要: Taking the test section of Doumen Reservoir in Shaanxi Province as an example, the permeability coefficient of the sediment at the bottom of the reservoir was calculated by field sampling and laboratory test. The leakage amount and leakage strength of the reservoir area were obtained by analytical solution, and the groundwater flow field changes under reservoir water storage conditions was simulated by numerical method. The results showed that the permeability coefficient of the sediment at the bottom of the reservoir and the leakage strength were 10 - 3 m/d and 14.97 mm/a, respectively; and the permeability coefficient and leakage strength in the

northeastern part of the reservoir area were relative large. The leakage in the reservoir area was about 7070.05 m³/a, accounting for 4.6 of the total storage capacity, and the leakage change was more affected by the precipitation. After five years of reservoir impoundment, the regional groundwater level rises 0.1 ~ 0.5 m, and the groundwater in the northeast of the reservoir area. The force gradient significantly increased and the groundwater flow direction deflected.

摘要: 以陕西省斗门水库试验段为例,通过野外取样及室内试验分析计算了库底沉积物的渗透系数,运用解析法求得了库区渗漏量和渗漏强度,采用数值法模拟了水库蓄水条件下的地下水水流场变化。结果表明:库底沉积物渗透系数数量级为 10⁻³ m/d,渗漏强度约为 14.97 mm/a,库区东北部渗透系数及渗漏强度较大;库区渗漏量约为 7 070.05 m³/a,约占总库容的 4.6,渗漏量变化受降水量影响较为明显;水库蓄水 5 年后区域地下水位整体抬升 0.1~0.5 m,库区东北部地下水水力梯度明显增大,地下水流向发生偏转。

入藏号: CSCD:6460701

地址: Li Wenyi, College of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key laboratory of Subsurface Hydrology and Ecology in Arid Areas of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Yang Amin, College of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key laboratory of Subsurface Hydrology and Ecology in Arid Areas of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Zhou Weibo, College of Environmental Science and Engineering, Chang'an University;; Chang'an University, ;; Key laboratory of Subsurface Hydrology and Ecology in Arid Areas of Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

地址: 李文溢, 长安大学环境科学与工程学院;; 长安大学, ;; 旱区地下水文与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

杨阿敏, 长安大学环境科学与工程学院;; 长安大学, ;; 旱区地下水文与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

周维博, 长安大学环境科学与工程学院;; 长安大学, ;; 旱区地下水文与生态效应教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

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作者: Ma Lianjing; Zhao Baofeng; Xu Huijun; Cao Haidong

作者: 马莲净; 赵宝峰; 徐会军; 曹海东

标题: Research on water inrush mechanism of fault coupling bed separation with fully-mechanized sublevel caving of ultra-thick coal seam

标题: 特厚煤层分层综放开采断层-离层耦合溃水机理

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作者关键词: ultra-thick coal seam; fully-mechanized sublevel caving; numerical simulation; similar material simulation; water inrush mechanism

作者关键词: 特厚煤层; 分层综放开采; 数值模拟; 相似材料模拟; 溃水机理

摘要: In order to research the water inrush mechanism of fault coupling bed separation under the complex condition and formulate corresponding water disaster control measures. Based on the analysis of geological, hydrogeological and mining condition in Laohutai coal mine, combined with water inrush accident, numerical simulation and similar material simulation were used to research two zones development rule of working face, the space formation characteristics of fault and bed separation with fully-mechanized sublevel caving of ultra-thick coal seam. The caving to mining ratio and fracturing to mining ratio are 4.98-5.42 and 7.10-7.30. The spatial form and size of faults are mainly affected by the fault throw and the distance from the working face. The bed separation space is mainly formed near the contact surface of different stratum. Based on the analysis of formation, water filling and water inrush process of fault and bed separation on the roof of working face, water inrush mechanism of fault coupling bed separation were found out: the mining of upper layer working face led to fault and bed separation space, then the space were filled with water from aquifer continuous replenishment, the water inrush was happened when the caving zone connected water body after lower working face mined. Compared with the previous water disaster caused by fault and bed separation, the water inrush of fault coupling bed separation has the following characteristics: the fault and bed separation are water filling source and channel of water disaster at the same time; The caving zone is the main cause of water disaster; The gestation and occurrence of water disaster are in different working face. For water damage characteristics, the corresponding project of water control was put forward. First of all, the research area is partition according to water disaster threat degree. Then, the coal resources not threatened by water disaster can be mining. The coal resources threatened by water disaster can be mining after the following measures: grouting and filling the space of fault and bed separation, drainage the water of fault and bed separation and reducing the disturbance from working face mining to the water of fault and bed separation. According to the safety mining of typical working face, the correctness of water inrush mechanism and the reliability of water disaster control scheme are preliminarily verified. In the next step, the water disaster control measures will be supplemented and improved according to the engineering verification on the ground and underground.

摘要: 为了研究在复杂条件下断层-离层耦合溃水的机理及制定相应的防治水措施,在分析了老虎台井田地质、水文地质和开采条件的基础上,结合水害事故,采用数值模拟和相似材料模拟两种方法,对特厚煤层分层综放开采工作面两带发育高度、断层和离层空间形成特征进行了量化研究,工作面回采后的冒采比和裂采比分别为4.98~5.42和7.10~7.30;断层空间形态和大小主要受到断层落差和与工作面距离影响;离层空间主要形成于不同岩性接触面附近。基于工作面顶板断层和离层空间形成、充水和溃水过程分析,揭示了断层-离层耦合溃水机理:上分层工作面回采导致覆岩中产生断层和离层空间,在接受含水层的持续补给后形成断层和离层水体,下分层工作面回采产生的垮落带波及至水体后发生溃水事故,与以往断层水害和离

层水害相比,具有以下特点:断层和离层同时作为水害事故的充水水源和导水通道;垮落带是导致水害发生的主要因素;水害的孕育和发生分别在不同的工作面。针对水害特点提出了相应的防治水方案,首先对研究区进行水害威胁程度分区,受水害威胁轻及较轻区域的煤炭资源可以正常回采,受水害威胁较重及重区域的煤炭资源必须采取以下措施方可回采:注浆充填已形成的断层和离层空间,疏放已形成的断层和离层水体,减少工作面回采对覆岩中断层和离层水体的扰动。根据典型工作面的安全回采,初步验证了溃水机理的正确性和防治水方案的可靠性,下一步将根据井上、下工程验证,补充和完善防治水措施。

入藏号: CSCD:6456381

地址: Ma Lianjing, School of Environmental Science and Engineering, Changan University;;Changan University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Zhao Baofeng, Xian Research Institute of China Coal Technology & Engineering Group Corp, Xi'an, Shaanxi 710054, China.

Cao Haidong, Xian Research Institute of China Coal Technology & Engineering Group Corp, Xi'an, Shaanxi 710054, China.

Xu Huijun, China Energy Investment Corporation Limited, Beijing 100011, China.

地址: 马莲净, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

赵宝峰, 中煤科工集团西安研究院有限公司, 西安, 陕西 710054, 中国.

曹海东, 中煤科工集团西安研究院有限公司, 西安, 陕西 710054, 中国.

徐会军, 国家能源投资集团有限责任公司, 北京 100011, 中国.

电子邮件地址: 860909mlj@163.com

电子邮件地址: 860909mlj@163.com

使用次数 (最近 180 天): 0

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作者: Jiang Cheng; Huo Aidi; Zhu Xinghua; Wei Hong; Zheng Xiaolu; Wang Xiaofan

作者: 姜程; 霍艾迪; 朱兴华; 韦红; 郑小路; 王小帆

标题: Research status of loess hydraulic erosion-landslide-mudflow chain

标题: 黄土水力侵蚀-滑坡-泥石流灾害链的研究现状

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作者关键词: 黄土高原; 黄土灾害链; 地质灾害; 链式结构; 断链措施

摘要: Loess is mainly distributed in the Loess Plateau of Northwest China. Because of the special properties of loess, such as structure, water sensitivity and collapsibility, loess is easy to induce geological disasters. The disaster sequences composed of primary disasters induced by loess characteristics and the secondary disasters caused by them often have a sequence of time, and interrelated in space. Once the disaster chain develops and evolves, the disaster-causing capability is extremely strong, and the scale of the disaster is extremely large. Based on the analysis of the chain structure, evolution mechanism, conditions and prevention measures of the loess hydraulic erosion-landslide-mud flow disaster chain, this paper expounds the causes, evolution mechanism and amplification effect of the loess hydraulic erosion-landslide-mud flow disaster chain. Prospects for the research trend of geological disaster chain in loess area and the further research direction or ideas in the future was proposed to provide scientific suggestions for the subsequent disaster chain research. The purpose is to find reasonable and effective engineering measures in order to reduce the probability and damage capacity of disasters.

摘要: 黄土主要分布于西北黄土高原地区,因其具水敏性、湿陷性、结构性,极易诱发地质灾害。因黄土特性诱发的原生灾害及其引起的次生灾害组成的灾害序列往往存在时间上先后顺序,空间上彼此相依,成因上相互关联的灾害链式关系。灾害链一旦发展演化,致灾能力极强,致灾规模极大。本文通过分析黄土水力侵蚀-滑坡-泥石流灾害链的链式结构、演化机理及条件、防治措施等研究现状,阐述了黄土水力侵蚀-滑坡-泥石流灾害链的诱因、演化机理及放大效应等。对黄土地区地质灾害链的研究趋势进行展望,并提出大致的研究思路以期为后续灾害链研究提供科学建议。旨在找寻合理有效的工程措施,以求能降低灾害的发生概率及破坏能力。

入藏号: CSCD:6458141

地址: Jiang Cheng, School of Environmental Science & Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Huo Aidi, School of Environmental Science & Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Wei Hong, School of Environmental Science & Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Zheng Xiaolu, School of Environmental Science & Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Wang Xiaofan, School of Environmental Science & Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Subsurface Hydrology and Ecological Effects in Arid Region, Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Zhu Xinghua, School of Geological Engineering and Surveying, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 姜程, 长安大学环境科学与工程学院;; 长安大学, ;; 旱区地下水文与生态效应教育部重

点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
霍艾迪, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
韦红, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
郑小路, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
王小帆, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
朱兴华, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.
电子邮件地址: 1228384952@qq.com; zhuxinghua@chd.edu.cn
电子邮件地址: 1228384952@qq.com; zhuxinghua@chd.edu.cn
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作者: Cao Wei; Zhang Hongbo; Ren Chongfeng; Nan Zhengnian; Xi Qiuyi

作者: 曹巍; 张洪波; 任冲锋; 南政年; 席秋义

标题: Identification of hydrological variation types in river streamflow series in Yulin,northern Shaanxi

标题: 陕北榆林地区河川径流变异类型的识别方法

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作者关键词: 水文序列; 河川径流; 变异类型; 变异识别; 陕北榆林

摘要: 【Objective】 This study explored the identification method for variation types of river runoff in Yulin area of northern Shaanxi to provide references for further understanding of the change composition, evolution and development mechanism of the river runoff in the Loess Plateau. 【Method】 The measured annual runoff sequences at 22 hydrological stations in Yulin,

Shaanxi were collected. The empirical mode decomposition(EMD) was combined with the second derivative, STARS and iterative cumulative sum of squares(ICSS) to decompose the streamflow series into intrinsic mode functions (IMFs, i. e. the high frequency component) and residual component (i. e. the low frequency component). The second derivative, STARS and ICSS methods were used to detect the trend changes and the abrupt changes in mean and variance in the runoff sequences for effective identification of compound variation types and characteristics. **【Result】** The annual runoff sequences of 22 hydrological stations in Yulin, Shaanxi showed attenuation trend, and the annual runoff attenuation rates were significantly different (-0.06%--54.73%), which posed a serious threat to regional water security in Yulin. The regional variation types of the annual runoff sequence were complex and variable, there were 8 types including no variation, trend variation, mean variation, variance variation, double variation in trend and mean, double variation in trend and variance, double variation in mean and variance, and triple variation in trend, mean and variance. The trend variations with rising before falling and with falling before rising mainly occurred around 1960 and 2000, respectively. Mean variation with jumping down was at around 1970 and variance variation occurred in 1960s and 1970s.

【Conclusion】 The variation degrees of runoff time sequences in different drainage basins of Yulin in northern Shaanxi were different and the types were complex. The trend variation, mean variation and variance variation were in balanced situation, and the compound type was gradually dominant. The changes of river streamflow series in Yulin region are being more complicated by the influences of climate change, underlying surface changes and human activities.

摘要: **【目的】**探索陕北榆林地区河川径流变异类型的识别方法,为进一步了解黄土高原河川径流变化组成及其演变规律与发展机制提供参考。**【方法】**以陕西榆林 22 个水文测站的实测年径流序列为研究对象,将经验模态分解(EMD)法与二阶导数法、STARS 法、迭代累积平方和(ICSS)法相结合,通过 EMD 分离径流序列中波动性成分(高频分量)与趋势性成分(低频分量),应用二阶导数法、STARS 法和 ICSS 法对径流序列中趋势变异、均值变异和方差变异进行检验,有效识别不同水文站径流序列的复合变异特征与类型。**【结果】**陕北榆林地区 22 个水文站点径流序列总体呈现衰减趋势,年径流衰减速率空间差异较大(-0.06%~ -54.73%),对榆林地区的区域用水安全造成了严重的威胁。年径流序列区域变异类型复杂多变,覆盖了未变异,趋势变异,均值变异,方差变异,趋势与均值两重变异,趋势与方差两重变异,均值与方差两重变异,趋势、均值、方差三重变异 8 种类型。其中,先升后降型和先降后升型的趋势变异主要集中在 1960 和 2000 年前后,向下跳跃均值变异主要发生于 1970 年左右,方差变异则多发于 20 世纪六七十年代。**【结论】**陕北榆林地区不同流域的径流时间序列变异程度有差异,且类型复杂多变,趋势变异、均值变异、方差变异基本呈现均势,且复合变异态势显著。在气候变化、下垫面条件变化以及直接人类活动的综合影响下,榆林地区的河川径流变化正在日趋复杂化。

入藏号: CSCD:6440612

地址: Cao Wei, School of Environmental Science and Engineering, Changfan University, Xi'an, Shaanxi 710054, China.

Nan Zhengnian, School of Environmental Science and Engineering, Changfan University, Xi'an, Shaanxi 710054, China.

Zhang Hongbo, School of Environmental Science and Engineering, Changfan University, Changfan University, Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an, Xi'an, Shaanxi, Shaanxi 710054, 710054.

Ren Chongfeng, School of Environmental Science and Engineering, Changfan

University;;Changfan University, ;;Key Laboratory of Subsurface Hydrology and Ecological Effect in Arid Region of Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Xi Qiuyi, Electric Power Research Institute of State Grid Shaanxi Electric Power Company, Xi'an, Shaanxi 71005, China.

地址: 曹巍, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

南政年, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

张洪波, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

任冲锋, 长安大学环境科学与工程学院;;长安大学, ;;旱区地下水文与生态效应教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

席秋义, 国网陕西省电力公司电力科学研究院, 西安, 陕西 71005, 中国.

电子邮件地址: 646869513@qq.com; hbzhang@chd.edu.cn

电子邮件地址: 646869513@qq.com; hbzhang@chd.edu.cn

使用次数 (最近 180 天): 0

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地球科学与资源学院

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作者: Ma Teng; Han Ling; Liu Quanming

作者: 马腾; 韩玲; 刘全明

标题: Inversion of surface soil moisture content of Spanish farmland using modified water cloud model

标题: 考虑地表粗糙度改进水云模型反演西班牙农田地表土壤含水率

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语言: Chinese

文献类型: Article

作者关键词: soil; moisture; models; surface roughness; water cloud model; vegetation canopy water content; inversion accuracy

作者关键词: 土壤; 水分; 模型; 地表粗糙度; 水云模型; 冠层含水率; 反演精度

摘要: Soil moisture content is an important parameter for constructing models in the agricultural, environmental, meteorological fields. The main method to retrieve soil moisture is SAR and optical remote sensing. To improve the soil moisture content inversion accuracy of farmland using

remote sensing, the Duero basin of Spain was selected as a representative region (41°06' N-41°32' N, 5°01' W-5°45' W). There were 23 automatic soil monitoring stations in the area. The soil moisture content of 19 observation stations was collected from ISMN, Sentinel-1 and Sentinel-2 were selected as remote sensing sources. The data for solving model parameters and verifying models were selected on January 16, April 16, June 15, August 8 and November 6 in 2018. The Sentinel-1 data with different incident angles on the above date was obtained. Sentinel-2 data obtained January 17, April 16, June 16, August 8 and November 6 in 2018. The orbit correction, radiation correction, improved LEE Sigma filter and geocoding were performed on Sentinel-1 images. Atmospheric correction was performed on Sentinel-2 images. Sentinel-2 images were used to produce vegetation index such as NDVI, NDWI and NDWI1725, 2200. Taking the 24-hours average of the above date as the soil water content. A Modified Water Cloud Model (MWCM) was established. In the MWCM, ground surface roughness was regarded as a variable related to the cross-polarization ratio and Transformed Soil Adjusted Vegetation Index (TSAVI). Three vegetation indexes (NDVI, NDWI and NDWI1725, 2200) were calculated and took into WCM and MWCM which were the indicator of vegetation water content. The overall RMSE of retrieved soil moisture of WCM using NDVI, NDWI, and NDWI1725, 2200 were 0.106, 0.118 and 0.113 m^{-3}/m^{-3} . The vegetation reflection parameters of three WCM were all equal to 0. It meant that under the condition of VV polarization in the C band, vegetation reflected energy could be ignored. The result also meant that the inversion accuracy of soil moisture content using WCM with NDVI, NDWI, and NDWI1725, 2200 were low when surface roughness was not considered. The MWCM was established where the backscatter coefficient of vertical polarization was expressed as decibel and vegetation canopy water content was substituted by NDVI, NDWI, and NDWI1725, 2200. The RMSE of retrieved soil moisture was 0.082, 0.094 and 0.077 m^{-3}/m^{-3} using MWCM. It meant the WCM in which surface roughness was added had the higher inversion accuracy. The cross-polarization ratio and TSAVI are fine indicators of ground surface roughness. The MWCM with NDWI1725, 2200 had the highest inversion accuracy, which meant NDWI1725, 2200 was a good index to the reflection of surface vegetation. The model had lower inversion accuracy when the vegetation water content was substituted by NDVI than the model with NDWI1725, 2200. The result also showed that NDWI was not a fine index to reflect vegetation water content. Different surface vegetation coverage was represented by NDVI equal to 0-0.2, 0.2-0.3, 0.3-0.4, 0.4-0.5 and 0.5-0.7. Overall, the inversion accuracy of MWCM gradual decreased with increasing of surface vegetation coverage. In the condition of NDVI equals 0-0.5, the MWCM had a higher inversion accuracy than WCM. Because the ground surface was covered by vegetation, the influenced of surface roughness was reduced, when NDVI equaled 0.5-0.7. The WCM and MWCM had similar accuracy. Therefore, the MWCM could get higher accuracy in vegetation coverage land than WCM. NDWI1725, 2200 was a good vegetation index using in the MWCM under different vegetation cover conditions. It provided ideal and theoretical support for such research. The crop type and other land cover types were not considered in this study which might influent the reflection parameter and the model accuracy. In the future study, the MWCM should be further modified to accommodate different crop type cover condition.

摘要: 土壤含水率是农业、环境、气象等领域进行建模的重要参数。该研究将微波遥感与光学遥感相结合,利用 Sentinel-1 数据交叉极化比及变换土壤调节植被指数对地表粗糙度进行估计,构建了一种改进的水云模型(modified water cloud model, MWCM)。分析将 NDVI、NDWI 和 NDWI1725,2200 等植被指数作为植被冠层含水率时,水云模型(water cloud model, WCM)

及 MWCM 农田地表土壤含水率的反演精度。结果表明:从总体精度上来看,MWCM 的反演精度优于 WCM。在不同植被覆盖度情况下:当植被覆盖度为中、低程度($NDVI < 0.5$),MWCM 具有较高的反演精度;在较高的植被覆盖度情况下($NDVI \geq 0.5$),WCM 与 MWCM 的反演精度较为接近。MWCM 可有效的建立微波后向散射系数与地表土壤水分的关系,提高土壤含水率反演精度,为各种地表覆盖类型的土壤含水率反演提供研究思路及理论支持。

入藏号: CSCD:6669001

地址: Ma Teng, School of Earth Science and Resources, Changan University;;Water Conservancy and Civil Engineering college, Inner Mongolia Agricultural University;;Shaanxi Key Laboratory of Land Consolidation, ;;;Shaanxi Key Laboratory of Land Consolidation, Xian;;Hohhot;;Xian, ;;;710054;;010018;;710054.

Han Ling, School of Earth Science and Resources, Changan University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xian;;Xian, ;;710054;;710054.

Liu Quanming, Water Conservancy and Civil Engineering college, Inner Mongolia Agricultural University, Hohhot, Inner Mongolia 010018, China.

地址: 马腾, 长安大学地球科学与资源学院;;内蒙古农业大学水利与土木建筑工程学院;;陕西省土地整治重点实验室, ;;;陕西省土地整治重点实验室, 西安;;呼和浩特;;西安, ;;;710054;;010018;;710054.

韩玲, 长安大学地球科学与资源学院;;陕西省土地整治重点实验室, ;;陕西省土地整治重点实验室, 西安;;西安, ;;710054;;710054.

刘全明, 内蒙古农业大学水利与土木建筑工程学院, 呼和浩特, 内蒙古 010018, 中国.

电子邮件地址: mt19822005@163.com; hanling@chd.edu.cn

电子邮件地址: mt19822005@163.com; hanling@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Luo Yaoqing; Li Yongjun; Lin Guangchun; Wang Zuopeng; Ren Pengfei; Teng Mingyao

作者: 罗耀清; 李永军; 林广春; 王祚鹏; 任鹏飞; 滕明耀

标题: The Taledesayi Granite Pluton in the Atengtao Mountains of the Yining Block: Genesis Analyses of A Highly Fractionated Granite

标题: 伊宁地块阿腾套山塔勒德萨依岩体:高分异花岗岩成因分析

来源出版物: 矿物岩石地球化学通报 卷: 38 期: 6 页: 1191-1206 出版年: 2019

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文献类型: Article

作者关键词: highly differentiated granite; the Carboniferous Mississippian period; the Taledesayi granitic pluton; the Atengtao Mountains; the Yining Block

作者关键词: 高分异花岗岩; 密西西比亚纪; 塔勒德萨依岩体; 阿腾套山; 伊宁地块

摘要: In order to explore age and petrogenesis of the Taledesayi syengranite-porphyry pluton in the southwestern Atengtao Mountains and to provide reliable information for the tectonic evolution of the Yining Block in Carboniferous, we have carried out field geological survey, zircon U-Pb dating, and geochemical research of the Taledesayi pluton in this paper. The LA-ICP-MS zircon U-Pb age of granite porphyry of (3383)Ma indicates that the pluton was formed in the Carboniferous Mississippian period. Mineral compositions of the granite are close to the minimum eutectic composition. Its' chemical compositions are characterized with high contents of Si, K and Rb, alkaline-rich, but low contents of Ti, Fe,Ca, Mg, Ba, Sr and P, indicating it is highly fractionated granite. Based on the analysis of geochemical data of contemporary (362-325 Ma)magmatic rocks, we believed that parental magma of the granite could be derived from partial melting of the mixed crust (juvenile crust + Proterozoic basement of amphibolite facies)and then underwent the fractional crystallization of plagioclase, hornblende, biotite, apatite, zircon and other accessory minerals. With the combination of the regional geological data, we have concluded that the Taledesayi granite was formed in the back-arc basin. The occurrence of the highly differentiated granitic pluton may indicate that the Southern Tianshan Ocean was coming to an end in Visean age (338 Ma)of Carboniferous Mississippian period.

摘要: 为探讨阿腾套山西南缘塔勒德萨依正长花岗岩-花岗斑岩体的形成时代和岩石成因,为伊宁地块石炭纪构造演化提供可靠资料,对塔勒德萨依岩体进行了野外调查、锆石 U-Pb 定年及地球化学研究。结果显示,花岗斑岩年龄为(3383)Ma,表明岩体形成于密西西比亚纪。花岗岩的矿物组成接近低共结组分,全岩以高 Si、富碱、富 K 和 Rb,低 Ti、少 Fe、Ca、Mg,贫 Ba、Sr、P 等为特征,表明其为高分异花岗岩类。结合区域同时代(362~325 Ma)岩浆岩的地球化学资料,认为该花岗岩的母岩浆由混合地壳(新生地壳和元古代角闪岩相基底)部分熔融形成且母岩浆历经了斜长石、角闪石、黑云母、磷灰石和锆石等矿物的分离结晶。综合区域资料认为,塔勒德萨依岩体形成于弧后盆地,此类高分异花岗岩的形成可能标志着维宪期(338 Ma)南天山洋已进入衰亡期。

入藏号: CSCD:6647063

地址: Luo Yaoqing, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Zuopeng, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Ren Pengfei, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Teng Mingyao, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Yongjun, School of Earth Science and Resources, Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, MLR, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, MLR, Xi'an;;Xi'an, ;; 710054;;710054.

Lin Guangchun, School of Earth Science and Resources, Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, MLR, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, MLR, Xi'an;;Xi'an, ;; 710054;;710054.

地址: 罗耀清, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

王祚鹏, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

任鹏飞, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

滕明耀, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李永军, 长安大学地球科学与资源学院;;自然资源部岩浆作用成矿与找矿重点实验室, ;;自然资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, ;; 710054;;710054.

林广春, 长安大学地球科学与资源学院;;自然资源部岩浆作用成矿与找矿重点实验室, ;;自然资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, ;; 710054;;710054.

电子邮件地址: 1098178598@qq.com; yongjunl@chd.edu.cn

电子邮件地址: 1098178598@qq.com; yongjunl@chd.edu.cn

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作者: Liu Futian; Li Rongxi; Liu Xinshe; Yang Mingyi; Zhao Bangsheng; Wu Xiaoli; Qin Xiaoli

作者: 刘福田; 李荣西; 刘新社; 杨鸣一; 赵帮胜; 吴小力; 覃小丽

标题: Study of Gas Accumulation under Source Control in Western Sulige Gas Field, Ordos Basin

标题: 鄂尔多斯盆地苏里格西部气田源控主导的天然气成藏研究

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作者关键词: source control theory; geochemistry; gas accumulation; tight sandstone gas; Permian Shihezi and Shanxi Formations; Sulige gas field; Ordos Basin

作者关键词: 源控论; 地球化学; 天然气成藏; 致密砂岩气; 二叠系石盒子组山西组; 苏里格气田; 鄂尔多斯盆地

摘要: Tight sandstone gas reservoirs are distributed over a wide area in the western Sulige gas field, with interconnected and superposed gas-bearing sands. The main gas-bearing sands occur in the eighth member of the Shihezi Formation and the first member of the Shanxi Formation. These are sand bodies of a river delta sedimentary system. In this study, the geochemical characteristics

of the gas from the study area were analyzed together with the characteristics of the source rocks and hydrocarbon generation in the basin to determine the gas accumulation characteristics and the extent to which the gas-water relationship is controlled by the source rocks. It is shown that the gas in the study area mainly migrated from SW to NE, from west to east, and from bottom to top. It was found that the study area, which is located within the triangular zone of three high-intensity hydrocarbon generation centers, produces abundant gas, not only from the three hydrocarbon generation areas but also in the study area itself, which is continually producing gas to this day. The effect of the source rocks is that, as the gas migrates and accumulates, it drives formation water northward and upward regionally. The general pattern in the study area is summed up as southern gas and northern water, more water above and less below.

摘要: 苏里格西部气田致密砂岩气藏大面积复合连片分布,其主要含气层段二叠系盒8段山1段为河流三角洲沉积体系砂体。通过分析研究区天然气地球化学特征,并结合盆地烃源岩分布与生烃特征,揭示了研究区源控作用下的天然气成藏特征及成藏过程中的气水关系。结果表明:研究区天然气整体具有从西南向东北、从西向东及自下而上的运移特征,反映了处于生烃中心三角地带的研究区接受了来源于生烃中心的异地成因气与现今持续的原地成因气。在源岩控制作用下,苏里格西部气田天然气运聚成藏过程中,天然气驱动地层水区域性向北、向上运移,使研究区具有南气北水和地层水上多下少的气水分布总格局。

入藏号: CSCD:6636017

地址: Liu Futian, School of Earth Science and Resources, Changan University, Xi'an, Shaanxi 710054, China.

Li Rongxi, School of Earth Science and Resources, Changan University, Xi'an, Shaanxi 710054, China.

Zhao Bangsheng, School of Earth Science and Resources, Changan University, Xi'an, Shaanxi 710054, China.

Wu Xiaoli, School of Earth Science and Resources, Changan University, Xi'an, Shaanxi 710054, China.

Qin Xiaoli, School of Earth Science and Resources, Changan University, Xi'an, Shaanxi 710054, China.

Liu Xinshe, Division and Exploration, Changqing Oilfield Co. Ltd., PetroChina, Xi'an, Shaanxi 710018, China.

Yang Mingyi, Division and Exploration, Changqing Oilfield Co. Ltd., PetroChina, Xi'an, Shaanxi 710018, China.

地址: 刘福田, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李荣西, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

赵帮胜, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

吴小力, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

覃小丽, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

刘新社, 中国石油长庆油田分公司勘探事业部, 西安, 陕西 710018, 中国.

杨鸣一, 中国石油长庆油田分公司勘探事业部, 西安, 陕西 710018, 中国.

电子邮件地址: liufutian2016@163.com; rongxi99@163.com

电子邮件地址: liufutian2016@163.com; rongxi99@163.com

使用次数 (最近 180 天): 0

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作者: Zhao Bangsheng; Li Rongxi; Qin Xiaoli; Liu Futian; Wu Xiaoli; Zhao Di; Liu Qi; Zhou Wei

作者: 赵帮胜; 李荣西; 覃小丽; 刘福田; 吴小力; 赵迪; 刘齐; 周伟

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作者关键词: Shanxi Formation; shale; pore; fracture; reservoir characteristics; Ordos Basin

作者关键词: 山西组; 页岩; 孔隙; 裂隙; 储层特征; 鄂尔多斯盆地

摘要: Shanxi Formation shale is a stratum of marine-continental transitional facies with potential for shale gas exploration in the Ordos Basin. The petrology, mineralogy, reservoir space, pore structure and reservoir quality of the shale show that Shanxi Formation shale comprises black mud shale, grey-black mudstone and dark grey silty mudstone. It mainly consists of 59.6% clay minerals and 36.9% quartz, on average. Fractures are classified into macro and microfractures; the latter mainly occur in the shale and organic macerals, with an average surface density of 116.6/m. In addition to mineral and diagenetic pores, organic pores occur in organic macerals, formed by hydrocarbon generation as a result of the high degree of thermal evolution. Shanxi Formation mud shale has an average porosity of 0.77% and an average permeability of $0.06 \times 10^{-3} \text{ mD}$. A positive correlation was found between total organic carbon (TOC), vitrinite reflectance (R_o) and clay mineral content; quartz content and shale porosity are negatively correlated. The general development of fractures increases the permeability of shale, favorable to the accumulation of shale gas. Comprehensive analysis shows that the geological conditions of the shale gas reservoir in the Shanxi Formation are general and difficult to develop. However, there are good prospects for shale gas in the layers and regions with fractures and associated properties.

摘要: 鄂尔多斯盆地山西组发育一套厚度大且有勘探潜力的陆海陆过渡相页岩。应用岩芯观察、X衍射、扫描电镜和显微镜观察以及高压压汞等方法,对该盆地中部山西组页岩的岩石学、矿物学、页岩储集空间、孔隙结构和物性特征进行分析研究。结果表明:研究区山西组页岩以黑色泥岩、黑色页岩夹纹层或薄层状深色粉砂岩为主,页岩主要由黏土矿物和石英两类矿物组成,二者平均含量分别为 59.6%和 36.9%。页岩宏观和微观裂隙发育,显微镜下统计的显微裂缝平均面密度达到 116.6/m。除了发育与矿物和成岩作用有关的矿物孔隙外,页岩中

有机显微组分发育较多的有机质孔。页岩孔隙度平均为 0.77%,渗透率平均为 0.06×10^{-3} μm^2 。山西组页岩总有机碳(TOC)、镜质体反射率(R_o ,%)和黏土矿物含量是影响页岩孔隙度的主要因素,具有正相关性,而石英含量与页岩孔隙度呈一定的负相关关系。山西组页岩中裂缝的普遍发育提高了页岩的渗透率,有利于页岩气聚集成藏。综合分析表明山西组页岩气储层地质条件一般,开发难度较大,但在裂缝发育、物性较好的层位和地区仍具有较好的页岩气资源前景。

入藏号: CSCD:6636018

地址: Zhao Bangsheng, School of Earth Science and Resources, Changan University, Xi'an, Shaanxi 710054, China.

Li Rongxi, School of Earth Science and Resources, Changan University, Xi'an, Shaanxi 710054, China.

Qin Xiaoli, School of Earth Science and Resources, Changan University, Xi'an, Shaanxi 710054, China.

Liu Futian, School of Earth Science and Resources, Changan University, Xi'an, Shaanxi 710054, China.

Wu Xiaoli, School of Earth Science and Resources, Changan University, Xi'an, Shaanxi 710054, China.

Zhao Di, School of Earth Science and Resources, Changan University, Xi'an, Shaanxi 710054, China.

Liu Qi, School of Earth Science and Resources, Changan University, Xi'an, Shaanxi 710054, China.

Zhou Wei, School of Earth Science and Resources, Changan University, Xi'an, Shaanxi 710054, China.

地址: 赵帮胜, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李荣西, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

覃小丽, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

刘福田, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

吴小力, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

赵迪, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

刘齐, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

周伟, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

电子邮件地址: 1099638093@qq.com; rongxi99@163.com

电子邮件地址: 1099638093@qq.com; rongxi99@163.com

使用次数 (最近 180 天): 0

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作者: Gong Chen; Pei Xianzhi; Li Ruibao; Li Zuochen; Pei Lei; Liu Chenjun; Gao Feng; Chen Youxin; Wang Meng; Zhao Shaowei

作者: 弓晨; 裴先治; 李瑞保; 李佐臣; 裴磊; 刘成军; 高峰; 陈有炘; 王盟; 赵少伟

标题: Despositional Provenance Analysis of the Jinjiahe Phyllite from Sanchazhi Area(Lueyang County) in Mianlue Tectonic Belt of South Qinling,Shaanxi:Evidence from Detrital Zircon U-Pb Dating

标题: 南秦岭勉略构造带略阳三岔子地区金家河千枚岩沉积物源分析:碎屑锆石 U-Pb 年代学证据

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作者关键词: South Qinling orogen; mianlue tectonic belt; detrital zircons; Guanjiagou Formation; zircon LA-ICP-MS U-Pb dating

作者关键词: 南秦岭; 勉略构造带; 碎屑锆石; 关家沟组; 锆石 LA-ICP-MS U-Pb 定年

摘要: A set of rock assemblage is exposed in the Sanchazi area, Mianlue tectonic belt of Southern Qinling orogenic belt, which consists of gray-black carbonaceous sericite-quartz-phyllite, gray-white sericite-quartz-phyllite, intercalated with gravelly sericite-phyllite, dolomitic limestone, siliceous rock and carbon-siliceous slate. In order to explore their formation age and provenance, we conducted LA-ICP-MS U-Pb dating on detrital zircons from the gravelly sericite-dolomite-quartz-phyllite and sericite-dolomite-quartz-phyllite in Jinjiahe area. The obtained zircon U-Pb ages can be divided into three groups: Neoproterozoic age group (678~966Ma), with main age peak at 781Ma for sample ML1259-TW3 and 865Ma for sample ML1261-TW1, respectively; Mesoproterozoic age group (1122~1432Ma); and Palaeoproterozoic-Archaean age group (1944~2824Ma). The minimum age groups of detrital zircons for two metamorphic detrital rocks are 678~736Ma (average age of 725Ma) and 771~775Ma (average age of 773Ma), respectively. Combined with the regional geological records, we propose that the provenance of clastic debris in the sedimentary strata was mainly sourced from the Neoproterozoic magmatic rocks within the Mianlue tectonic belt, the Bikou block, and the Hannan-Micangshan complex in the northwestern margin of the Yangtze block. The maximum depositional age of the studied meta-sedimentary rocks is not later than Nanhua Period, and it may give insights into the post-collision-cracking stage of the Mianlue tectonic belt and the northwestern margin of the Yangtze block during the mid-late Neoproterozoic period (800Ma~).

摘要: 南秦岭勉略构造带略阳三岔子地区发育一套灰灰黑色含碳绢云石英千枚岩和灰白色绢云石英千枚岩夹灰黑色含砾绢云千枚岩、白云质灰岩、硅质岩以及碳硅质板岩的岩石组合。为探讨其形成时代及沉积物源,笔者对其中的含砾绢云白云质石英千枚岩、绢云白云质石英千枚岩进行岩石学及 LA-ICP-MS 碎屑锆石 U-Pb 年代学研究。所获得的碎屑锆石年龄可以分为 3 组: 新元古代年龄组 (678~966Ma), 该段有明显峰值, 峰值年龄分别为 781Ma、865Ma; 中元古代年龄组 (1122~1432Ma); 古元古代-太古代年龄组 (1944~2824Ma)。2 件变质碎屑岩的碎屑锆石最小年龄组分别为 678~736Ma (平均年龄为 725Ma)、771~775Ma (平均年龄为

773Ma)。综合研究认为该沉积地层沉积时代不早于南华纪,其沉积物源主要为勉略构造带内、碧口微地块、扬子地块西北缘汉南米仓山杂岩新元古代岩浆岩,其沉积事件对应于新元古带中晚期(800Ma~)勉略构造带及扬子地块西北缘后碰撞裂解阶段。

入藏号: CSCD:6630538

地址: Gong Chen, School of Earth Sciences and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Pei Xianzhi, School of Earth Sciences and Resources, Chang'an University;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Li Ruibao, School of Earth Sciences and Resources, Chang'an University;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Li Zuochen, School of Earth Sciences and Resources, Chang'an University;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Pei Lei, School of Earth Sciences and Resources, Chang'an University;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Liu Chenjun, School of Earth Sciences and Resources, Chang'an University;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Gao Feng, School of Earth Sciences and Resources, Chang'an University;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Chen Youxin, School of Earth Sciences and Resources, Chang'an University;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Wang Meng, School of Earth Sciences and Resources, Chang'an University;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Zhao Shaowei, School of Earth Sciences and Resources, Chang'an University;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

地址: 弓晨, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

裴先治, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部

矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
李瑞保, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部
矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
李佐臣, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部
矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
裴磊, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿
产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
刘成军, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部
矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
高峰, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿
产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
陈有忻, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部
矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
王盟, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿
产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
赵少伟, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部
矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
电子邮件地址: 634341238@qq.com; peixianzhi@qq.com
电子邮件地址: 634341238@qq.com; peixianzhi@qq.com
使用次数 (最近 180 天): 0
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作者: Ma Xiaojun; Liang Jiwei; Li Jianxing; Jia Weihang; Tao Wenxing; Liu Yalan; Liu Xiaofeng

作者: 马晓军; 梁积伟; 李建星; 贾伟航; 陶文星; 刘亚兰; 刘晓峰

标题: Meso-cenozoic Tectonic Uplift and Evolution of Central and Western Ordos Basin

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作者关键词: 裂变径迹分析; 热史模拟; 构造抬升; 鄂尔多斯盆地; 中生代

摘要: Through using the fission-track analysis and thermal evolution simulation, this paper discusses the Meso-cenozoic tectonic-dynamic thermal evolution of Central and Western Ordos Basin and its geological response. The AFT age of different tectonic units and the related strata in the studying area reveal that there may be two times uplift process occurred in the end of Late Cretaceous to Early Paleocene (79~65Ma) and Eocene to Early Miocene (56~15Ma). The spatial distribution of AFT ages suggests that the uplift and cooling time in south is early than in north, and the overall uplift was occurred in later period. The thermal evolution simulation indicates that this studying area had wholly experienced rapid uplift in Late Cretaceous, and the low uplift was happened in Paleocene to Late Miocene, while the further rapid uplift was occurred after Late Miocene. The tectonic uplift of Late Cretaceous in this studying area may be related to the evolution of Qinling tectonic units. The tectonic uplift of Cenozoic is consistent with the evolution of rifting around this basin. The rapid uplift since late Miocene may be related to the remote effect of the Tibetan Plateau uplift.

摘要: 通过磷灰石裂变径迹(AFT)分析与热史模拟的方法,探讨了鄂尔多斯盆地中西部地区中生代构造热演化过程及地质响应。不同构造单元及不同层位样品的AFT年龄结果表明,研究区中生代以来经历2次构造抬升:晚白垩世末古新世早期(79~65Ma)和始新世中新世早期(56~15Ma);AFT年龄空间对比图表明,研究区抬升冷却具有南早北晚、后期整体抬升的特征。热史模拟结果表明,研究区整体于晚白垩世末期快速冷却抬升,古新世中新世晚期为缓慢抬升,中新世末以来抬升速率明显加快。研究区中生代的构造演化过程与周缘构造单元的相互作用密不可分,晚白垩世以来的构造抬升可能与秦岭造山带构造演化有关,新生代以来的构造抬升与盆地周缘裂陷的演化具有一致性,中新世晚期以来的快速抬升可能与青藏高原隆升的远程效应有关。

入藏号: CSCD:6630545

地址: Ma Xiaojun, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

Liang Jiwei, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

Tao Wenxing, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

Liu Yalan, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

Liu Xiaofeng, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Jianxing, Chengdu Institute of Geology and Mineral Resources, Chengdu, Sichuan 610082, China.

Jia Weihang, Geological Exploration in the Chinese Building Materials Center Team in Gansu Province, Tianshui, Gansu 741000, China.

地址: 马晓军, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

梁积伟, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

陶文星, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

刘亚兰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

刘晓峰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李建星, 成都地质矿产研究所, 成都, 四川 610082, 中国.

贾伟航, 中国建筑材料工业地质勘查中心甘肃总队, 天水, 甘肃 741000, 中国.

电子邮件地址: 1192584847@qq.com

电子邮件地址: 1192584847@qq.com

使用次数 (最近 180 天): 0

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作者: Yan Xinyun; Jiao Jiangang; Dong Yibo; Qi Dong; Leng Xin; Liu Chao

作者: 闫馨云; 焦建刚; 董一博; 祁东; 冷馨; 刘超

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作者关键词: 南秦岭; 吴家湾金矿; 流体包裹体; 找矿方向

摘要: The Wujiawan gold deposit is an important gold deposit in northern Hanyin, Shaanxi. It is located at the Shiquan-Shenhe thrust-napped ductile shear zone in South Qinling. The field geological study found that the ore-bearing horizon of the Wujiawan gold deposit is the fourth lithological layer (S_{1m14}) of the first lithology section of the Meiziya Formation, and this layer is mainly composed of carbon-bearing sericite schist with siliceous rocks; The structure is mainly composed of two layer ductile shear zones (RFa and RFb), which can roughly distinguish the three-phase structural facies of S₁, S₂ and S₃. In which, S₀ is almost completely replaced, and S₂ deformation is closely related to gold mineralization. Gold ore body was mainly formed in the ductile shear zone during S₂ deformation. Based on geological research, the quartz veins from the Wujiawan Gold Mine can be divided into three phases. The study of fluid inclusions shows that these inclusions are dominated by gas-liquid two-phase inclusions, with rare pure gas phase, pure liquid phase and three-phase inclusions. Their homogeneous temperatures range from 176.8 °C to 344.4 °C, which is concentrated at 230~280 °C. Their salinity vary from 0.35 wt% to 13.51 wt% and are concentrated in 2~10 wt%. The ore-forming fluid belongs to medium-low temperature and low salinity fluid. The fluid capture depth is 1.38~3.47 km and is concentrated at 1.5~ 2.8 km, and the

mineralization is occurred in the middle and shallow parts. The fluid inclusions of quartz vein in S₂ stage are closely related to mineralization, their homogeneous temperatures are mainly concentrated at 240~280 °C, which are the fluid in the main ore-forming period. Laser Raman spectroscopy analysis shows that the liquid phase composition of gas-liquid two-phase inclusions is dominated by H₂O, containing a small amount of CO₂ and CH₄. The gas phase components are mainly CO₂, followed by CH₄, N₂ and H₂S. The inclusion types are mainly H₂O CO₂ system inclusions with rich CO₂. Compared to the properties of fluid inclusions in different areas of northern Hanyin, it is found that the homogeneous temperatures of fluid inclusions range from 190 °C to 260 °C, and their salinities vary from 6 wt% to 10 wt%, which are beneficial to mineralization.

摘要: 吴家湾金矿是汉阴北部地区的一个重要的金矿床,处于南秦岭石泉神河韧性滑脱逆冲推覆带。对其进行野外地质研究发现,吴家湾金矿赋矿层位为梅子垭组第一岩性段第四岩性层(S_{1m}₁~4),岩性主要为含碳绢云片岩夹硅质岩,控矿构造主要为RFa和RFb 2条顺层韧性剪切带,大致可分辨出S₁、S₂及S₃期构造面理,S₀几乎全部被置换,S₂期变形与金矿成矿关系密切,金矿体主要于该期形成的韧性剪切带中产出。在地质研究基础上,可将吴家湾金矿区石英脉划分为3期,对流体包裹体的研究表明,包裹体类型以气液两相包裹体为主,纯气相、纯液相及三相包裹体较少见;均一温度范围介于176.8~344.4°C,集中于230~280°C。盐度范围为0.35%~13.51%,集中于2%~10%,成矿流体属于中低温、低盐度流体。流体捕获深度在1.38~3.47 km,集中于1.5~2.8 km,于中浅部成矿。S₂期石英脉流与成矿关系紧密,流体包裹体均一温度主要集中在240~280°C,为主成矿期流体。激光拉曼光谱分析表明气液两相包裹体液相成分以H₂O为主,含少量CO₂和CH₄;气相成分主要为CO₂,其次为CH₄、N₂及H₂S;包裹体类型主要为富含CO₂的H₂O CO₂体系包裹体。对汉阴北部不同地区流体包裹体的性质进行对比研究后发现,流体包裹体均一温度为190~260°C,盐度为6%~10%,在这个区间内有利于成矿。

入藏号: CSCD:6630549

地址: Yan Xinyun, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Dong Yibo, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Qi Dong, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Leng Xin, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Liu Chao, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Jiao Jiangang, School of Earth Science and Resources, Chang'an University;;Key Laboratory of Western Mineral Resources and Geological Engineering, Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, MNR, ;;Key Laboratory of Western Mineral Resources and Geological Engineering, Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, MNR, Xi'an;;Xi'an;;Xi'an, Shaanxi;;Shaanxi;;Shaanxi 710054;;710054;;710054.

地址: 闫馨云, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

董一博, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

祁东, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

冷馨, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

刘超, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

焦建刚, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室;;国土资源部岩浆作用成矿与找矿重点实验室,;;西部矿产资源与地质工程教育部重点实验室;;国土资源部岩浆作用成矿与找矿重点实验室, 西安;;西安;;西安, 陕西;;陕西;;陕西 710054;;710054;;710054, 中国.

电子邮件地址: yanxinyun@chd.edu.cn; jiangang@chd.edu.cn

电子邮件地址: yanxinyun@chd.edu.cn; jiangang@chd.edu.cn

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作者: Deng Nan; Liu Yunhua; Zhao Qiang; Wu Yong; Li Xiaoyan; Ma Yuanhao; Fan Yuanyuan; Meng Ru

作者: 邓楠; 刘云华; 赵强; 吴勇; 李小严; 马源皓; 范媛媛; 孟茹

标题: Geological Characteristics and Genesis of the Tangba Gold Deposit in Wudu, Gansu Province

标题: 甘肃武都塘坝金矿床地质特征及矿床成因

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作者关键词: gold deposit; Tangba in Gansu; geochemical characteristics; genesis discussion

作者关键词: 金矿床; 甘肃塘坝; 地球化学特征; 成因探讨

摘要: The Tangba gold deposit is located at the eastern section of the Yangshan-Shijiba gold mineralization belt in the southern part of the Western Qinling. The ore body is occurred in the strata of Paleozoic Lower Devonian Qiaotou Formation, which is closely related to the granite porphyry vein in space. The ore body and the vein are controlled by the fault in the fold's axial part. The ore body is occurred as veined and lens texture. The ore minerals are mainly pyrite and arsenopyrite, and the surrounding rock alterations are mainly silicification, sericitization and carbonation. The $\delta^{18}\text{O}_{\text{(H}_2\text{O)}} \text{(V-SMOW)}$ values of main ore-forming fluid vary from 7.89 to 9.97, $\delta_{\text{(D)}} \text{(V-SMOW)}$ values range from -81.3 to -77.0, and the pyrite $\delta^{34}\text{S}$ () change from -1.3 to 0.8, with an average of -0.23, showing the characteristics of deep source sulfur. The zircon U-Pb dating age is (212.82 ± 7) Ma for granite porphyry. The test analysis of fluid inclusions in

this mining area shows that the ore-forming hydrothermal fluid has the characteristics of medium-low temperature and low salinity. The complete uniform temperature range of CO₂ phase in the main ore-forming period is 252.6 °C ~342.8 °C, with an average of 279.72 °C. The volume uniform temperature range is 156.9 °C ~307.6 °C, and their average value is 256.7 °C. The comprehensive study considers that this deposit belongs to a medium-low temperature magmatic hydrothermal gold deposit associated with magmatic activity.

摘要: 甘肃武都塘坝金矿床位于西秦岭南部阳山石鸡坝金矿带的东段。矿体赋存于古生界下泥盆统桥头组中,在空间上与花岗斑岩脉关系密切,矿体及岩脉受褶皱轴部断层的控制,矿体呈脉状、透镜状,矿石矿物主要为黄铁矿和毒砂,围岩蚀变主要为硅化、绢云母化、碳酸盐化。主成矿流体 $\delta^{18}\text{O}(\text{H}_2\text{O}(\text{V-SMOW}))$ 变化范围为 7.89~9.97, $\delta(\text{D}(\text{V-SMOW}))$ 变化范围为 -81.3~-77.0,黄铁矿 $\delta^{34}\text{S}(\text{‰})$ 变化范围为 -1.3~0.8,平均为 -0.23,显示深源硫的特征。花岗斑岩中锆石 U-Pb 测年年齡为(212.82.7)Ma。矿区流体包裹体测试分析显示出成矿热液具有中低温、中低盐度特征,主成矿期石英中 CO₂ 相完全均一温度范围为 252.6~342.8 °C,平均值为 279.72 °C;水液两相型包裹体均一温度范围为 156.9 °C~307.6 °C,平均值为 256.7 °C。综合研究认为,该矿床为与岩浆活动有关的中低温岩浆热液型金矿床。

入藏号: CSCD:6630550

地址: Deng Nan, School of Earth Science and Resources, Chang'an University, Xi'an, Shaaxi 710054.

Liu Yunhua, School of Earth Science and Resources, Chang'an University, Xi'an, Shaaxi 710054.

Li Xiaoyan, School of Earth Science and Resources, Chang'an University, Xi'an, Shaaxi 710054.

Ma Yuanhao, School of Earth Science and Resources, Chang'an University, Xi'an, Shaaxi 710054.

Fan Yuanyuan, School of Earth Science and Resources, Chang'an University, Xi'an, Shaaxi 710054.

Meng Ru, School of Earth Science and Resources, Chang'an University, Xi'an, Shaaxi 710054.

Zhao Qiang, Third Institute Geological and Mineral Exploration of Gansu Provincial Bureau of Geology and Mineral Resources, Lanzhou, Gansu 730000, China.

Wu Yong, Third Institute Geological and Mineral Exploration of Gansu Provincial Bureau of Geology and Mineral Resources, Lanzhou, Gansu 730000, China.

地址: 邓楠, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

刘云华, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李小严, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

马源皓, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

范媛媛, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

孟茹, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

赵强, 甘肃省地质矿产勘查开发局第三地质矿产勘查院, 兰州, 甘肃 730000, 中国.

吴勇, 甘肃省地质矿产勘查开发局第三地质矿产勘查院, 兰州, 甘肃 730000, 中国.

电子邮件地址: 490540075@qq.com; 280056933@qq.com

电子邮件地址: 490540075@qq.com; 280056933@qq.com

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作者: Zhang Guishan; Fang Weixuan; Peng Ren; Zheng Houyi

作者: 张贵山; 方维萱; 彭仁; 郑厚义

标题: Zircon U-Pb Chronology, Origin and Tectonic Significance of the Triassic High Potassic Volcanic Rock from Gejiu, Yunnan, Southwestern China

标题: 云南个旧三叠纪高钾质火山岩锆石 U-Pb 年代学、岩石成因及构造意义

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作者关键词: 锆石 U-Pb 年龄; 高钾质; 苦橄岩; 地球化学; 个旧

摘要: The Triassic volcanic rocks of the Gejiu Group(T_{2g})outcrop in the Kafang area of Gejiu. These rocks have zircon U-Pb ages of 214.52.2 Ma, and indeed, Triassic is an important period of volcanic activities in the Gejiu region. The Kafang volcanic rocks have SiO₂ of 39.28% to 44.56%, MgO of 11.87% to 17.81%, Mg# from 0.69 to 0.82, TiO₂ from 1.79% to 3.11%, Ti/Y ratios from 641 to 1124, and K₂O/Na₂O ratios from 1.25 to 25.95, indicating a high K alkaline picrite and titanium-rich signature. These volcanic rocks are relatively enriched in LREE, LILE (Rb, Ba, K) and HFSE (Nb, Ta, Zr, Hf). The rocks are characterized by steeply right dipping chondrite normalized REE patterns with insignificant Eu and Ce anomalies. It is inferred that the magma of the volcanic rocks was derived from the mantle without significant crustal contamination. The Gejiu high K picrite was likely derived from partial melting of phlogopite-rich mantle peridotite. Besides, the magma was formed at high temperature (1554 °C) and pressure (3.6 GPa), i.e., about 115 km deep, which may relate to mantle plume. We propose that the Gejiu high K picrite may have been formed in a Triassic back-arc rifted basin and possibly related to asthenospheric mantle upwelling or mantle plume.

摘要: 个旧卡房段三叠纪高钾质火山岩赋存于个旧组(T_{2g}), 锆石 U-Pb 测年结果显示火山岩年龄为 214.52.2 Ma, 代表了个旧地区三叠纪火山岩活动的重要期次。该火山岩为一套碱性高钾质苦橄岩, 具有富 Ti 特征, 其 SiO₂ 含量为 39.28%~44.56%, MgO 含量为 11.87%~17.81%, Mg# 值介于 0.69~0.82 之间, TiO₂ 含量为 1.79%~3.11%、Ti/Y=641~1124, K₂O/Na₂O 值为 1.25~25.95; 不同程度富集轻稀土元素(LREE)、大离子亲石元素(Rb、Ba、K)和高场强元素(Nb、Ta、Zr、Hf), 轻重稀土元素分馏明显, deltaEu 和 deltaCe 异常不明显, 研究表明岩浆演化过程中未发生地壳物质混染作用, 具有原生岩浆的特征。个旧高钾质苦橄岩源自饱满型富含金云母地幔橄辉岩部分熔融, 具有较高的熔融平衡温度 (1554 °C) 和平衡压力 (3.6 GPa), 岩浆熔融的深度大约在 115 km, 可能来自地幔热点轴的部分

熔融。个旧高钾质苦橄岩形成的地构造背景为三叠纪弧后裂谷盆地,其形成与软流圈地幔物质上涌或地幔热点活动密切相关。

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地址: Zhang Guishan, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi, China; Nonferrous Metals Geology Survey, Beijing 710065, China.

Fang Weixuan, China Nonferrous Metals Geology Survey, Beijing 100012, China.

Peng Ren, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710065, China.

Zheng Houyi, General Institute of Geological Survey, China Chemical Geology and Mine Bureau, Beijing 100013, China.

地址: 张贵山, 长安大学地球科学与资源学院; 有色金属矿产地质调查中心, 西安, 陕西; 北京 710065; 100012, 中国.

方维萱, 有色金属矿产地质调查中心, 北京 100012, 中国.

彭仁, 长安大学地球科学与资源学院, 西安, 陕西 710065, 中国.

郑厚义, 中化地质矿山总局化工地质调查总院, 北京 100013, 中国.

电子邮件地址: zygszh@chd.edu.cn; 569026971@qq.com

电子邮件地址: zygszh@chd.edu.cn; 569026971@qq.com

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作者: Lei Ruxiong; Zhao Tongyang; Li Ping; Dong Lianhui; Li Jihong; Wu Changzhi

作者: 雷如雄; 赵同阳; 李平; 董连慧; 李基宏; 吴昌志

标题: H-O-S-Pb Isotopic Geochemistry of Dapinggou Gold Deposit in Northern Altun and Its Implications for Ore Genesis

标题: 北阿尔金地区大平沟金矿 H-O-S-Pb 同位素地球化学特征对金矿成因的启示

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Altun

作者关键词: 同位素地球化学; 造山型金矿; 大平沟金矿床; 北阿尔金

摘要: Dapinggou gold deposit is one of the typical gold deposits in Northern Altun. The deposit is characterized by K-feldspar quartz vein-type and altered rock-type mineralization. The gold mineralization occurs within near the E-W ductile shear zone with the K-feldspar leptynite of Archaean Milan Group as the principal host rock. The ore minerals are mainly pyrite, with minor limonite and natural gold. The measured $\delta^{18}\text{O}$ (VSMOW) values for the gold-bearing quartz range from 12.4 to 15.3, the estimated $\delta^{18}\text{O}$ fluid values range from 7.4 to 10.3, and the δD (VSMOW) values of fluid inclusions in quartz range from -97 to -66, indicating that the ore-forming fluid is dominated by metamorphic sources. The $\delta^{34}\text{S}$ (VCDT) values of sulfide minerals range from 6.9 to 8.3 in accordance with those of the typical orogenic gold deposits. The $^{206}\text{Pb}/^{204}\text{Pb}$ ratios of sulfides range from 18.310 1 to 19.373 9, $^{207}\text{Pb}/^{204}\text{Pb}$ ratios from 15.587 2 to 15.654 1, and the $^{208}\text{Pb}/^{204}\text{Pb}$ ratios from 38.119 1 to 39.143 9, indicating the lead source of sulfide the same as the orogenic type. It is proposed that Dapinggou gold deposit can be classified as the orogenic gold deposit, the gold formation is controlled by the near EW secondary fault and the ductile shear zone, the metallogenic material is derived from the Archaean metamorphic rocks, and the ore-forming fluids are mainly metamorphic fluids.

摘要: 大平沟金矿床是北阿尔金地区典型金矿床之一,矿化类型以钾长石石英脉型和蚀变岩型为主,矿体赋存于近东西向韧性剪切带中,围岩为太古宙米兰岩群钾长变粒岩。矿石矿物以黄铁矿为主,另有少量褐铁矿和自然金等。大平沟金矿床含金石英脉中石英的 $\delta^{18}\text{O}$ (VSMOW) 值为 12.4~15.3,估算的流体 $\delta^{18}\text{O}$ 值介于 7.4~10.3 之间,石英中流体包裹体的氢同位素为 -97~-66,表明成矿流体以变质流体来源为主;含金石英脉中硫化物的 $\delta^{34}\text{S}$ (VCDT) 值为 6.9~8.3,主要为壳源硫,与典型造山型金矿的硫值一致;硫化物的 $^{206}\text{Pb}/^{204}\text{Pb}$ 值为 18.310 1~19.373 9, $^{207}\text{Pb}/^{204}\text{Pb}$ 值为 15.587 2~15.654 1,而 $^{208}\text{Pb}/^{204}\text{Pb}$ 值为 38.119 1~39.143 9,反映硫化物的铅来源具有造山带铅特征。综合分析认为,大平沟金矿床属于造山型金矿,其形成受近东西向次级断裂和韧性剪切带控制,成矿流体以变质流体为主,成矿物质来源于太古宙深变质岩。

入藏号: CSCD:6622636

地址: Lei Ruxiong, College of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhao Tongyang, Xinjiang Bureau of Geology and Mineral Resources, Urumqi, Xinjiang 830000, China.

Li Ping, Xinjiang Bureau of Geology and Mineral Resources, Urumqi, Xinjiang 830000, China.

Dong Lianhui, Xinjiang Bureau of Geology and Mineral Resources, Urumqi, Xinjiang 830000, China.

Li Jihong, Nanjing Center, China Geological Survey, Nanjing, Jiangsu 210016, China.

Wu Changzhi, School of Earth Sciences and Engineering, Nanjing University, Nanjing, Jiangsu 210093, China.

地址: 雷如雄, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

赵同阳, 新疆维吾尔自治区地质矿产勘查开发局, 乌鲁木齐, 新疆 830000, 中国.

李平, 新疆维吾尔自治区地质矿产勘查开发局, 乌鲁木齐, 新疆 830000, 中国.

董连慧, 新疆维吾尔自治区地质矿产勘查开发局, 乌鲁木齐, 新疆 830000, 中国.

李基宏, 中国地质调查局南京地质调查中心, 南京, 江苏 210016, 中国.

吴昌志, 南京大学地球科学与工程学院, 南京, 江苏 210093, 中国.

电子邮件地址: ruxionglei@chd.edu.cn

电子邮件地址: ruxionglei@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Li Junjun; Cao Jiannong; Cheng Beibei; Liao Juan; Zhu Yingying

作者: 李军军; 曹建农; 程贝贝; 廖娟; 朱莹莹

标题: High spatial resolution remote sensing imagery segmentation based on combination of pixels and multi-scale objects using spectral clustering

标题: 联合像素与多尺度对象的高分辨率遥感影像谱聚类分割

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作者关键词: photogrammetry and remote sensing; remote sensing image segmentation; spectral clustering; normalized cut; multi-scale objects

作者关键词: 摄影测量与遥感; 遥感影像分割; 谱聚类; 归一化分割; 多尺度对象

摘要: An spectral clustering segmentation method for high spatial resolution(HSR) remote sensing image based on combination of pixels and multi-scale objects is proposed.The algorithm first focus on building a graph that integrates multi-scale information as well as improve similarity computation method between objects.Then,the similarity matrix is computed on the graph,and normalized cut criterion is used to similarity matrix eigen-decomposition so that the original data is mapped into the low-dimensional subspace.Finally,the clustering algorithm is used to complete the image segmentation after the selected subset of the eigenvectors.In order to prove the effectiveness of the algorithm,we choose high spatial resolution remote sensing images to conduct experiment and compare to the state-of-the-art techniques.The experimental result show that three of four experimental indexes are superior to other algorithms,which proves the effectiveness of this proposed method segmentation method.

摘要: 建立了融合多尺度信息的图模型,同时,为了顾及对象的局部统计特性,改进了基于对象的顶点间相似度计算方法。在图模型的基础上完成相似矩阵计算,并使用归一化分割准则对

相似矩阵特征进行分解,将原始数据映射到低维子空间。最后,对特征筛选后的子集使用聚类算法完成影像分割。为了验证本文方法的有效性,选取高空间分辨率遥感影像进行实验并与目前分割精度较高的算法做定量化对比。实验结果表明:在 4 项实验指标中,除一项基本持平外,其他 3 项指标优于其他算法,证明了本文方法在高分辨率遥感影像分割中的有效性。

入藏号: CSCD:6618286

地址: Li Junjun, College of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710061, China.

Cheng Beibei, College of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710061, China.

Liao Juan, College of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhu Yingying, College of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710061, China.

Cao Jiannong, College of Geological Engineering and Surveying, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 李军军, 长安大学地球科学与资源学院, 西安, 陕西 710061, 中国.

程贝贝, 长安大学地球科学与资源学院, 西安, 陕西 710061, 中国.

廖娟, 长安大学地球科学与资源学院, 西安, 陕西 710061, 中国.

朱莹莹, 长安大学地球科学与资源学院, 西安, 陕西 710061, 中国.

曹建农, 长安大学地质工程与测绘学院, 西安, 陕西 710061, 中国.

电子邮件地址: ljj19921592@163.com; caojiannong@126.com

电子邮件地址: ljj19921592@163.com; caojiannong@126.com

使用次数 (最近 180 天): 0

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作者: Liu Lei; Wu Mengmeng; Yin Cuijing; Zhou Jun; Xie Wenyang; Yin Chuntao

作者: 刘磊; 吴朦朦; 尹翠景; 周军; 谢文杨; 尹春涛

标题: Influence of the Different Spatial Resolutions for Alteration Mineral Mapping

标题: 影像空间分辨率对蚀变信息提取结果的影响研究

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作者关键词: 空间分辨率; 脉状蚀变; 面状蚀变; 金滩子地区

摘要: Vein-type alterations are extensively distributed and normally very thin, the extraction of these alteration zones is affected by the spatial resolution of remote sensing data seriously. To evaluate the ability of different spatial resolutions for alteration mineral mapping, taking Jintanzi area as the study area, the pixel of airborne CASI/SASI hyperspectral data were resampled to 5 m, 10 m, 15 m, 20 m and 30 m. The spectrum of muscovite from JPL spectral library and matched filtering method were utilized to extract the distribution of muscovite minerals. Spectra of pixels show that for alteration of large areas the spectral features are influenced weakly by the changing of spatial resolution and all the absorption features could be retained. Comparably, for the thin vein-type alteration, with the degradation of spatial resolution, the effect of the mixed pixel is more serious. Thus, the absorption feature of image spectra is very shallow. When the spatial resolution is 30 m, the absorption is weakest and difficult to be identified. The mapping results of the muscovite show that the thin vein-type alteration (about 1 to 5 meters wide) could be identified in the images with resolution of 5 m, 10 m and 15 m, while it is difficult for the images with resolution of 20 m and 30 m to detect.

摘要: 脉状蚀变分布广泛且蚀变规模一般较小, 遥感影像空间分辨率对此类蚀变提取影响严重。为了评估不同空间分辨率数据对脉状矿化蚀变信息的提取能力, 以甘肃北山金滩子地区为例, 应用航空高光谱 CASI/SASI 数据, 将像元重采样至 5、10、15、20 和 30 m 共 5 种空间分辨率模式; 以 JPL 光谱库中白云母矿物光谱曲线为参考, 利用光谱匹配滤波法提取区内白云母化蚀变。不同规模蚀变带在 5 种分辨率模式下像元光谱表明: 面状蚀变由于面积较大, 空间分辨率变化对像元光谱吸收特征影响较小; 脉状蚀变带特别是较窄脉状蚀变带随着空间分辨率的降低, 混合像元影响越来越强, 像元光谱的吸收特征越来越浅, 30 m 空间分辨率时吸收特征最弱。5 种空间分辨率影像的白云母矿物提取结果表明较窄蚀变带 (宽约 1~5 m) 在 5~15 m 空间分辨率图像中均线状特征明显, 在 20 m 分辨率数据结果中仅断续出现, 在 30 m 空间分辨率结果中仅个别像元被突出。

入藏号: CSCD:6621683

地址: Liu Lei, School of Earth Sciences and Resources, Chang'an University, Key Laboratory for the study of Focused Magmatism and Giant Ore Deposits, MNR, Xi'an, Shaanxi 710054, China.

Wu Mengmeng, School of Earth Sciences and Resources, Chang'an University, Key Laboratory for the study of Focused Magmatism and Giant Ore Deposits, MNR, Xi'an, Shaanxi 710054, China.

Yin Cuijing, School of Earth Sciences and Resources, Chang'an University, Key Laboratory for the study of Focused Magmatism and Giant Ore Deposits, MNR, Xi'an, Shaanxi 710054, China.

Xie Wenyang, School of Earth Sciences and Resources, Chang'an University, Key Laboratory for the study of Focused Magmatism and Giant Ore Deposits, MNR, Xi'an, Shaanxi 710054, China.

Yin Chuntao, School of Earth Sciences and Resources, Chang'an University, Key Laboratory for the study of Focused Magmatism and Giant Ore Deposits, MNR, Xi'an, Shaanxi 710054, China.

Zhou Jun, School of Earth Sciences and Resources, Chang'an University; Xi'an Spacetime Geo-mineral Technology Limited, Key Laboratory for the study of Focused Magmatism and Giant Ore Deposits, MNR, Xi'an, Shaanxi 710054; 710068.

地址: 刘磊, 长安大学地球科学与资源学院, 自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

吴朦朦, 长安大学地球科学与资源学院, 自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

尹翠景, 长安大学地球科学与资源学院, 自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

谢文杨, 长安大学地球科学与资源学院, 自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

尹春涛, 长安大学地球科学与资源学院, 自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

周军, 长安大学地球科学与资源学院;;西安时空地质矿产技术有限公司, 自然资源部岩浆作用成矿与找矿重点实验室;; 西安;;西安, 陕西;;陕西 710054;;710068, 中国.

电子邮件地址: liul@chd.edu.cn

电子邮件地址: liul@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Gao Zuoyu; Liu Yunhua; Han Yixiao; Lei Wanshan; Deng Nan

作者: 高作宇; 刘云华; 韩一筱; 雷万杉; 邓楠

标题: Geological characteristics and genesis of the Fanjiashan copper and gold skarn deposit of western Qinling in Tianshui, Gansu

标题: 西秦岭天水范家山夕卡岩型铜金矿床地质特征及成因探讨

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作者关键词: 铜金矿; 夕卡岩型; 范家山; 西秦岭

摘要: The Fanjiashan copper and gold mine of the metallogenic subzone is located in the north of West Qinling Mountains, at the core of the Wenquan composite granite-Tianshui porphyry-skarn molybdenum copper and gold zone. The geological characteristics of the deposit show that the Fanjiashan copper and gold mine is dominated by gold and copper mineralization and mainly controlled by the rock-wall rock contact belt and fracture zone surrounding the nearby rocks. The wall rocks feature alterations by skarnization, amphibolitization, silicification and sericitization. We studied the temperature, salinity and H-O isotope of mother lode inclusions in the Fanjiashan

copper and gold deposit. The results show that the main metallogenic fluid has a salinity(S) of 2.0%-11.0%(w(NaCl)_(eq)) and a homogeneous temperature of 120-345 °C (mostly in 150-280 °C). This medium temperature and medium to low salinity fluid can be characterized as a mixture of magmatic water and atmospheric precipitation. The zircon U-Pb age of metallogenic granite porphyry is 248.31.9Ma(MSWD=0.67, N =9), indicating mineralization in early Indosinian. Based on the regional tectonic setting, the Fanjiashan copper and gold mine is a skarn deposit, arising from the crust thickening during the early-stage of Indosinian collision, and has deep ground porphyry mineralization potential.

摘要: 范家山铜金矿位于西秦岭北成矿亚带, 温泉复式花岗岩-天水斑岩-夕卡岩铜金矿带的核心位置。矿床地质特征表明: 范家山铜金矿体主要受岩体与围岩接触带以及岩体附近的断裂破碎带的控制, 以金铜矿化为主, 围岩蚀变为夕卡岩化、角岩化及硅化、绢英岩化等。范家山铜金矿床主矿脉包裹体温度、盐度及 H-O 同位素研究显示, 主成矿流体的盐度(S)为 2.0%~11.0%(w(NaCl)_(eq)), 均一温度为 120~345 °C, 主要集中在 150~280 °C 范围, 具有中温和中低盐度的特征, 为岩浆水和大气降水的混合。成矿花岗斑岩锆石 U-Pb 年龄为 (248.31.9)Ma(MSWD=0.67, N=9), 表明成矿活动发生在印支早期。结合区域构造背景, 范家山铜金矿为印支期早期陆陆碰撞导致地壳加厚背景下的夕卡岩型矿床, 深部具有斑岩型成矿的潜力。

入藏号: CSCD:6613059

地址: Gao Zuoyu, School of Earth Science and Resources, Chang'an University;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, ;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an;; Xi'an, ;; 710054;; 710054.

Liu Yunhua, School of Earth Science and Resources, Chang'an University;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, ;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an;; Xi'an, ;; 710054;; 710054.

Han Yixiao, School of Earth Science and Resources, Chang'an University;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, ;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an;; Xi'an, ;; 710054;; 710054.

Lei Wanshan, School of Earth Science and Resources, Chang'an University;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, ;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an;; Xi'an, ;; 710054;; 710054.

Deng Nan, School of Earth Science and Resources, Chang'an University;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, ;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an;; Xi'an, ;; 710054;; 710054.

地址: 高作宇, 长安大学地球科学与资源学院;; 自然资源部岩浆作用成矿与找矿重点实验室, ;; 自然资源部岩浆作用成矿与找矿重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

刘云华, 长安大学地球科学与资源学院;; 自然资源部岩浆作用成矿与找矿重点实验室, ;; 自然资源部岩浆作用成矿与找矿重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

韩一筱, 长安大学地球科学与资源学院;; 自然资源部岩浆作用成矿与找矿重点实验室, ;; 自然

资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
雷万杉, 长安大学地球科学与资源学院;;自然资源部岩浆作用成矿与找矿重点实验室, ;;自然资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
邓楠, 长安大学地球科学与资源学院;;自然资源部岩浆作用成矿与找矿重点实验室, ;;自然资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
电子邮件地址: 616718538@qq.com; Zyyhliu@chd.edu.cn
电子邮件地址: 616718538@qq.com; Zyyhliu@chd.edu.cn
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作者: Liu Yuan; Konietzky Heinz

作者: 刘源; Konietzky Heinz

标题: PARTICLE-BASED MODELING OF CRACK PROPAGATION DURING PULL-APART BASIN DEVELOPMENT

标题: 基于离散元方法对走滑拉分盆地演化及次级断裂扩展过程研究

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作者关键词: numerical modeling; pull-apart basins; transtensional basins; crack propagation; Discrete Element Method

作者关键词: 数值模拟; 拉分盆地; 张扭性盆地; 断裂扩展; 离散元方法

摘要: Pull-apart basins are extensional structures which are closely related to strike-slip faults. Pull -apart basins have received considerable attention from geologists because of its significant tectonic meaning and the associations with volcanism, earthquake swarms, and special mineralization. Although numerous studies have contributed to the current understanding of pull-apart basin evolution, pull-apart basin development concentrating on crack propagation and coalescence is lacking because of the limitations of the previous methods. A particle - based approach, which is based on Discrete Element Method (DEM), can be successfully used to simulate crack propagation during pull-apart basin development for pure strike-slip. Transtensional models are also set up to investigate basin development and crack propagation in transtensional systems, with different angles between the master strike-slip faults and the motion direction in each system. Modeling results are compared with natural examples worldwide such as

the Dead Sea basin, Cinarcik basin in Marmara Sea, and El Paraiso basin in SW Colombia et al. This research provides new method and view to study the evolution of pull - apart basins and the propagation and coalescence of the related strike-slip faults.

摘要: 拉分盆地是一种与走滑断裂带密切相关的特殊拉张构造,因其重要的构造意义,及其与火山活动、中小地震群集、特殊的成矿作用间的伴生关系而受到研究者的高度重视。关于拉分盆地的形成演化过程,已有较多的研究成果,但是由于研究手段的限制,缺少对盆地演化中次级断裂扩展过程的研究。基于离散元的数值计算方法是研究断裂扩展方式的理想方法。本文采用基于离散元的颗粒流方法,揭示纯走滑拉分盆地发育过程中的断裂扩展和连接过程,为拉分盆地演化机理和断裂扩展提供新的研究方法。同时,根据主走滑断层与块体运动方向的夹角不同,建立不同的张扭性拉分盆地模型,系统研究张扭性盆地的断裂扩展和演化机理。将上述理论研究结果与死海盆地等经典拉分盆地实例相结合,探讨了死海盆地、土耳其 Cinarcik 盆地、哥伦比亚 El Paraiso 盆地等的形成演化机理和断裂扩展方式。

入藏号: CSCD:6613318

地址: Konietzky Heinz, Geotechnical Institute, TU Bergakademie Freiberg, Freiberg, 09599, Germany.

Konietzky Heinz, Geotechnical Institute, TU Bergakademie Freiberg, Freiberg, 09599, Germany.

Liu Yuan, School of Earth Science and Resources, Chang'an University;; Geotechnical Institute, TU Bergakademie Freiberg, ;; Xi'an;; Freiberg, Shannxi;; Germany 710054;; 09599.

地址: 刘源, 长安大学地球科学与资源学院;; Geotechnical Institute, TU Bergakademie Freiberg, ;; 西安;; Freiberg, 陕西;; Germany 710054;; 09599, 中国.

电子邮件地址: lhmannely@sina.com

电子邮件地址: lhmannely@sina.com

使用次数 (最近 180 天): 0

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作者: Liu Yanrong; Li Fang; Liu Yunhua; Liu Minwu

作者: 刘艳荣; 李芳; 刘云华; 刘民武

标题: Infrared Microthermometry of Fluid Inclusions in the Erdaohezi Pb-Zn-Ag Polymetallic Deposit, Inner Mongolia

标题: 内蒙古二道河子铅锌银多金属矿床流体包裹体红外显微测温研究

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作者关键词: fluid inclusions; infrared microthermometric measurement; Erdaohezi Pb-Zn-Ag polymetallic deposit

作者关键词: 流体包裹体; 红外显微测温; 二道河子铅锌银矿床

摘要: The Erdaohezi Pb-Zn-Ag polymetallic deposit, one of the largest and representative deposits in the Derbugan metallogenic belt, is mainly hosted in the volcanic rocks of the middle Jurassic Tamulangou Formation along NW and NWW-trending fault zones. Sphalerite, which is one of the main ore minerals in the deposit, has been classified into three generations according to their corresponding ore-forming stages. Black sphalerite formed at the earliest stage, followed by reddish brown to brown sphalerite, and tawny or pale yellow sphalerite in the latest stage. Fluid inclusions in sphalerite of different ore-forming stages and its coexisting quartz have been studied using infrared microscopy. It is believed that the sphalerite-hosted fluid inclusions may provide direct and detailed information regarding the ore-forming fluids. Our results show that the fluid inclusions in sphalerite and its coexisting quartz generally have similar morphological characteristics, salinities, densities and homogenization temperatures, which is consistent with the fact that sphalerite is intergrowth with quartz. Microthermometric and laser Raman spectroscopic data indicate the ore-forming fluid evolved from a moderate-temperature, low to moderate-salinity and CO₂-rich aqueous fluid in the earliest ore-forming stage to a low to moderate-temperature, low to moderate salinity and CO₂-depleted aqueous fluid in the middle stage, and a low-temperature, low-salinity and aqueous fluid in the last ore-forming stage. Boiling, natural cooling and mixing with meteoric water took place at three different ore-forming stages respectively and caused deposition of sphalerite. The Erdaohezi deposit is, therefore, a post-magmatic mesothermal-epithermal Pb-Zn-Ag polymetallic deposit related to volcanic-subvolcanic magmatism.

摘要: 二道河子铅锌银多金属矿床是得耳布干成矿带具有代表性的铅锌矿床之一。闪锌矿作为主要矿石矿物,可分为早期黑色-中期红棕色或棕色-晚期黄褐色或浅黄色三个世代。采用红外显微镜技术和激光拉曼技术对不同世代闪锌矿及共生石英中的流体包裹体进行显微测温 and 成分测试,初步认为三个世代闪锌矿基本与石英内的三次流体活动相对应,推测它们形成于同一物理化学条件,捕获同一成矿流体,但闪锌矿流体包裹体能更直观而细致地勾勒出成矿流体的演化过程。从成矿早期至晚期,随着流体演化,流体包裹体的均一温度、盐度及 CO₂ 含量均明显下降,流体从中温、中低盐度、CO₂-H₂O-NaCl 体系向低温、低盐度、H₂O-NaCl 体系演化。此外,在整个主成矿过程中,影响成矿物质沉淀富集的机制也随时间变化有所差异:早期流体沸腾是黑色闪锌矿等硫化物形成的重要因素;中期以流体自然冷却作用为主,形成了红棕色闪锌矿等硫化物;至晚期,随着大气水的混入,流体混合作用是形成晚期闪锌矿等硫化物的重要原因。二道河子矿床为与火山-次火山有关的浅成中低温热液矿床。

入藏号: CSCD:6603040

地址: Liu Yanrong, School of Earth Science and Resources, Chang'an University;; ;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Liu Yunhua, School of Earth Science and Resources, Chang'an University;; ;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Liu Minwu, School of Earth Science and Resources, Chang'an University;; ;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education,

Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Li Fang, Wuhan Center of China Geological Survey, Wuhan, Hubei 430205, China.

地址: 刘艳荣, 长安大学地球科学与资源学院;;长安大学, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

刘云华, 长安大学地球科学与资源学院;;长安大学, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

刘民武, 长安大学地球科学与资源学院;;长安大学, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

李芳, 中国地质调查局武汉地质调查中心, 武汉, 湖北 430205, 中国.

电子邮件地址: fwjlyr@chd.edu.cn

电子邮件地址: fwjlyr@chd.edu.cn

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作者: Wang Xiaofeng; Ma Xue; Feng Xiaoming; Zhou Chaowei; Fu Bojie

作者: 王晓峰; 马雪; 冯晓明; 周潮伟; 傅伯杰

标题: Spatial-temporal characteristics of trade-off and synergy of ecosystem services in key vulnerable ecological areas in China

标题: 重点脆弱生态区生态系统服务权衡与协同关系时空特征

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作者关键词: key vulnerable ecological areas; ecosystem services; trade-offs and synergies; ecological restoration

作者关键词: 重点脆弱生态区; 生态系统服务; 权衡与协同; 生态恢复

摘要: Until now, studies on trade-offs and synergies of ecosystem services were mostly on a local scale. Key vulnerable ecological areas have been the main target areas for improving the ecological environment in China. Based on the quantitative assessment of soil conservation, vegetation net primary productivity (NPP), and water production services in key vulnerable ecological areas of China from 1990 to 2015, we studied the trade-off and synergy of ecosystem services using the correlation coefficient method and vegetation continuous fields

(VCF) data. The results showed that:(1) during the 26 years, the soil conservation services, NPP and water production services in key vulnerable ecological areas showed a distribution pattern of more south and less north, and the interannual variations of the three services were smaller, but they all had an upward trend; (2) the three ecosystem services in the investigated key vulnerable ecological areas were synergistic as a whole and partially balanced, and the synergistic relationship is weakening; (3) the ecological service area's ecosystem service synergy is greater than the non-ecological in the recovery area, the dynamic change trend of the weakening of the trade-off relationship is higher than that of the non-ecological recovery area. Quantitative assessment of the spatial and temporal characteristics of trade-offs and synergies of ecosystem services would be useful for studying the temporal nonlinearity and spatial heterogeneity of the relationships among ecosystem services, and it would be of great significance for the sustainable development of ecosystems in key vulnerable ecological areas.

摘要: 目前,有关生态系统服务权衡与协同关系的研究多集中在局地尺度,在宏观尺度上的研究较少。重点脆弱生态区是我国改善生态环境的主要目标区域,在定量评估我国重点脆弱生态区 1990-2015 年土壤保持、植被净初级生产力(NPP)和产水服务的基础上,利用相关系数法并结合植被分布场数据对生态系统服务权衡与协同关系进行研究。结果表明:(1)26 年间,重点脆弱生态区的土壤保持服务、NPP、产水服务呈现出南多北少的分布格局,且 3 种服务的年际变化较小,但均有上升的趋势;(2)重点脆弱生态区的 3 种生态系统服务之间是整体上协同,局部权衡的关系,并且协同关系呈减弱的趋势;(3)生态恢复区的生态系统服务的协同程度大于非生态恢复区,权衡关系减弱的动态变化趋势高于非生态恢复区。定量评估生态系统服务权衡与协同关系的时空特征,有利于研究生态系统服务之间相互关系在时间上的非线性和空间上的异质性,对重点脆弱生态区生态系统的可持续发展具有重要意义。

入藏号: CSCD:6607183

地址: Wang Xiaofeng, School of Earth Science and Resources, Chang 'an University;;Shaanxi Key Laboratory of Land Engineering, ;;Shaanxi Key Laboratory of Land Engineering, Xi'an;;Xi'an, ;; 710054;;710054.

Ma Xue, School of Earth Science and Resources, Chang 'an University, Xi'an, Shaanxi 710054, China.

Zhou Chaowei, School of Earth Science and Resources, Chang 'an University, Xi'an, Shaanxi 710054, China.

Feng Xiaoming, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, State Key Laboratory of Urban and Regional Ecology, Beijing 100085, China.

Fu Bojie, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences;;Institute of Terrestrial Surface System Science and Sustainable Development, Beijing Normal University, State Key Laboratory of Urban and Regional Ecology;;, ;, Beijing;;Beijing 100085;;100085.

地址: 王晓峰, 长安大学地球科学与资源学院;;陕西省土地工程重点实验室, ;;陕西省土地工程重点实验室, 西安;;西安, ;; 710054;;710054.

马雪, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

周潮伟, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

冯晓明, 中国科学院生态环境研究中心, 城市与区域生态国家重点实验室, 北京 100085, 中国.

傅伯杰, 中国科学院生态环境研究中心;;北京师范大学陆地表层系统科学与可持续发展研究院, 城市与区域生态国家重点实验室;;, ;, 北京;;北京 100085;;100085, 中国.

电子邮件地址: wangxf@chd.edu.cn

电子邮件地址: wangxf@chd.edu.cn

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作者: Zhang Yiqian; Feng Xiaoming; Wang Xiaofeng; Fu Bojie; Zhou Chaowei

作者: 张毅茜; 冯晓明; 王晓峰; 傅伯杰; 周潮伟

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标题: 重点脆弱生态区生态恢复的综合效益评估

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作者关键词: 重点脆弱生态区; 生态恢复; 综合效益评估; T 检验

摘要: The dramatic impact of global change and human activity has led to changes in ecosystem functions and services that are vital to human well-beings. Consequently, ecosystem degradation has become a serious problem globally. Comprehensive evaluation of the benefits of ecological restoration is an important way to measure the effects of implementation of restoration projects. In this study, China's key fragile ecological regions were selected as research objects. Four typical services were selected, including water production, soil conservation, food supply, and carbon sequestration, to construct a comprehensive evaluation index system for ecological restoration in the research area. Welch's t test was used to test restoration of ecosystem services in significant and insignificant regions and to comparatively analyze changes in the ecological restoration benefits in the study area. The results showed that from 2000 to 2015, the implementation of ecological restoration projects increased the overall ecosystem services of the fragile area by 20.86%. The comprehensive benefit changed from volatility to stability and stabilized around the mean value 0.55. The comprehensive benefit values of the karst area were the highest, reaching greater than or equal to 0.75. The changes in ecological system types were mainly the transformation between farmland, forest, grassland, and settlement ecosystems. The increase in

forest and grassland ecosystems promoted the level of ecosystem service. The results of the t test indicated that ecological restoration led to an increase in comprehensive benefits and ecosystem services.

摘要: 全球变化和人类活动的剧烈影响导致对人类福祉至关重要的生态系统功能和服务的改变,生态系统退化已成为全球面临的严重问题之一。综合评价生态恢复效益是目前衡量恢复工程实施效果的重要途径。以中国重点脆弱生态区为研究对象,选取产水、土壤保持、食物供给、固碳 4 项服务,构建研究区生态恢复综合效益评估指标体系,并通过 Welch T 方法检验恢复显著和不显著区生态系统服务指标,对比分析研究区生态恢复综合效益的变化情况。结果表明:2000 年到 2015 年,生态恢复工程的实施使脆弱区生态系统服务整体增长 20.86%;综合效益由波动变化转为稳定,并稳定在其均值 0.55 附近,其中喀斯特区综合效益最高,达 0.75 以上;生态系统类型变化主要是农田、森林、草地和聚落生态系统之间的转移,森林和草地生态系统的增加使得生态系统服务水平升高;T 检验的结果表明生态恢复带来综合效益的改善和生态系统服务能力的提高。

入藏号: CSCD:6607185

地址: Zhang Yiqian, School of Earth Science and Resources, Chang'an University;; Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, ;; State Key Laboratory of Urban and Regional Ecology, Xi'an;; ;; Beijing 710054;; 100085.

Feng Xiaoming, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, State Key Laboratory of Urban and Regional Ecology, Beijing 100085, China.

Wang Xiaofeng, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhou Chaowei, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Fu Bojie, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences;; Institution of Terrestrial Surface System Science and Sustainable Development, Beijing Normal University, State Key Laboratory of Urban and Regional Ecology;; ;; Beijing;; Beijing 100085;; 100875.

地址: 张毅茜, 长安大学地球科学与资源学院;; 中国科学院生态环境研究中心, ;; 城市与区域生态国家重点实验室, 西安;; ;; 北京 710054;; 100085.

冯晓明, 中国科学院生态环境研究中心, 城市与区域生态国家重点实验室, 北京 100085, 中国.

王晓峰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

周潮伟, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

傅伯杰, 中国科学院生态环境研究中心;; 北京师范大学陆地表层系统科学与可持续发展研究院, 城市与区域生态国家重点实验室;; ;; 北京;; 北京 100085;; 100875, 中国.

电子邮件地址: fengxm@rcees.ac.cn; wangxf@chd.edu.cn

电子邮件地址: fengxm@rcees.ac.cn; wangxf@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Li Junjun; Cao Jiannong; Liao Juan; Chen Beibei; Zhu Yingying

作者: 李军军; 曹建农; 廖娟; 程贝贝; 朱莹莹

标题: Spectral clustering segmentation of high spatial resolution remote sensing imagery based on multi-scale object

标题: 多尺度对象高空间分辨率遥感影像谱聚类分割

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作者关键词: high spatial resolution remote sensing imagery; spectral clustering; multi-scale; superpixel

作者关键词: 高空间分辨率遥感影像; 谱聚类; 多尺度; 超像素

摘要: According to the shortcomings in storage of similarity matrix, inefficiency of eigenvector decomposition and the accuracy of segmentation using pixel based single-scale or multi-scale spectral clustering. First, different space and range domain bandwidth parameters were given to generate different scale super-pixel layer by mean-shift algorithm. Then, pixels and multi-layer superpixels were used to model the high spatial resolution remote sensing imagery to represent its topology structure, that is construct a pixel-superpixel based undirectional weighted graph model under the graph cut theory, and we also optimized the method to calculate the vertex whose connected with each other to finish similarity matrix. Finally, a spectral clustering algorithm based on normalized cut criterion was used to partition the graph model and get the final segmentation result. This method reduces the computational complexity while improve segmentation accuracy of pixel-based spectral clustering. The segmentation results of standard images database and GF2 remote sensing images show that the method is effective.

摘要: 针对基于像素模型的单尺度或多尺度谱聚类影像分割方法在相似矩阵存储、特征分解效率及分割精度方面存在的不足。该文首先通过给定多组空间及光谱带宽参数,利用 mean-shift 初分割生成不同尺度的超像素对象层;然后联合像素与超像素对高空间分辨率影像中的不同类别地物进行的多尺度建模表达其空间拓扑关系,即在图割理论框架下建立像素-超像素联合的多尺度无向图模型 $G(V,E,W)$,同时根据遥感影像纹理特征丰富的特点,在顶点相似性计算过程中融合纹理特征;最后使用基于 normalized cut 准则的谱聚类算法,对图模型划分得到最终分割结果。该方法较好地降低了基于像素的谱聚类分割方法的计算复杂度,同时提高分割结果准确率。标准测试数据集和高分 2 号遥感影像分割结果表明了该方法的有效性。

入藏号: CSCD:6588498

地址: Li Junjun, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi

710064, China.

Liao Juan, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Beibei, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhu Yingying, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710064, China.

Cao Jiannong, College of Geological Engineering and Surveying, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 李军军, 长安大学地球科学与资源学院, 西安, 陕西 710064, 中国.

廖娟, 长安大学地球科学与资源学院, 西安, 陕西 710064, 中国.

程贝贝, 长安大学地球科学与资源学院, 西安, 陕西 710064, 中国.

朱莹莹, 长安大学地球科学与资源学院, 西安, 陕西 710064, 中国.

曹建农, 长安大学地质工程与测绘学院, 西安, 陕西 710064, 中国.

电子邮件地址: ljj19921592@163.com; caojiannong@126.com

电子邮件地址: ljj19921592@163.com; caojiannong@126.com

使用次数 (最近 180 天): 0

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作者: Dong Yibo; Jiao Jiangang; Liu Kai; Ren Tao; Dong Caiying; Qiu Yujin

作者: 董一博; 焦建刚; 刘凯; 任涛; 董彩盈; 裘雨锦

标题: Application of Soil Geochemical Measurement to the Liujiaxia Area of the Xiajiadian Gold Mine in the South Qinling

标题: 土壤地球化学测量在南秦岭夏家店金矿刘家峡测区的应用

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作者关键词: soil geochemical measurement; factor analysis; abnormal evaluation; metallogenic prediction; Xiajiadian gold mine; Liujiaxia; the south Qinling

作者关键词: 土壤地球化学测量; 因子分析; 异常评价; 成矿预测; 刘家峡; 夏家店金矿; 南秦岭

摘要: In order to expand the known deposit, a 1: 10,000 soil geochemical survey was carried out in the Liujiaxia survey area, the perimeter of the Xiajiadian gold mine. Using statistical methods, correlation and R - factor analyses were performed to Au and its associated elements Ag, Cu, Pb, Zn, As, Sb, Hg, Mo and Bi. Five factor groups were divided: F_1 [Au, Ag, As, Hg, Sb], F_2 [Ag, Cu, Pb], F_3 [Zn], F_4 [Mo] and F_5 [Bi]. Maps of single element and the combined element anomalies were prepared to reveal the spatial distribution of Au and its associated elements. Combining mathematical statistics, elemental anomaly maps and geological conditions of the study area, the metallogenic prediction of the Xiajiadian gold deposit was made and 6 target areas were delineated. Through validation by trenching and drilling, four gold ore bodies were discovered in three prediction areas, marking a breakthrough of ore search in the perimeter of the mine. Besides, a new ore - bearing layer of the Devonian Xihecha Formation was found. This work proves the applicability of soil geochemical measurement in the study area, and provides an effective prospecting method and a new direction for the next prospecting work in the Xiajiadian gold mine.

摘要: 为扩大南秦岭夏家店金矿规模,对夏家店金矿外围刘家峡测区进行了 1: 10000 土壤地球化学测量。利用数理统计方法,对 Au 及其伴生元素 Ag、Cu、Pb、Zn、As、Sb、Hg、Mo 及 Bi 等 10 种元素进行了相关性分析及 R 型因子分析,划分出 F_1[Au、Ag、As、Hg、Sb]、F_2[Ag、Cu、Pb]、F_3[Zn]、F_4[Mo]及 F_5[Bi]共 5 个因子分组;并将其单元素异常及组合元素异常处理成图,分析了 Au 及其伴生元素的空间分布规律。结合数理统计分析结果、元素异常图及研究区地质情况,对夏家店金矿进行成矿预测,圈定出 6 个预测区。通过探槽及钻探工程验证,最终于 3 个预测区内发现了 4 条金矿体,成功实现金矿边部找矿突破,验证了土壤地球化学测量方法在研究区的适用性,同时发现新的赋矿层位泥盆系西河岔组,为夏家店金矿下一步找矿工作提供了有效的找矿方法及新的方向。

入藏号: CSCD:6586399

地址: Dong Yibo, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Jiao Jiangang, School of Earth Science and Resources, Chang'an University;;Key Laboratory of Western China's Mineral Resources and Geological Engineering;;MLR Key Laboratory of Genesis and Exploration of Magmatic Ore Deposits, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering;;MLR Key Laboratory of Genesis and Exploration of Magmatic Ore Deposits, Xi'an;;Xi'an;;Xi'an, Shaanxi;;Shaanxi;;Shaanxi 710054;;710054;;710054.

Liu Kai, Shangluo Northwest Nonferrous 713 Corps Company Limited, Shangluo, Shaanxi 726000, China.

Ren Tao, Shangluo Northwest Nonferrous 713 Corps Company Limited, Shangluo, Shaanxi 726000, China.

Dong Caiying, Shangluo Northwest Nonferrous 713 Corps Company Limited, Shangluo, Shaanxi 726000, China.

Qiu Yujin, Shangluo Northwest Nonferrous 713 Corps Company Limited, Shangluo, Shaanxi 726000, China.

地址: 董一博, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

焦建刚, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室;;国土资源部岩浆作用成矿与找矿重点实验室, ;;西部矿产资源与地质工程教育部重点实验室;;国土资源部岩浆作用成矿与找矿重点实验室, 西安;;西安;;西安, 陕西;;陕西;;陕西 710054;;710054;;710054, 中国.

刘凯, 商洛西北有色七一三总队有限公司, 商洛, 陕西 726000, 中国.
任涛, 商洛西北有色七一三总队有限公司, 商洛, 陕西 726000, 中国.
董彩盈, 商洛西北有色七一三总队有限公司, 商洛, 陕西 726000, 中国.
裘雨锦, 商洛西北有色七一三总队有限公司, 商洛, 陕西 726000, 中国.

电子邮件地址: knowadoctor@chd.edu.cn; jiangang@chd.edu.cn

电子邮件地址: knowadoctor@chd.edu.cn; jiangang@chd.edu.cn

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作者: Mu Kebin; Pei Xianzhi; Li Ruibao; Li Zuochen; Pei Lei; Liu Chenjun; Gao Feng; Chen Youxin; Wang Meng; Zhao Shaowei

作者: 穆可斌; 裴先治; 李瑞保; 李佐臣; 裴磊; 刘成军; 高峰; 陈有炘; 王盟; 赵少伟

标题: Geochronology, Geochemistry and Geological Significance of the Granite Veins in the Bailongjiang Group, South Qinling

标题: 南秦岭白龙江群中花岗岩脉群年代学、地球化学特征及地质意义

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作者关键词: South Qinling; Bailongjiang Group; granite; zircon U-Pb dating; geochemistry; tectonic environment

作者关键词: 南秦岭; 白龙江群; 花岗岩; 锆石 U-Pb 定年; 地球化学; 构造环境

摘要: An EW-trending Indosinian granitoid belt is occurred at the north side of the Mianlue suture zone in the southern margin of the Qinling Orogenic Belt. The granite veins in Silurian Bailongjiang Group are parts of the Indosinian granitoids in South Qinling, with width range from 1 to 8 m and extend direction of NWW-SEE. They consist of granodiorite porphyry and quartz diorite porphyry. In this paper, the intensive granite veins from Silurian Bailongjiang Group in South Qinling have been detailedly studied from the aspects of LA-ICP-MS zircon U-Pb ages and geochemistry characteristics. The results show that the crystallization age of the granodiorite porphyry veins in Bailongjiang Group is (210.44±0.47) Ma, belonging to the Late Triassic. Geochemical data show that these veins have relatively high K₂O and Sr contents, Zr/Y ratios, they are enriched in LREE and LILE, but poor in HFSE, and their Rittnerman indexes (σ) are 1.41~2.73. These samples are similar to the high-K calc-alkaline I-type granitoids. Moreover, they

are characterized by low Y and Yb abundances, high (La/Yb)_N ratios and depleted in Nb, Ta and Ti, suggesting that they possibly originated mainly from the partial melting of thinned crustal basic rocks triggered by lower crustal delamination, with minor mantle-derived component, and they were formed in the geological underground of crustal thickening. Combined with regional geological data, it is proposed that the granite veins in Bailongjiang Group were formed in a post-collisional tectonic environment, and were formed in the transitional stage from extrusion to extensional regime after collision between the North China plate and the Yangtze plate.

摘要: 秦岭造山带南缘勉略缝合带北侧发育近东西向展布的印支期花岗岩带, 出露于南秦岭志留系白龙江群中花岗岩脉群, 属于该花岗岩带的一部分, 其宽度多为 1~8m 不等, 呈北西西南东向延伸, 主要岩性为花岗闪长斑岩-石英闪长斑岩组合。笔者对南秦岭志留系白龙江群中密集出露的花岗岩脉体进行了详细的 LA-ICP-MS 锆石 U-Pb 年代学及岩石地球化学研究, 结果表明, 白龙江群中花岗闪长斑岩脉结晶年龄为 (210.440.47) Ma, 属晚三叠世。地球化学特征显示这些脉体相对高 K₂O、Sr 含量及 Zr/Y 值, 富集 LREE 和 LILE, 亏损 HFSE, 里特曼指数 (σ) 为 1.41~2.73, 具高钾钙碱性 I 型花岗岩特征。此外, 它们明显亏损 Nb、Ta 及 Ti, 低 Y、Yb, 具有较高的 (La/Yb)_N 值, 表明它们可能为地壳增厚背景下, 下地壳拆沉作用导致减薄地壳中以基性岩为主的源岩部分熔融的产物, 可能存在幔源岩浆的贡献。综合区域地质资料研究认为, 出露于南秦岭白龙江群中的花岗岩脉群形成于后碰撞构造环境, 是华北板块与扬子板块碰撞造山之后挤压体制向伸展体制转换阶段的产物。

入藏号: CSCD:6573469

地址: Mu Kebin, School of Earth Science and Resource, Changan University, Xian, Shaanxi 710054, China.

Gao Feng, School of Earth Science and Resource, Changan University, Xian, Shaanxi 710054, China.

Pei Xianzhi, School of Earth Science and Resource, Changan University;;Key Laboratory of Western Mineral Resource and Geological Engineering of Ministry of Education, ;;Key Laboratory of Western Mineral Resource and Geological Engineering of Ministry of Education, Xian;;Xian, Shaanxi;;Shaanxi 710054;;710054.

Li Ruibao, School of Earth Science and Resource, Changan University;;Key Laboratory of Western Mineral Resource and Geological Engineering of Ministry of Education, ;;Key Laboratory of Western Mineral Resource and Geological Engineering of Ministry of Education, Xian;;Xian, Shaanxi;;Shaanxi 710054;;710054.

Li Zuochen, School of Earth Science and Resource, Changan University;;Key Laboratory of Western Mineral Resource and Geological Engineering of Ministry of Education, ;;Key Laboratory of Western Mineral Resource and Geological Engineering of Ministry of Education, Xian;;Xian, Shaanxi;;Shaanxi 710054;;710054.

Pei Lei, School of Earth Science and Resource, Changan University;;Key Laboratory of Western Mineral Resource and Geological Engineering of Ministry of Education, ;;Key Laboratory of Western Mineral Resource and Geological Engineering of Ministry of Education, Xian;;Xian, Shaanxi;;Shaanxi 710054;;710054.

Liu Chenjun, School of Earth Science and Resource, Changan University;;Key Laboratory of Western Mineral Resource and Geological Engineering of Ministry of Education, ;;Key Laboratory of Western Mineral Resource and Geological Engineering of Ministry of Education, Xian;;Xian, Shaanxi;;Shaanxi 710054;;710054.

Chen Youxin, School of Earth Science and Resource, Changan University;;Key Laboratory of

Western Mineral Resource and Geological Engineering of Ministry of Education, ;;Key Laboratory of Western Mineral Resource and Geological Engineering of Ministry of Education, Xian;;Xian, Shaanxi;;Shaanxi 710054;;710054.

Wang Meng, School of Earth Science and Resource, Changan University;;Key Laboratory of Western Mineral Resource and Geological Engineering of Ministry of Education, ;;Key Laboratory of Western Mineral Resource and Geological Engineering of Ministry of Education, Xian;;Xian, Shaanxi;;Shaanxi 710054;;710054.

Zhao Shaowei, School of Earth Science and Resource, Changan University;;Key Laboratory of Western Mineral Resource and Geological Engineering of Ministry of Education, ;;Key Laboratory of Western Mineral Resource and Geological Engineering of Ministry of Education, Xian;;Xian, Shaanxi;;Shaanxi 710054;;710054.

地址: 穆可斌, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

高峰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

裴先治, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

李瑞保, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

李佐臣, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

裴磊, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

刘成军, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

陈有炘, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

王盟, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

赵少伟, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: mukebin000@163.com

电子邮件地址: mukebin000@163.com

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作者: Li Zuochen; Pei Xianzhi; Wei Liyong; Zhao Wenchuan; Wang Meng; Liu Chengjun; Li

Ruibao; Pei Lei; Chen Youxin; Qin Li

作者: 李佐臣; 裴先治; 魏立勇; 赵文川; 王盟; 刘成军; 李瑞保; 裴磊; 陈有炘; 秦利

标题: Detrital zircon U-Pb age and provenance analysis of Lower Cretaceous-Pliocene continental strata at Lintan area in the West Qinling orogenic belt

标题: 西秦岭临潭地区下白垩统上新统陆相地层碎屑锆石 U-Pb 年代学及其物源分析

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作者关键词: West Qinling orogenic belt; Lower Cretaceous-Pliocene; zircon U-Pb age; detrital zircon; provenance analysis

作者关键词: 西秦岭; 下白垩统上新统; 锆石 U-Pb 年代学; 碎屑锆石; 物源分析

摘要: With clastic rocks of the Lower Cretaceous Mogou Formation and the Pliocene Linxia Formation at Lintan area in the West Qinling orogenic belt as the study object, the authors used LA-ICP-MS zircon UPb isotope geochronological method to explore the provenance of Mogou Formation and Linxia Formation, which has important significance of study of Meso-Cenozoic tectonic evolution of the West Qinling orogenic belt. The results show that the detrital zircon ages are divided into 6 groups: (1) The Neoproterozoic (2627~1676Ma); (2) The Mesoproterozoic (1487~1035Ma); (3) The Neoproterozoic (996~812Ma); (4) The Early Paleozoic (534~425Ma); (5) The Late Paleozoic (409~252Ma); (6) The Early Mesozoic (250~197Ma), of which, the Neoproterozoic (2627~1676Ma) ages data possess the largest proportion, accounting for about 50.31% of the total data. The other ages possess a smaller proportion. The provenance source of Mogou Formation and Linxia Formation were much more complicated and characterized by obvious diversity. The Zircon age distribution of the two samples was consistent, with the Indosinian, Caledonian, and Neoproterozoic age peaks, as well as the unique peaks of 1.8Ga and 2.5Ga in the North China Block. The Lower Cretaceous Mogou Formation and the Pliocene Linxia Formation are characterized by proximal deposition. The Middle Qinling tectonic belt provides provenance, and the age patterns of the detrital zircon recorded the age information of multi-recycling zircons in the geological bodies of the provenance area.

摘要: 选取西秦岭造山带临潭地区下白垩统磨沟组和新近系上新统临夏组碎屑岩为研究对象, 运用 LA-ICP-MS 锆石 U-Pb 同位素年代学方法, 探讨磨沟组和临夏组的物质来源。结果显示, 碎屑锆石年龄谱可分为 6 组: ① 新太古代古元古代 (2627~1676Ma); ② 中元古代 (1487~1035Ma); ③ 新元古代 (996~812Ma); ④ 早古生代 (534~425Ma); ⑤ 晚古生代 (409~252Ma); ⑥ 早中生代 (250~197Ma)。其中, 新太古代古元古代 (2627~1676 Ma) 的年龄数据约占总体的 50.31%, 所占比例最大, 其余年龄段所占比例则较少。下白垩统磨沟组和上新统临夏组中蕴含的锆石年龄信息分布特征较为一致, 均有新元古代、早古生代、早中生代年龄峰值, 以及华北板块特有的 1.8Ga 和 2.5Ga 年龄峰值。下白垩统磨沟组和上新统临夏组具有近源堆积为主的特征, 合作-岷县断裂北侧的中秦岭构造带为其提供了物源, 碎屑锆石年龄谱特征记录了物源区地质体中的再旋回年龄信息。本研究对西秦岭中新生代的构造演化研究具有重要意义。

入藏号: CSCD:6570442

地址: Li Zuochen, Faculty of Earth Science and Resources, Chang'an University, Key Laboratory

of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an, Shaanxi 710054, China.

Pei Xianzhi, Faculty of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an, Shaanxi 710054, China.

Wang Meng, Faculty of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an, Shaanxi 710054, China.

Liu Chengjun, Faculty of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an, Shaanxi 710054, China.

Li Ruibao, Faculty of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an, Shaanxi 710054, China.

Pei Lei, Faculty of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an, Shaanxi 710054, China.

Chen Youxin, Faculty of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an, Shaanxi 710054, China.

Qin Li, Faculty of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an, Shaanxi 710054, China.

Wei Liyong, No.5 Gold Geological Party of CAPF, Xi'an, Shaanxi 710100, China.

Zhao Wenchuan, No.5 Gold Geological Party of CAPF, Xi'an, Shaanxi 710100, China.

地址: 李佐臣, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;; 自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

裴先治, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;; 自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

王盟, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;; 自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

刘成军, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;; 自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

李瑞保, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;; 自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

裴磊, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;; 自然资

源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

陈有炘, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

秦利, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

魏立勇, 中国人民武装警察部队黄金第五支队, 西安, 陕西 710100, 中国.

赵文川, 中国人民武装警察部队黄金第五支队, 西安, 陕西 710100, 中国.

电子邮件地址: lizuochen2003@163.com; peixzh@163.com

电子邮件地址: lizuochen2003@163.com; peixzh@163.com

使用次数 (最近 180 天): 0

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作者: Yin Lichang; Wang Xiaofeng; Zhang Kun; Xiao Feiyan; Cheng Changwu; Zhang Xinrong

作者: 尹礼唱; 王晓峰; 张琨; 肖飞艳; 程昌武; 张欣蓉

标题: Trade-offs and synergy between ecosystem services in National Barrier Zone

标题: 国家屏障区生态系统服务权衡与协同

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作者关键词: 国家屏障区; 两屏三带; 生态系统服务; 权衡; 协同

摘要: The better understanding of the trade-off and synergy relationship between different services is the foundation for the sustainable management of decision-making of various ecosystem services. In 2018, the national key special project titled as Typical fragile ecological restoration and protection research clearly pointed out that it was necessary to optimize the ecosystem services pattern of Two ecological barriers and three shelters, and the optimization of services is inseparable from the accurate understanding of trade-offs and synergies. Therefore, it is important and urgent to carry out trade-offs and synergies research in National Barrier Zone ecosystem services on a national scale. In this paper, the RUSLE model, CASA model and

InVEST water yield model were used to evaluate the spatial distribution pattern of soil conservation, carbon sequestration and water yield services in the National Barrier Zone during 2000- 2015, and to analyze the trends of the three ecosystem services. Correlation analysis and root mean square deviation were used to quantify the trade- offs and synergies between different services in the overall aspect and spatial aspect of each sub-barrier zone. The conclusions are as follows: (1) The spatial pattern of three ecosystem services of National Barrier Zone decreased from southeast to northwest and temporally, soil retention and water yield increased significantly with slope of 20.64 t/(km²·a) and 4.13 mm/a, respectively. Carbon sequestration showed a slight upward trend (p=0.96). The promotion of services is significantly helpful to the protection of national ecological security. (2) The correlation coefficient among soil retention, carbon sequestration and water production was greater than 0, indicating that the three ecosystem services were synergistic in all sub-barrier zones. Spatially, there is a strong heterogeneity between the trade-offs and synergies, and it is found that the pixel ratio of trade-off between carbon sequestration and water production is 49%, while that between carbon sequestration and soil retention is 27% in the forest barrier of Northeast China. Therefore, it is highly recommended to consider the differences of services in the trade-off relationship among all the sub-barrier zones and spatial areas to make the policy for the construction of sustainable ecological environment.

摘要: 对不同服务间存在的此消彼长的权衡关系和相互增益的协同关系的正确认知,是开展多种生态系统服务可持续管理决策的前提。2018 年国家重点专项典型脆弱生态修复与保护研究中明确指出要优化两屏三带生态系统服务格局,而服务的优化离不开对权衡与协同关系的准确认知。因此,在国家尺度上开展国家屏障区生态系统服务权衡与协同研究具有重要性和迫切性。本文采用 RUSLE 模型、CASA 模型和 InVEST 产水模型分别评估国家屏障区 2000-2015 年土壤保持、固碳和产水服务的空间分布格局,并分析三种服务的变化趋势,采用相关分析法和均方根偏差法量化不同服务在各子屏障带整体和空间上的权衡与协同关系。结论如下:①国家屏障区的三项服务在空间上均呈现由东南向西北减少的格局,而在时间上,土壤保持与产水显著增加(p<0.05),增加量分别为 20.64 t/(km²·a)和 4.13mm/a,而固碳呈现微弱的上升趋势(p=0.96),服务的提升有利于保障国家生态安全。②在各子屏障带整体上,土壤保持、固碳及产水间相关系数基本大于 0(p<0.05),表明三者以协同为主;而在空间上,两两服务间的权衡与协同关系存在着极强的空间异质性,如东北森林带固碳与产水、固碳与土壤保持的权衡关系像元比例分别达 49%和 27%,且均集中在北部。因此,在进行生态环境建设时,需要同时考虑到整体与局部空间的服务权衡与协同关系的不同,以制定更为合理的生态保护政策。

入藏号: CSCD:6566688

地址: Yin Lichang, College of Earth Science and Resources, Changan University;;Research Centre for Eco-Environmental Sciences, Chinese Academy of Sciences, ;; Xi'an;; ;;Beijing 710054;;100089.

Wang Xiaofeng, College of Earth Science and Resources, Changan University;;Shaanxi Provincial Key Laboratory of Land Engineering, ;;Shaanxi Provincial Key Laboratory of Land Engineering, Xi'an;;Xi'an, ;; 710054;;710054.

Zhang Kun, Nanjing Institute of Environmental Sciences, Ministry of Ecology and Environment of China, Nanjing, Jiangsu 210042, China.

Xiao Feiyan, College of Earth Science and Resources, Changan University, Xi'an, Shaanxi 710054, China.

Cheng Changwu, College of Earth Science and Resources, Changan University, Xi'an, Shaanxi 710054, China.

Zhang Xinrong, College of Earth Science and Resources, Changan University, Xi'an, Shaanxi 710054, China.

地址: 尹礼唱, 长安大学地球科学与资源学院;;中国科学院生态环境研究中心, ;; 西安;; ;;北京 710054;;100089.

王晓峰, 长安大学地球科学与资源学院;;陕西省土地工程重点实验室, ;;陕西省土地工程重点实验室, 西安;;西安, ;; 710054;;710054.

张琨, 生态环境部南京环境科学研究所, 南京, 江苏 210042, 中国.

肖飞艳, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

程昌武, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

张欣蓉, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

电子邮件地址: yinlichang3064@163.com; wangxf@chd.edu.cn

电子邮件地址: yinlichang3064@163.com; wangxf@chd.edu.cn

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作者: Hu Guochao; Yang Xingke; Ren Cangzhi; Li Bin; Han Ke; An Le; Chao Huixia

作者: 胡国朝; 杨兴科; 任仓智; 李斌; 韩珂; 安乐; 晁会霞

标题: Characteristics of Ore-controlling Rules of Matigou-Miaogou Gold Deposit in Fengxian County, Shaanxi Province

标题: 陕西凤县马蹄沟-庙沟金矿区控矿构造特征

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作者关键词: 控矿构造; 脆-韧性剪切带; 热液蚀变; 成矿岩脉; 马蹄沟-庙沟金矿; 晚三叠世; 秦岭

摘要: Matigou-Miaogou gold deposit in Fengxian County, Shaanxi Province is located in the Tangzang-Shangdan tectonic mixed zone of the Qinling orogenic belt. Because of the multi-stage orogenic ductile and brittle tectonic activities, there are many types of superimposed composite shear zones, and deep granite magmatic intrusion during collisional orogeny, which make it an

important favorable zone for gold mineralization. The Lower Paleozoic Luohansi Group is a set of shallowly metamorphic and strongly deformed volcanic-sedimentary rocks in the ore-hosting strata of the mining area. It has undergone multi-stage tectonic deformation and metamorphism. Folds and faults are well developed, which make the ore body morphology complex and can be roughly divided into north-south tectonic belts. The shape of folds is complex and varied, and the overall shape of folds is reversed S-shaped, while the fracture is a series of brittle-brittle toughness with multiple primary and secondary matching. This paper uses the research methods of structural section and slice of rock and ore in the mining area, based on the field geological facts, through the special study on hierarchical classification of the mining area structure, detailed research on various types of ore-controlling structure styles and features in the area. Combined with the methods of rock slices, petrochemical analysis and deep exploration of prospecting engineering, the history of regional tectonic evolution, divided different levels of ore-controlling structures, a four-level ore-control structure was divided. Structural profiles show that tight folds and other ductile shear deformation and dynamic metamorphism such as mylonite zone and schistosomiasis zone are developed in the mining area. Rock (ore) slices show that mylonite foliation displacement early regional foliation (phyllite, etc.) is widespread in the mining area, which can reach above the level of primary mylonite, and is multi-stage brittle and ductile superimposition transformation. Gold mineralization is related to ore type and fabric. Gold grade of altered mylonite ($10.2 \times 10^{-6} \sim 17.5 \times 10^{-6}$), weathered: $4.97 \times 10^{-6} \sim 6.23 \times 10^{-6}$), especially superimposed quartz vein type, is higher than altered cataclastic rock (1.16×10^{-6}), rock mass and boundary contact zone with the lowest grade ($0.18 \times 10^{-6} \sim 0.89 \times 10^{-6}$), and is mineralized. The study concluded that there is a stripping fault before the metallogenic period. Matigou-Miaogou gold deposit is a fourth-order tectonic orecontrolling zone and a first-order Tangzang-Shangdan tectonic melange zone, which controls the distribution of metallogenic belts and ore-forming geological bodies in the area, i. e. the north-south tectonic slices and Jingshaowan back-shaped. The second-order is a nearly east-west-trending Luohansi-Wayaoshang brittle-ductile fracture (F9), which retains the characteristics of multi-stage compression brittle-ductile structure from north to south, and the section develops tectonic slices, it controls the spatial location of mineralized alteration zone.

摘要: 陕西凤县马蹄沟-庙沟金矿处于华北板块与华南板块之间的唐藏-商丹构造混杂带内。矿区赋矿地层下古生界罗汉寺岩群为一套浅变质、强变形的火山-沉积岩系,经历了多期构造变形、变质作用,使得矿体形态变得更加复杂。采用矿区构造剖面与岩(矿)石切片研究方法,通过野外实地调研及构造分级分类专题研究,对区内多种类型的控矿构造样式及性质等进行了详细研究,结合岩石光薄片观察、岩石化学分析、探矿工程深部揭露和区域构造演化历史分析等方法,划分出四级控矿构造。研究表明:区内存在成矿期前剥离断层,主体控矿构造为近EW向展布的罗汉寺-瓦窑上脆-韧性断层(F9)及其NWW向派生脆-韧性剪切带和断裂破碎带;主控矿构造方向为近EW向和NWW向;矿体向北缓倾,在空间上呈复式褶皱或褶皱层样式,局部受北倾直立片理化带控制,产状较陡;与金矿体关系密切的岩脉为晚三叠世花岗斑岩脉。金成矿主体经受晚印支期脆-韧性剪切变形期热液蚀变富集,并在脆性阶段叠加有剪切带引张破裂及含金石英细脉加富。该矿床成矿类型为晚三叠世脆-韧性剪切带叠加引张破裂热液型金矿。

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地址: Hu Guochao, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Bin, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Han Ke, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

An Le, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Yang Xingke, School of Earth Science and Resources, Chang'an University;; Chang'an University, ;; Key Laboratory of Western Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710054;; 710054.

Chao Huixia, School of Earth Science and Resources, Chang'an University;; Chang'an University, ;; Key Laboratory of Western Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710054;; 710054.

Ren Cangzhi, Shaanxi Institute of Geological Survey, Xi'an, Shaanxi 710054, China.

地址: 胡国朝, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李斌, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

韩珂, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

安乐, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

杨兴科, 长安大学地球科学与资源学院;; 长安大学, ;; 西部矿产资源与地质工程教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

晁会霞, 长安大学地球科学与资源学院;; 长安大学, ;; 西部矿产资源与地质工程教育部重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

任仓智, 陕西省地质调查院, 西安, 陕西 710054, 中国.

电子邮件地址: 1730120772@qq.com; xky61@163.com

电子邮件地址: 1730120772@qq.com; xky61@163.com

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作者: Gao Yunfeng; Yang Xingke; Ruan Shiqi; Han Ke; Zhang Weisheng; Zhu Wei

作者: 高云峰; 杨兴科; 阮仕琦; 韩珂; 张伟胜; 朱伟

标题: Characteristics of Ore-controlling Structures and Prospecting Indicators in the Western Tungsten Deposit Area of Zhen'an, South Qinling

标题: 南秦岭镇安西部钨矿集区控矿构造特征及找矿标志

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作者关键词: ore-controlling structure; skarn type; quartz vein type; prospecting indicator; scheelite; western Zhen'an area; South Qinling

作者关键词: 控矿构造; 矽卡岩型; 石英脉型; 找矿标志; 白钨矿; 镇安西部; 南秦岭

摘要: The western tungsten deposit area of Zhen'an is located in the south Qinling tectonic belt. The main exposed strata in the area are Paleozoic carbonate rocks. The magmatic rocks are mainly rouge dams, lazy benches and Sihaiping granite bodies. The fault development in the area provides a ore-conducting and orebearing structure for the tungsten ore formation in the area. The skarn-type tungsten mineralization occurred in the near EW strike fracture zone. In addition, the NE-NNE-oriented quartz vein-type tungsten mineralization also developed, which together constitute the main tungsten-molybdenum mineralization type in this area. This paper mainly conducts field investigation and indoor research on typical tungsten deposits such as Qipangou and Hetaoping in the mining area, and has obtained the following knowledge: (1) The ore-controlling structure in the ore-concentrating area is a tectonic fracture in two different directions from the EW and the NE-NNE direction. (2) According to the tectonic background of the area, the tectonic fractures in the NE-NNE of the oreconcentrating area are formed by the Late Indosinian-Yanshanian tectonic activities, and the near-east tectonic fractures are mainly formed by the Indosinian tectonic activities. Compared with the Yanshanian tungsten-molybdenum ore-forming period, the near-east-west fault is a pre-mineral structure, while the NE-NNE fault fracture belongs to the metallogenic structure. (3) The type of tungsten mineralization in the ore-concentrating area is mainly composed of hydrothermal quartz vein type and fault-controlled skarn type. The quartz vein type is mainly controlled by the NE-NNE fault and joint fissures, and the skarn type is mainly controlled by the neareast-west fault fracture zone.

摘要: 镇安西部钨矿集区位于南秦岭构造带,区内出露地层主要为古生代碳酸盐岩,岩浆岩主要为胭脂坝、懒板凳和四海坪花岗岩体。区内断裂发育,为钨矿成矿提供了导矿构造和容矿构造。近EW走向断裂破碎带内出现了典型的矽卡岩型钨矿化,此外NE-NNE走向的石英脉型钨矿化同样发育,二者共同构成了本区的主要钨钼矿化类型。通过对矿集区棋盘沟和核桃坪等典型钨矿床进行野外调查及室内研究,取得以下认识:(1)矿集区内控矿构造为近EW向与NE-NNE向2组不同方向的构造裂隙;(2)根据该区构造背景,矿集区内NE-NNE构造裂隙是晚印支-燕山期构造活动形成的,近EW向构造裂隙则主要是印支期构造活动形成的,相对于燕山期钨钼成矿期近EW向断裂为成矿前构造,而NE-NNE向断裂裂隙属于成矿期构造;(3)矿集区内钨矿化类型以热液石英脉型和矽卡岩型为主,其中石英脉型主要受NE-NNE向断裂及节理裂隙控制,矽卡岩型主要受近EW向断裂破碎带控制。

入藏号: CSCD:6558797

地址: Gao Yunfeng, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Yang Xingke, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Ruan Shiqi, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Han Ke, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Weisheng, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhu Wei, Shaanxi Mineral Resources and Geological Survey, Xi'an, Shaanxi 710054, China.

地址: 高云峰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

杨兴科, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

阮仕琦, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

韩珂, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

张伟胜, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

朱伟, 陕西省矿产地质调查中心, 西安, 陕西 710054, 中国.

电子邮件地址: 308647910@qq.com; xky6105@163.com

电子邮件地址: 308647910@qq.com; xky6105@163.com

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作者: Zhang Yongming; Pei Xianzhi; Li Zuochen; Li Ruibao; Liu Chengjun; Pei Lei; Chen Youxin; Wang Meng

作者: 张永明; 裴先治; 李佐臣; 李瑞保; 刘成军; 裴磊; 陈有炘; 王盟

标题: Zircon U-Pb Geochronology, Geochemistry and Its Geological Implication of the Early Indosinian Basic Complex in the Qinghai Nanshan Tectonic Belt

标题: 青海南山构造带印支早期基性杂岩体年代学、地球化学特征及地质意义

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作者关键词: basic complex; zircon U-Pb dating; geochemistry; late Early Triassic; Qinghai Nanshan

作者关键词: 基性杂岩; 锆石 U-Pb 定年; 地球化学; 早三叠世晚期; 青海南山

摘要: The Qinghai Nanshan tectonic belt, situated in the northern margin of Gonghe basin, is the conjunction area among the West Qinling orogenic belt, South Qilian tectonic belt and Zongwulong tectonic belt. A large quantity of intrusive rocks outcropped in the Qinghai Nanshan tectonic belt, but the distribution of basic rocks is less and dispersed. The petrogenesis of basic rocks is significant to reveal the tectonic framework and evolution history in that period. The Lari basic complex is composed of gabbro and pyroxenite, which situates in the middle of the Qinghai

Nanshan tectonic belt. In this paper, a detailed study on petrology, mineralogy, geochemistry and LA-ICP-MS zircon U-Pb dating was carried out for the Lari basic complex. The results show that the crystallization ages of the gabbro and pyroxenite are 247.72.8 Ma and 247.92.5 Ma, respectively, suggesting that the complex intruded in the late Early Triassic. The whole rock geochemical data show that the rocks of Lari basic complex are relatively rich in Na, Mg and Fe, but poor in Si and K, suggesting that the gabbros belong to the tholeiitic series. What's more, they have high ratios of Al_2O_3/TiO_2 , low contents of TiO_2 , which are typical features of boninite and boni-basalts. The rocks are enriched in LREE, LILEs (Cs, Rb, K, Sr) and depleted in HREE (Nb, Ta, Zr, Hf, Ti, P), which are similar to the arc magma, but different from ridge and intraplate basalt. The mineral electron microprobe analysis shows that plagioclase in the rocks of Lari basic complex is similar to the high calcium plagioclase in gabbro which originates in the island arc or active continental margin. The gabbro and pyroxenite of the Lari basic complex were formed by partial melting of the spinel lherzolite. In combination with analyses of regional geological setting, we suggest that there existed a Late Paleozoic-Early Mesozoic limited oceanic basin in the Qinghai Nanshan area. The Lari basic complex formed during the early stage of the oceanic basin subduction.

摘要: 青海南山构造带是衔接宗务隆构造带、南祁连构造带和西秦岭造山带的重要结合带。该地区印支早期岩浆作用强烈,虽然该期基性岩分布少而分散,但其成因研究对探讨青海南山构造带印支期演化过程具有重要意义。本文对构造带中段由辉长岩和辉石岩组成的拉日基性杂岩体开展了详细的岩石学、矿物学、岩石地球化学及 LA-ICP-MS 锆石 U-Pb 同位素年代学研究。结果表明,辉长岩和辉石岩的结晶年龄分别为 247.72.8 Ma 和 247.92.5 Ma,说明岩体侵位于早三叠世晚期。岩石具有低 Si、富 Na、低 K 和高 Mg、Fe 的特征;其中,辉长岩属拉斑玄武岩系列,同时,高 Al_2O_3/TiO_2 比值和低 TiO_2 含量与玻安岩和玻玄岩相似。岩石的地球化学特征与洋脊和板内玄武岩差异明显,其富集 LREE 和大离子亲石元素 LILEs(Cs、Rb、K、Sr),亏损 Nb、Ta、Zr、Hf、Ti、P 等高场强元素,显示与岛弧岩浆岩相似的地球化学特征。矿物电子探针分析表明,斜长石为类似于岛弧或活动大陆边缘辉长岩中的高钙斜长石。辉长岩和辉石岩均为尖晶石二辉橄榄岩部分熔融的产物。综合分析表明,研究区可能存在晚古生代-早中生代有限小洋盆,拉日基性杂岩体形成于洋盆俯冲早期阶段。

入藏号: CSCD:6553428

地址: Zhang Yongming, School of Earth Science and Resources, Chang'an University;; Faculty of Resources and Environmental Engineering, Shandong University of Technology, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, MNR;; Xi'an;; Zibo, ;; 710054;; 255049.

Pei Xianzhi, School of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, MNR, Xi'an, Shaanxi 710054, China.

Li Zuochen, School of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, MNR, Xi'an, Shaanxi 710054, China.

Li Ruibao, School of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key

Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an, Shaanxi 710054, China.

Liu Chengjun, School of Earth Science and Resources,Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an, Shaanxi 710054, China.

Pei Lei, School of Earth Science and Resources,Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an, Shaanxi 710054, China.

Chen Youxin, School of Earth Science and Resources,Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an, Shaanxi 710054, China.

Wang Meng, School of Earth Science and Resources,Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an, Shaanxi 710054, China.

地址: 张永明, 长安大学地球科学与资源学院;;山东理工大学资源与环境工程学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室;;, 西安;;淄博, 陕西;;山东 710054;;255049, 中国.

裴先治, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

李佐臣, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

李瑞保, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

刘成军, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

裴磊, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

陈有炘, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

王盟, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

电子邮件地址: 403016769@qq.com; peixzh@263.net

电子邮件地址: 403016769@qq.com; peixzh@263.net

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作者: Chen Youxin; Pei Xianzhi; Zhao Jun; Wang Meng; Guan Liwei; Zhu Yongsheng; Liu Lei; Duguer Weiwei; Tian Zengbiao

作者: 陈有焯; 裴先治; 赵军; 王盟; 关力伟; 朱永胜; 刘雷; 杜古尔·卫卫; 田增彪

标题: Detrital Zircon U-Pb Age of the Lower Carboniferous Akeshake Formation in Wenquan Area, Chinese West Tianshan, and Its Tectonic Implications

标题: 西天山温泉地区下石炭统阿克沙克组碎屑锆石 U-Pb 年龄及其构造意义

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作者关键词: 中国西天山; 温泉地区; 阿克沙克组; 碎屑锆石 U-Pb 年龄; 构造意义; 年代学

摘要: The Tianshan orogeny, which is located in the southwestern part of the Central Asian orogenic belt (CAOB), is a window to explore the accretionary orogenic process of the CAOB. The Akeshake Formation clastic rocks, widespread in the Wenquan area, is an important geological record for the study of the Early Carboniferous basin and orogenic evolution of Chinese West Tianshan. Zircon LA-MC-ICP-MS U-Pb dating of mylonitic sandstone from the Akeshake Formation shows that the detrital zircons have a wide range of zircon ages from 4285 Ma to 3314 Ma, which can be divided into 3 groups: 428 Ma, 381-364 Ma and 343-331 Ma. Based on the dating results, combined with the mineralogical characteristics and CL images of the detrital zircons as well as the regional geological data, we propose that the deposition age of the Akeshake Formation is the later Early Carboniferous, which is consistent with the fossil record. It is also inferred that the detrital materials of the studied sandstone were mainly derived from intermediate to acidic volcanic rocks and sedimentary rock of the Dahalajunshan Formation. Therefore, the formation of sedimentary rocks of Akeshake Formation was in the active continental margin.

摘要: 天山造山带位于中亚造山带西南部,是了解中亚造山带增生造山过程的一个窗口.中国西天山温泉地区出露的下石炭统阿克沙克组碎屑岩是西天山造山带早石炭世盆地演化和造山过程的重要物质记录.运用 LA-MC-ICP-MS 锆石 U-Pb 测年方法,对阿克沙克组糜棱岩化砂岩中碎屑锆石进行测试分析.结果显示,碎屑锆石 $^{206}\text{Pb}/^{238}\text{U}$ 表面年龄介于 4285 Ma~3314 Ma,表现出较宽的年龄谱,按照年龄及频率分布特征可以划分为 3 组:428 Ma、381~364 Ma 和 343~331 Ma.综合分析锆石的形态特征、内部结构、元素含量和区域地质资料,取得以下认识:(1)西天山温泉地区出露的阿克沙克组形成于早石炭世晚期,与其中的古生物化石时代一致;(2)阿克沙克组的物源为中酸性火山岩和沉积岩,主要来源于下伏的大哈拉军山组,属于近源沉积,形成于活动大陆边缘.

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地址: Chen Youxin, School of Earth Science and Resources, Chang'an University;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Pei Xianzhi, School of Earth Science and Resources, Chang'an University;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Wang Meng, School of Earth Science and Resources, Chang'an University;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Zhao Jun, No.8 Gold Geological Party of Chinese People's Armed Police Force, Urumqi, Xinjiang 830057, China.

Guan Liwei, No.8 Gold Geological Party of Chinese People's Armed Police Force, Urumqi, Xinjiang 830057, China.

Zhu Yongsheng, No.8 Gold Geological Party of Chinese People's Armed Police Force, Urumqi, Xinjiang 830057, China.

Liu Lei, No.8 Gold Geological Party of Chinese People's Armed Police Force, Urumqi, Xinjiang 830057, China.

Duguer Weiwei, No.8 Gold Geological Party of Chinese People's Armed Police Force, Urumqi, Xinjiang 830057, China.

Tian Zengbiao, No. 519 Geological Party, North China Geological Exploration Bureau, Baoding, Hebei 071000, China.

地址: 陈有炘, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

裴先治, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

王盟, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

赵军, 中国人民武装警察部队黄金第八支队, 乌鲁木齐, 新疆 830057, 中国.

关力伟, 中国人民武装警察部队黄金第八支队, 乌鲁木齐, 新疆 830057, 中国.

朱永胜, 中国人民武装警察部队黄金第八支队, 乌鲁木齐, 新疆 830057, 中国.

刘雷, 中国人民武装警察部队黄金第八支队, 乌鲁木齐, 新疆 830057, 中国.

杜古尔·卫卫, 中国人民武装警察部队黄金第八支队, 乌鲁木齐, 新疆 830057, 中国.

田增彪, 华北地质勘查局 519 大队, 保定, 河北 071000, 中国.

电子邮件地址: chenyouxin1988@163.com; peixzh@263.net

电子邮件地址: chenyouxin1988@163.com; peixzh@263.net

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作者: Wang Meng; Pei Xianzhi; Liu Chengjun; Zhang Yongming; Li Zuochen; Li Ruibao; Pei Lei; Chen Youxin; Chen Guochao

作者: 王盟; 裴先治; 刘成军; 张永明; 李佐臣; 李瑞保; 裴磊; 陈有炘; 陈国超

标题: Magma Mixing of the Heimahe Pluton in the Qinghai Nanshan Tectonic Zone: Evidence from Petrology, Geochemistry and Geochronology, and Its Tectonic Implications

标题: 青海南山黑马河岩体岩浆混合成因的岩石地球化学和年代学证据及其构造意义

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作者关键词: Qinghai Nanshan; northern margin of West Qinling; Heimahe pluton; mafic microgranular enclaves; petrogenesis; geochemistry

作者关键词: 青海南山; 西秦岭北缘; 黑马河岩体; 暗色微粒包体; 岩石成因; 地球化学

摘要: The Heimahe pluton is located in the Qinghai Nanshan tectonic belt, northern margin of the West Qinling orogeny. Mafic microgranular enclaves (MMEs) are widely distributed in the Heimahe pluton. However, the petrogenesis of the MMEs is an issue of debate. We present the petrology, mineral chemistry, rock geochemistry and geochronology of the granodiorite and MMEs from the pluton in this paper. The outcrop conditions, shapes, structural and mineral characters of the MMEs reflect that they were products of rapid crystallization when mafic magma injected into the intermediate-acid magma. In the binary diagram of major elements, the granodiorites and MMEs show a mixing trend between mantle- and crust-derived magmas. Besides, their total REE contents and similar REE patterns and Eu anomalies also support the magma mixing model. LA-ICPMS zircon U-Pb dating results show that the granodiorite formed at 246 Ma, and the MMEs formed at 245 Ma. The same crystallization age suggests that the MMEs were not restites or host-rock xenoliths. Combined with regional geology, we suggest that the Heimahe pluton formed by the southward subduction of the limited oceanic basin in the northern margin of the West Qinling, and the Qinghai Nanshan tectonic belt experienced the same evolutionary process with the Tianjun Nanshan belt.

摘要: 黑马河岩体位于西秦岭北缘青海南山构造带内, 岩体中发育大量闪长质包体, 但其成因却有一定的争议. 从岩石学、矿物学、地球化学和年代学等方面对黑马河岩体花岗闪长岩及其中的闪长质包体进行了详细研究. 包体的野外产出状态、形态、结构构造和矿物学特征均显示出, 它们是基性岩浆注入到中酸性岩浆中快速冷凝结晶的产物. 在主量元素协变图解中, 花岗闪长岩和闪长质包体显示出壳幔岩浆混合作用的趋势. 另外, 两者稀土总量和相似的稀土

元素配分模式及 Eu 负异常程度,也显示二者具有岩浆混合的特征.LA-ICPMS 锆石 U-Pb 定年结果显示,花岗闪长岩形成于 246 Ma,闪长质包体形成于 245 Ma,两者具有几乎一致的结晶年龄,排除了包体为源区难熔残余或围岩捕虏体的可能性,也排除了基性岩浆在花岗质岩浆固结后再侵入的可能性.结合区域地质资料,认为黑马河岩体形成于西秦岭北缘有限小洋盆向南的俯冲阶段,青海南山构造带与天峻南山一带具有相同的构造岩浆演化历史.

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地址: Wang Meng, School of Earth Science and Resources,Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an, Shaanxi 710054, China.

Pei Xianzhi, School of Earth Science and Resources,Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an, Shaanxi 710054, China.

Liu Chengjun, School of Earth Science and Resources,Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an, Shaanxi 710054, China.

Li Zuochen, School of Earth Science and Resources,Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an, Shaanxi 710054, China.

Li Ruibao, School of Earth Science and Resources,Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an, Shaanxi 710054, China.

Pei Lei, School of Earth Science and Resources,Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an, Shaanxi 710054, China.

Chen Youxin, School of Earth Science and Resources,Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an, Shaanxi 710054, China.

Zhang Yongming, School of Earth Science and Resources,Chang'an University;;Faculty of Resources and Environmental Engineering,Shandong University of Technology, Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR;;, Xi'an;;Zibo, ;; 710054;;255049.

Chen Guochao, School of Earth Science and Resources,Chang'an University;;School of Civil Engineering,Nanyang Institute of Technology, Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR;;, Xi'an;;Nanyang, ;; 710054;;473000.

地址: 王盟, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;

自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.
裴先治, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.
刘成军, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.
李佐臣, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.
李瑞保, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.
裴磊, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.
陈有炘, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.
张永明, 长安大学地球科学与资源学院;;山东理工大学资源与环境工程学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室;;, 西安;;淄博, 陕西;;山东 710054;;255049, 中国.
陈国超, 长安大学地球科学与资源学院;;南阳理工学院土木工程学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室;;, 西安;;南阳, 陕西;;河南 710054;;473000, 中国.
电子邮件地址: wangmeng@chd.edu.cn; peixzh@263.net
电子邮件地址: wangmeng@chd.edu.cn; peixzh@263.net
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作者: Gao Feng; Pei Xianzhi; Li Ruibao; Li Zuochen; Pei Lei; Chen Youxin; Wang Meng; Liu Chengjun; Li Zongyao

作者: 高峰; 裴先治; 李瑞保; 李佐臣; 裴磊; 陈有炘; 王盟; 刘成军; 李宗耀

标题: Detrital Zircon U-Pb Ages and Geological Significance of Low-Metamorphosed Liuling Sedimentary Assemblage in the Shangdan Area Eastern Qinling Orogenic Belt

标题: 东秦岭商丹地区刘岭群浅变质沉积岩系碎屑锆石 U-Pb 年龄及其地质意义

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作者关键词: 东秦岭商丹地区; 刘岭群浅变质沉积岩系; 碎屑锆石 U-Pb 定年; 地球化学

摘要: The conventional Liuling Group is widespread in the northern part of South Qinling structure zone, which has been regarded as a key factor for revealing the convergence process between South Qinling structure zone and North Qinling structure zone in Early Paleozoic for its significant tectonic position. Compared to the Liuling Group exposed in Shanyang-Zhashui area, Liuling Group in Danfeng-Shangnan-Xiping area is more complicated in the degree of deformation and metamorphism, which is named as low-metamorphosed Liuling sedimentary assemblage and Liuling sedimentary assemblage in this paper, respectively. Liuling sedimentary assemblage in Shanyang-Zhashui area was defined as Middle-Upper Devonian based on reliable fossils, while there are none fossil evidences for low-metamorphosed Liuling sedimentary assemblage, defined as Lower Paleozoic. In this paper, LA-ICP-MS detrital zircon U-Pb ages of two garnet-bearing two-mica quartz schist samples in low-metamorphosed Liuling sedimentary assemblage were tested, results ranged from 2 598-390 Ma, yield two prominent age clusters at ~ 1.0 - 0.6 Ga and ~ 0.5 - 0.4 Ga, as well as three sub-prominent age clusters at ~ 2.6 - 2.3 Ga, ~ 1.71 - 1.60 Ga and ~ 1.3 - 1.2 Ga. Combined with regional geology, we suggest that: the Liuling sedimentary assemblage and low-metamorphosed Liuling sedimentary assemblage were mainly fed by South Qinling structure zone and North Qinling structure zone, own double-direction sources, they may have deposited at the same time in a forland basin, and experienced different degree of deformation and metamorphism lately. The maximum depositional age of low-metamorphosed Liuling sedimentary assemblage is ~ 390 Ma, which most likely deposited in Middle-Late Devonian.

摘要: 传统意义的刘岭群广泛分布于南秦岭北缘地区, 由于特殊的大地构造位置, 其一直被视为揭示秦岭造山带早古生代南秦岭构造带和北秦岭构造带汇聚过程的重要窗口。丹凤-商南-西坪地区的刘岭群较山阳-柞水地区的刘岭群变质程度深且变形复杂, 分别被称为刘岭群浅变质沉积岩系和刘岭群沉积岩系以示区分。山阳-柞水地区的刘岭群沉积岩系据可靠的古生物化石证据被划归为中泥盆统或上泥盆统, 而商丹地区的刘岭群浅变质沉积岩系则无可靠的时代证据, 被划归为下古生界。通过对商丹地区浅变质沉积岩系中的石榴二云母石英片岩进行 LA-ICP-MS 锆石 U-Pb 同位素年龄研究, 获得碎屑锆石年龄谱介于 2 598~390 Ma, 2 个主要峰值年龄段分别为 ~ 1.0 ~ 0.6 Ga 和 ~ 0.5 ~ 0.4 Ga, 3 个次要峰值年龄段分别为 ~ 2.6 ~ 2.3 Ga、 ~ 1.71 ~ 1.60 Ga 和 ~ 1.3 ~ 1.2 Ga。综合本次及前人研究表明: 刘岭群浅变质沉积岩系和沉积岩系物源具有双源性, 南、北秦岭构造带均为其提供重要物源; 商丹地区刘岭群浅变质沉积岩系最大沉积时限为 ~ 390 Ma, 该地层最可能形成于中晚泥盆世; 刘岭群沉积岩系和刘岭群浅变质沉积岩系可能为同时代沉积物, 后期经历不同构造变形, 形成于前陆盆地构造环境。

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地址: Gao Feng, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Zongyao, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Pei Xianzhi, School of Earth Science and Resources, Chang'an University;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, MNR, ;; Key Laboratory for the Study of

Focused Magmatism and Giant Ore Deposits,MNR, Xi'an;;Xi'an, ;; 710054;;710054.

Li Ruibao, School of Earth Science and Resources,Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an;;Xi'an, ;; 710054;;710054.

Li Zuochen, School of Earth Science and Resources,Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an;;Xi'an, ;; 710054;;710054.

Pei Lei, School of Earth Science and Resources,Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an;;Xi'an, ;; 710054;;710054.

Chen Youxin, School of Earth Science and Resources,Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an;;Xi'an, ;; 710054;;710054.

Wang Meng, School of Earth Science and Resources,Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an;;Xi'an, ;; 710054;;710054.

Liu Chengjun, School of Earth Science and Resources,Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,MNR, Xi'an;;Xi'an, ;; 710054;;710054.

地址: 高峰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李宗耀, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

裴先治, 长安大学地球科学与资源学院;;自然资源部岩浆作用成矿与找矿重点实验室, ;;自然资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

李瑞保, 长安大学地球科学与资源学院;;自然资源部岩浆作用成矿与找矿重点实验室, ;;自然资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

李佐臣, 长安大学地球科学与资源学院;;自然资源部岩浆作用成矿与找矿重点实验室, ;;自然资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

裴磊, 长安大学地球科学与资源学院;;自然资源部岩浆作用成矿与找矿重点实验室, ;;自然资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

陈有炘, 长安大学地球科学与资源学院;;自然资源部岩浆作用成矿与找矿重点实验室, ;;自然资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

王盟, 长安大学地球科学与资源学院;;自然资源部岩浆作用成矿与找矿重点实验室, ;;自然资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

刘成军, 长安大学地球科学与资源学院;;自然资源部岩浆作用成矿与找矿重点实验室, ;;自然资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: gaofchd@163.com; peixzh@263.net

电子邮件地址: gaofchd@163.com; peixzh@263.net

使用次数 (最近 180 天): 0

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作者: Zhi Qian; Li Yongjun; Yang Gaoxue; Xu Qian; Ning Wentao; Luo Xin

作者: 支倩; 李永军; 杨高学; 徐倩; 宁文涛; 罗鑫

标题: LA-ICP-MS zircon U-Pb Dating for Rhyolite of Jimunai Formation in the Saur Mountain, Western Junggar, Xinjiang, and its Geological Implications

标题: 西准噶尔萨吾尔山一带吉木乃组流纹岩 LA-ICP-MS 锆石 U-Pb 年代学及地质意义

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作者关键词: West Junggar; Jimunai Formation; LA-ICP-MS zircon U-Pb dating of rhyolite; Late Carboniferous

作者关键词: 西准噶尔; 吉木乃组; 流纹岩 LA-ICP-MS 锆石 U-Pb 年龄; 晚石炭世

摘要: The geological age of the Jimunai Formation has long been controversial in the Saur Mountain of West Junggar. It is also a volcanic-sedimentary stratum with the highest proportion of volcanic rocks to the total thickness of strata, and thus, it is an effective method to resolve the age divergences of the Jimunai Formation using accurate geological age of the volcanic rocks. LA-ICP-MS dating was used to determine the zircons from the newly discovered rhyolite of the upper Jimunai Formation, which yielded zircon U-Pb age of 304.12.5 Ma ($n=15$, $MSWD=1.07$), corresponding to the end of the Late Carboniferous. In view of predecessors' fossil information, we suggest that the formation age of Jimunai Formation is Bashkirian to Kasimovian of Late Carboniferous. Isotopic dating of rhyolite accurately constrained the minimum age of the Jimunai Formation, and provided new chronological evidence for the establishment of regional stratigraphic framework and stratigraphic correlation.

摘要: 吉木乃组是西准噶尔萨吾尔山地区地质时代久存争议的地层,也是火山岩占地层总厚度比例最高的火山-沉积地层。采用同位素年龄标定火山岩准确的地质时代,是解决本组时代分歧的有效手段。吉木乃组顶部新发现的流纹岩中获得(304.12.5)Ma($n=15$, $MSWD=1.07$)的 LA-ICP-MS 锆石 U-Pb 年龄,确认成岩时代为晚石炭世晚期(大致相当于卡西莫夫期)。结合前人在本组下部层位采集的植物化石,限定吉木乃组时代为晚石炭世(大致为巴什基尔期卡西莫夫期)。流纹岩同位素定年准确约束了吉木乃组地质时代上限,为区域地层格架的建立和地层对比提供了可靠的时代依据。

入藏号: CSCD:6553861

地址: Zhi Qian, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Xu Qian, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Ning Wentao, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Luo Xin, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Yongjun, School of Earth Science and Resources, Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, MLR, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, MLR, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Yang Gaoxue, School of Earth Science and Resources, Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, MLR, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, MLR, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

地址: 支倩, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

徐倩, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

宁文涛, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

罗鑫, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李永军, 长安大学地球科学与资源学院;;国土资源部岩浆作用成矿与找矿重点实验室, ;;国土资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

杨高学, 长安大学地球科学与资源学院;;国土资源部岩浆作用成矿与找矿重点实验室, ;;国土资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: 2511979891@qq.com; yongjunl@chd.edu.cn

电子邮件地址: 2511979891@qq.com; yongjunl@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Wang Hui; Feng Chengyou; Zhang Mingyu

作者: 王辉; 丰成友; 张明玉

标题: Characteristics and exploration and research progress of global cobalt deposits

标题: 全球钴矿资源特征及勘查研究进展

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作者关键词: geology; cobalt deposit; classification of cobalt deposits; cobalt mineral resources; exploration progress; research progress

作者关键词: 地质学; 钴矿床; 成因类型; 资源特征; 勘查进展; 研究现状

摘要: The emerging industry related to cobalt is developing at a high speed in recent years. Cobalt is one of the indispensable metals in the manufacture of rechargeable batteries for new-energy vehicles and superalloy in turbine engines for jet aircrafts. This paper gives a brief account of the types and characteristics of global cobalt deposits and summarizes the progress of the cobalt prospecting and research. The global cobalt resources mainly occur in the forms of stratabound Cu-Co deposits, Ni-Co laterite deposits, magmatic Ni-Cu-Co sulfide deposits and hydrothermal and volcanogenic deposits, which exhibit extremely uneven distributions. The hydrothermal and volcanic Co-polymetallic deposits have mostly produced Co as the main commodity and have a good prospecting potentiality. Most Co deposits are more or less associated with mafic to ultramafic rocks. Moreover, large quantities of cobalt resources occur in extensive deposits of Fe-Mn nodules and crusts on the modern sea floor. There is absolutely an urgent need for further research on ore-forming conditions, tectonic settings and mineralization mechanism of cobalt deposits. The comprehensive understanding of metallogeny and practical prospecting models would be significantly beneficial for exploration and exploitation of cobalt resources in this new-energy era.

摘要: 近年来,钴矿相关新兴产业方兴未艾,从新能源汽车的充电电池到喷气涡轮机中的超级合金,钴均是不可或缺的关键金属材料之一。文章介绍了全球钴矿类型及分布特征,着重对近年来全球钴矿的勘查、研究取得的进展进行了梳理和总结。迄今为止,全球钴资源主要来源于沉积岩容矿型层控 Cu-Co 矿床、红土型 Ni-Co 矿床和岩浆型 Ni-Cu-Co 矿床及热液、火山成因钴多金属矿床,但总体分布极不均衡。热液及火山成因 Co 多金属矿床多数以 Co 为主要金属,表现出较大的找矿的潜力。上述几种钴矿床大多与基性-超基性岩有着直接的或间接的成因联系。此外,还有大量的钴资源赋存在洋底 Fe-Mn 结核与结壳内。关于钴矿的成矿条件、构造背景与成矿机理等关键问题仍亟需开展进一步的研究工作,深入理解钴矿的成矿规律并建立行之有效的找矿模型,将为新能源时代钴矿的勘查和开发提供有效的支撑和指导。

入藏号: CSCD:6553032

地址: Wang Hui, School of Earth Sciences and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Feng Chengyou, Institute of Exploration Techniques, CAGS, Langfang, Hebei 065000, China.

Zhang Mingyu, Institute of Mineral Resources, CAGS, Beijing 100037, China.

地址: 王辉, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

丰成友, 中国地质科学院勘探技术研究所, 廊坊, 河北 065000, 中国.

张明玉, 中国地质科学院矿产资源研究所, 北京 100037, 中国.

电子邮件地址: wanghui16@chd.edu.cn; fengchy@cags.ac.cn

电子邮件地址: wanghui16@chd.edu.cn; fengchy@cags.ac.cn

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作者: Wang Yating; Kong Jinling; Yang Liangyan; Li Jianfeng; Zhang Wenbo

作者: 王雅婷; 孔金玲; 杨亮彦; 李健锋; 张文博

标题: Remote Sensing Inversion of Soil Moisture in Vegetation-Sparse Arid Areas based on SVR

标题: 基于 SVR 的旱区稀疏植被覆盖下土壤水分遥感反演

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作者关键词: SVR; Radarsat-2; SVR; Radarsat-2; AIEM model; effective roughness parameter; soil moisture inversion; semi-arid regions of northwest China; Uxin Banner of Inner Mongolia; vegetation-sparse

作者关键词: AIEM 模型; 有效粗糙度参数; 土壤水分反演; 西北半干旱区; 内蒙古乌审旗; 稀疏植被

摘要: In the arid and semi-arid regions of northwest China, the precipitation is scarce and evapotranspiration is intense. Soil moisture, as an important ecological factor, affects the energy balance of soil-atmosphere interface. In recent years, Support Vector Regression (SVR) model has been applied in soil moisture inversion for its merits including high estimation accuracy, good ability to deal with non-linear processing and strong generalization ability. However, existing models rarely consider the influence of surface roughness, which limits inversion accuracy. Taking the Uxin Banner of Ordos city of Inner Mongolia as a study area, this study aims to construct a suitable soil moisture inversion model through combining Radarsat-2 synthetic aperture radar (SAR) data and GF-1 data. To extract backscattering coefficient of bare soil (σ_{soil}^0) from the full polarization Radarsat-2 SAR data, we used Water-Cloud model (WCM) to remove the influence of vegetation-sparse layer on the radar backscattering coefficient. Meanwhile, we constructed backscattering coefficient database of bare soil by using Advanced Integrated Equation Model (AIEM) and Oh Model, and used Look Up Table (LUT) method to simulate effective surface roughness parameters such as root mean square height (S) and correlation length (L). Finally, the soil moisture model was built based on support vector regression, and the soil moisture inversion results of different data sources under the backscattering coefficients of different polarization modes were systematically compared and analyzed. The results showed that the inversion accuracy of the co-polarization data (W polarization or HH polarization) was higher than that of the cross-polarization data (VH polarization or HV polarization) when the single data source without considering the roughness parameter was used as the model parameter. When the model parameter was the multi-source data with considering the roughness parameter, the inversion accuracy of different polarization data was improved. When the data source was σ_{vv}^0 and roughness parameter, the inversion model had a higher precision, the correlation coefficient between inversion value and measured value was 0.917. The mean absolute error (MAE) and root mean square error (RMSE) were 3.980% and

5.187%,respectively.Our findings can serve as the technical support for remote sensing of surface soil moisture in vegetation-sparse arid areas.

摘要: 中国西北半干旱区降水稀少、蒸散强烈,土壤水分作为重要的生态因子,影响着土壤-大气界面的能量平衡。支持向量回归模型具有估算精度高、可处理非线性问题、泛化能力强等优点,近年来被应用于土壤水分反演研究中,但已有模型极少考虑地表粗糙度因素的影响,导致反演精度受到一定限制。因此,本文以内蒙古乌审旗为研究区,采用水云模型去除地表稀疏植被覆盖的影响,提取全极化 Radarsat-2 SAR 影像裸土后向散射系数(σ_{soil}^0),并利用 AIEM 模型和 Oh 模型建立后向散射系数数据库,采用 LUT 法模拟地表有效粗糙度参数,构建基于支持向量回归的土壤水分反演模型,并系统地对比分析了不同极化方式的后向散射系数作为数据源的土壤水分反演结果。研究表明:不考虑粗糙度参数的单数据源作为模型参数时,同极化数据反演结果比交叉极化具有更高的反演精度;当模型参数为考虑粗糙度的多源数据时,不同极化数据的反演精度均有所提高,其中数据源为 σ_{vv}^0 和粗糙度参数时,反演结果最好($R^2=0.917$, $M4E=3.980\%$, $RMSE=5.187\%$)。研究结果可为旱区稀疏植被覆盖地表土壤水分的遥感监测提供技术支持。

入藏号: CSCD:6551384

地址: Wang Yating, School of Earth Science and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Yang Liangyan, School of Earth Science and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Li Jianfeng, School of Earth Science and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Wenbo, School of Earth Science and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Kong Jinling, School of Geological Engineering and Geomatics,Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 王雅婷, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

杨亮彦, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李健锋, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

张文博, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

孔金玲, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: E-mail:ytwang_chd@126.com; E-mail:jlkong@163.com

电子邮件地址: E-mail:ytwang_chd@126.com; E-mail:jlkong@163.com

使用次数 (最近 180 天): 0

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作者: Shao Yajing; Yuan Xuefeng

作者: 邵雅静; 员学锋

标题: Zoning of cultivated land quality improvement potential based on limiting factor analysis

标题: 基于限制因子分析的耕地质量提升潜力分区

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作者关键词: limiting factor; cultivated land quality; land consolidation; spatial autocorrelation; Baoji City

作者关键词: 限制因子; 耕地质量; 土地整治; 空间自相关; 宝鸡市

摘要: The aim of this study was to identify the types of dominant limiting factors of cultivated land quality in Baoji City. According to the spatial distribution of the improving potential of limiting factors, we divided the potential zoning of cultivated land quality improvement, and discussed the improvement measures of cultivated land quality in different potential zones. The results showed that the main type of limiting factors of cultivated land quality was the type of single factor, including soil layer, organic matter, and irrigation, which accounted for 66.11% of total area. The improving potential of cultivated land quality in Baoji City was at a medium level. The distribution trend was high in the north and low in the south, with certain spatial clustering characteristics. A total of 334 administrative villages in Baoji City have a high potential for improving the quality of cultivated land, which shows HH distribution type (Grade I District). Thus, we can increase the intensity of land consolidation projects in this region to improve the overall level of cultivated land quality. Strategies to improve the quality of cultivated land in the central part of Baoji City should focus on increasing the effective soil layer thickness, increasing the content of soil organic matter, and improving the irrigation conditions of agricultural land. In addition, the improvement of soil erosion should be strengthened in the northern region, and effective measures to reduce the impacts of rock outcrop and topographic slope on the quality of cultivated land should be taken in the southern region.

摘要: 以宝鸡市为研究区,从地类图斑尺度,识别了宝鸡市耕地质量主导限制因子类型,根据限制因子提升潜力的空间分布特征,划分了耕地质量提升潜力分区,探讨了不同潜力分区耕地质量的提升措施。结果表明:宝鸡市耕地质量限制因子主要为单因子限制型,包括土层限制、有机质限制和灌溉限制,共占宝鸡市耕地总面积的 66.11%;耕地质量提升潜力处于中等水平,且呈现北高南低的分布趋势,在空间上表现出一定的集聚特点;宝鸡市 334 个行政村耕地质量提升潜力较高且呈 HH 型分布(I 级区),可加大该区域土地整治工程力度,以提高区域耕地质量整体水平;宝鸡市中部地区的耕地质量提升措施应着重考虑增加有效土层厚度、提高土壤有机质含量和改善农用地灌溉条件;北部地区还应加强对土壤侵蚀的改良,南部地区应采取有效措施减小岩石露头度和地形坡度对耕地质量的影响。

入藏号: CSCD:6548993

地址: Shao Yajing, School of Earth Science and Resources, Chang'an University;; Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, ;; Xi'an;; ;; Beijing 710054;; 100101.

Yuan Xuefeng, School of Earth Science and Resources, Chang'an University; Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences; Shaanxi Key Laboratory of Land Renovation, ;;; Shaanxi Key Laboratory of Land Renovation, Xi'an; ;;; Xi'an, ; Beijing; ; 710054; 100101; ; 710054.

地址: 邵雅静, 长安大学地球科学与资源学院; ; 中国科学院地理科学与资源研究所, ; ; 西安; ; ; 北京 710054; ; 100101.

员学锋, 长安大学地球科学与资源学院; ; 中国科学院地理科学与资源研究所; ; 陕西省土地整治重点实验室, ; ; ; 陕西省土地整治重点实验室, 西安 ; ; ; 西安, ; ; 北京 ; ; 710054; ; 100101; ; 710054.

电子邮件地址: ynllsyj@163.com; zyxfyun@chd.edu.cn

电子邮件地址: ynllsyj@163.com; zyxfyun@chd.edu.cn

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作者: Han Lei; Li Yunqi; Zhao Yonghua; Wang Da; Guo Siqu

作者: 韩磊; 李蕴琪; 赵永华; 王达; 郭思琪

标题: Ground concentration distribution and source of PM_(2.5) in Guanzhong Region

标题: 关中地区 PM_(2.5)地面浓度分布及来源

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作者关键词: MODIS; MODIS; aerosol optical depth; air trajectory

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摘要: Atmospheric quality is closely related to human living environment. Atmospheric pollutants, especially fine particulate matter, directly and indirectly endanger human health. Therefore, many cities put the monitoring of fine particulate concentration at an important position. We analyzed the correlation between MODIS high-resolution aerosol products (aerosol optical depth, AOD) and PM_(2.5) concentration monitoring data in Guanzhong area in spring 2017 and constructed a direct fitting model. A multiple regression model containing meteorological elements was established by combining meteorological observation data. Those two models were compared. The results showed that the multivariate regression model with meteorological factors had better fitting

degree for the spatial distribution of PM_{2.5} in Guanzhong area ($r^2=0.768$, $P<0.01$). In the spring of 2017, the spatial distribution of PM_{2.5} (AOD) in Guanzhong area showed a trend of being high in the east region and low in the west region. The highest value appeared in Xi'an, Weinan and Xianyang, being 1.019, 0.911, and 0.124, respectively. Results from the principal component analysis of a typical polluted weather and simulation of its potential transmission path based on HYSPLIT backward trajectory model showed that atmospheric quality in Guanzhong area in spring 2017 was affected by multi-pollutants, multi-pollutant sources and multi-channel combined pollution, and the air mass mainly came from southwestern Mongolia. Our results provide reference for the prevention and control of air pollution and ecological environment protection in Guanzhong area.

摘要: 大气质量与人类的生存环境息息相关,大气中的污染物质尤其是细颗粒物直接与间接危害人类健康,因此许多城市把对细颗粒物浓度的监测放在了重要位置。利用2017年春季关中地区的MODIS高分辨率气溶胶产品(气溶胶光学厚度,AOD)与地面PM_{2.5}浓度监测数据进行相关性分析构建模型,结合气象观测资料建立含气象要素的多元回归模型,并将二者进行比较。结果表明,含气象要素的多元回归模型对关中地区PM_{2.5}地面浓度的空间分布拟合度更好($r^2=0.768$, $P<0.01$)。2017年春季关中地区的PM_{2.5}空间分布总体呈现东高西低的趋势,AOD最高值出现在西安、渭南和咸阳三市,分别为1.019、0.911和0.124。通过对一次典型污染天气进行主成分分析和基于HYSPLIT向后轨迹模型模拟其潜在传输路径发现,关中地区2017年春季大气质量受多污染物、多污染源以及多途径复合污染影响,且污染气团主要来自蒙古国西南部。研究结果对关中地区的大气污染防治与生态环境保护具有一定借鉴的意义。

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地址: Han Lei, College of Earth Science and Resources/College of Land Engineering, Chang'an University;; Shaanxi Key Laboratory of Land Consolidation, ;; Shaanxi Key Laboratory of Land Consolidation, Xi'an;; Xi'an, ;; 710054;; 710054.

Li Yunqi, College of Earth Science and Resources/College of Land Engineering, Chang'an University;; Shaanxi Key Laboratory of Land Consolidation, ;; Shaanxi Key Laboratory of Land Consolidation, Xi'an;; Xi'an, ;; 710054;; 710054.

Zhao Yonghua, College of Earth Science and Resources/College of Land Engineering, Chang'an University;; Shaanxi Key Laboratory of Land Consolidation, ;; Shaanxi Key Laboratory of Land Consolidation, Xi'an;; Xi'an, ;; 710054;; 710054.

Wang Da, College of Earth Science and Resources/College of Land Engineering, Chang'an University;; Shaanxi Key Laboratory of Land Consolidation, ;; Shaanxi Key Laboratory of Land Consolidation, Xi'an;; Xi'an, ;; 710054;; 710054.

Guo Siqi, College of Earth Science and Resources/College of Land Engineering, Chang'an University;; Shaanxi Key Laboratory of Land Consolidation, ;; Shaanxi Key Laboratory of Land Consolidation, Xi'an;; Xi'an, ;; 710054;; 710054.

地址: 韩磊, 长安大学地球科学与资源学院/土地工程学院;; 陕西省土地整治重点实验室, ;; 陕西省土地整治重点实验室, 西安;; 西安, ;; 710054;; 710054.

李蕴琪, 长安大学地球科学与资源学院/土地工程学院;; 陕西省土地整治重点实验室, ;; 陕西省土地整治重点实验室, 西安;; 西安, ;; 710054;; 710054.

赵永华, 长安大学地球科学与资源学院/土地工程学院;; 陕西省土地整治重点实验室, ;; 陕西省土地整治重点实验室, 西安;; 西安, ;; 710054;; 710054.

王达, 长安大学地球科学与资源学院/土地工程学院;; 陕西省土地整治重点实验室, ;; 陕西省

土地整治重点实验室, 西安;;西安,;; 710054;;710054.

郭思琪, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室,;;陕西省土地整治重点实验室, 西安;;西安,;; 710054;;710054.

电子邮件地址: hanshuanglei@chd.edu.cn; yonghuaz@chd.edu.cn

电子邮件地址: hanshuanglei@chd.edu.cn; yonghuaz@chd.edu.cn

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作者: Chen Guochao; Pei Xianzhi; Li Ruibao; Li Zuochen; Pei Lei; Liu Chengjun; Chen Youxin; Wang Meng; Gao Feng; Li Xiaobing

作者: 陈国超; 裴先治; 李瑞保; 李佐臣; 裴磊; 刘成军; 陈有炘; 王盟; 高峰; 李小兵

标题: Lithospheric extension of the post-collision stage of the Paleo-Tethys oceanic system in the East Kunlun Orogenic Belt: insights from Late Triassic plutons

标题: 东昆仑古特提斯后碰撞阶段伸展作用:来自晚三叠世岩浆岩的证据

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作者关键词: 岩浆岩; 后碰撞; 构造演化; 东昆仑造山带; 晚三叠世

摘要: We studied in detail the rock assembly, distribution and petrogenesis of Late Triassic plutons in the East Kunlun Orogenic Belt (EKOB) by performing a comprehensive analysis of rock types, intrusion ages, petrogeochemistry and isotopic geochemistry characteristics of the plutons. The Late Triassic is a tectonically pivotal transitional period during the evolution of the Paleo-Tethys oceanic system in EKOB when various magmatic rocks, including gabbro, granodiorite, monzonite and syenite, crystallized extensively while adakitic magmatic rock and A-type granite were extensively exposed. Compared to plutons intruded during subduction stage, the Late Triassic plutons possess smaller scale outcrop, such as small intrusions, stocks and dykes intruding into earlier magmatite and strata. Geochemically, the plutons mainly belong to metaluminous to weakly peraluminous high-K to shoshonite series. They are enriched in light rare earth elements (LREE) and large-ion lithophile elements (LILE), Rb, Th, Ba and Cs, and depleted

in heavy rare earth elements (HREE) and high field strength elements (HFSE), Nb, Ta and Ti, with varying degrees of differentiation, enrichment and depletion from rock to rock. Most of the plutons have similar isotopic characteristics to that of Late Permian-Triassic mafic magmatic rocks; furthermore, some rocks have higher $\epsilon_{\text{Nd}}(t)$ and $\epsilon_{\text{Hf}}(t)$ values. Mafic magmatite, ordinary granite and adakitic magmatite are ubiquitous in EKOB. However, A-type granites are mainly developed in the Qimantagh tectonic zone, near the Ayakekumulake-Xiangride fault. The mafic plutons are most likely derived from partial melting of metasomatic mantle wedge with subduction fluid based on their arc magmatite features. Most of the ordinary granites and adakitic magmatites are partial-melting products of juvenile lower crust, except for some mantle-derived adakitic magmatites with mantle magma mixing, as well as some A-type granites from relict of partial-melting of lower crust. All studies indicate that EKOB stepped into the post-collision stage of the Paleo-Tethys oceanic system in the Late Triassic period. Crust thickening and density increasing, triggered by continuous collision between the Bayanhar block and EKOB, led to lithospheric delamination due to gravitational instability, which resulted in lithospheric mantle decompressional melting to yield much of mafic magma. Mafic magma later on intruded into different crust melts and partial-melts of delaminated crust to form metasomatic mantle magma, which, through magmatic mixing and later stage evolution, produced the rich and diverse plutons of the Late Triassic in EKOB.

摘要: 通过对东昆仑造山带晚三叠世岩浆岩的岩石类型、形成时代、岩石地球化学和同位素地球化学资料综合分析,对岩浆岩的岩石组合、分布特征和岩石成因进行研究,探讨东昆仑造山带晚三叠世构造演化的地球动力学背景。东昆仑造山带晚三叠世是古特提斯演化过程中重要的构造转换期,岩浆岩岩石类型多样,主要包括辉长岩、花岗闪长岩、二长花岗岩和正长花岗岩,并且广泛出露具埃达克质特征的岩浆岩和A型花岗岩。晚三叠世岩浆岩的出露规模与俯冲阶段相比,规模较小,一般以小岩体、岩株和岩脉侵入于早期岩体和地层中。东昆仑晚三叠世岩浆岩主体为准铝-弱过铝质高钾钙碱性-钾玄岩系列,轻重稀土元素具有一定分异,富集大离子亲石元素,亏损高场强元素,岩石类型不同时分异程度、富集和亏损程度有一定差异。大部分晚三叠世花岗质岩浆岩的同位素特征与晚二叠世-三叠纪镁铁质岩浆岩近似,部分具有更高的 $\epsilon_{\text{Nd}}(t)$ 和 $\epsilon_{\text{Hf}}(t)$ 值。镁铁质岩浆岩、普通花岗岩、埃达克质岩浆岩在东昆仑各个构造带皆有分布,A型花岗岩主要分布在祁漫塔格构造带(东昆北)的阿牙克库木湖-香日德断裂附近。东昆仑晚三叠世镁铁质岩浆岩具有弧岩浆岩特征,为俯冲流体交代的地幔楔部分熔融产物。普通花岗岩和埃达克质岩浆岩多为新生下地壳部分熔融产物,少量埃达克质岩浆岩由于与地幔的交代作用,具有幔源特征。A型花岗岩为残留下地壳部分熔融的产物。部分普通花岗岩、埃达克质岩浆岩和A型花岗岩由于岩浆混合作用,具幔源特征。构造环境研究表明,东昆仑在晚三叠世进入古特提斯演化的后碰撞阶段。巴颜喀拉地块同东昆仑地块的持续碰撞导致地壳加厚,密度增大,使岩石圈重力不稳定发生拆沉作用,引发岩石圈地幔减压熔融,产生大量的镁铁质岩浆岩;镁铁质岩浆底侵不同类型地壳熔融及拆沉地壳部分熔融而形成的岩浆交代地幔,以及岩浆混合和岩浆后期演化,形成了东昆仑造山带晚三叠世丰富多样的岩浆岩。

入藏号: CSCD:6546372

地址: Chen Guochao, School of Earth Science and Resources, Chang'an University;;School of Civil Engineering, Nanyang Institute of Technology, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources;;, Xi'an;;Nanyang, ;; 710054;;473000.

Pei Xianzhi, School of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an, Shaanxi 710054, China.

Li Ruibao, School of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an, Shaanxi 710054, China.

Li Zuochen, School of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an, Shaanxi 710054, China.

Pei Lei, School of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an, Shaanxi 710054, China.

Liu Chengjun, School of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an, Shaanxi 710054, China.

Chen Youxin, School of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an, Shaanxi 710054, China.

Wang Meng, School of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an, Shaanxi 710054, China.

Gao Feng, School of Earth Science and Resources, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources, Xi'an, Shaanxi 710054, China.

Li Xiaobing, School of Earth Science and Resources, Chang'an University;;College of Geographical Sciences, Shanxi Normal University, Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Natural Resources;;, Xi'an;;Linfen, ;; 710054;;041000.

地址: 陈国超, 长安大学地球科学与资源学院;;南阳理工学院土木工程学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室;;, 西安;;南阳, 陕西;;河南 710054;;473000, 中国.

裴先治, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

李瑞保, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

李佐臣, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

裴磊, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

刘成军, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

陈有忻, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

王盟, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

高峰, 长安大学地球科学与资源学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室, 西安, 陕西 710054, 中国.

李小兵, 长安大学地球科学与资源学院;;山西师范大学地理科学学院, 西部矿产资源与地质工程教育部重点实验室;;自然资源部岩浆作用成矿与找矿重点实验室;;, 西安;;临汾, 陕西;;山西 710054;;041000, 中国.

电子邮件地址: chaoschen@126.com; peixzh@sina.com

电子邮件地址: chaoschen@126.com; peixzh@sina.com

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作者: 韩珂; 杨兴科; 杨龙伟; 张健; 李斌; 阮仕琦; 安乐; 高云峰

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作者关键词: structure-alteration lithofacies mapping; brittle-ductile shear zone; ore prospecting and forecast; Huanglong gold deposit; South Qinling

作者关键词: 构造-蚀变岩相填图; 脆-韧性剪切带; 找矿预测; 黄龙金矿; 南秦岭

摘要: With the new round of prospecting for crisis mines in China, the ore - prospecting theories and methods with low cost and high efficiency are especially important for prospecting in the deep subsurface and periphery of some old mines. The structure - alteration lithofacies - mapping is one of the approaches in this aspect. Its working range accords with the survey scope in the mine area, focusing on data of rock, ore - controlling structure and mineralization alteration. Based on the simplified geological map of the mine area, these data were plotted on the base map in periods and different features. Then a map of structure - altered rock facies was prepared to help search for primary ore - controlling structures and altered rock facies zones related with mineralization, providing a basis for ore - search at depth and periphery and work plan in the mine area. This method has been applied to the Huanglong gold deposit in the South Qinling, the northern margin of Yangtze Plate, where the Silurian Meiziya Formation has experienced multi - stage tectonic deformation and is superimposed with regional metamorphism and hydrothermal metamorphism. As a result, three brittle - ductile shear zones and altered rock zones such as biotitization and silicification were indentified in the deposit area, which are closely related to the existence of old ore bodies, and should be primary targets for the next step of exploration in this area.

摘要: 随着新一轮全国危机矿山找矿工作的开展,低成本、高效率的就矿找矿理论和方法对于一些老矿区的深部和外围找矿尤为重要。矿区构造-蚀变岩相填图的范围就是矿区勘查范围,在填图过程中把控岩构造、控矿构造、矿化蚀变等信息作为填图重点,以矿区地质图为底图,把野外填图过程中收集到的有关控矿构造、矿化蚀变等信息分期次、分不同特征等标示在底图上,形成控岩控矿构造实际材料图。在实际材料图基础上,编制矿区构造-蚀变岩相图,从而寻找主要的控矿构造和与矿化密切相关的蚀变岩相带,并为下一步矿区外围和深部找矿、工程布置提供靶区依据。黄龙金矿区位于扬子板块北缘南秦岭构造带,矿区志留系梅子垭组地层经历了多期构造变形,并叠加有区域变质和热液变质作用。本研究采用构造-蚀变岩相填编图的方法,在矿区填编出了3条脆-韧性剪切带和黑云母变斑晶化、硅化等蚀变岩相带,并认为脆-韧性剪切带、黑云母变斑晶化带、硅化带及蚀变岩相叠加带等蚀变与金矿体存在密切关系,是矿区下一步外围及深部找矿的重点靶区。

入藏号: CSCD:6540826

地址: Han Ke, School of Earth Science and Resources, Chang an University, Xi 'an, Shaanxi 710054, China.

Yang Longwei, School of Earth Science and Resources, Chang an University, Xi 'an, Shaanxi 710054, China.

Zhang Jian, School of Earth Science and Resources, Chang an University, Xi 'an, Shaanxi 710054, China.

Li Bin, School of Earth Science and Resources, Chang an University, Xi 'an, Shaanxi 710054, China.

Ruan Shiqi, School of Earth Science and Resources, Chang an University, Xi 'an, Shaanxi 710054, China.

An Le, School of Earth Science and Resources, Chang an University, Xi 'an, Shaanxi 710054, China.

Gao Yunfeng, School of Earth Science and Resources, Chang an University, Xi 'an, Shaanxi 710054, China.

Yang Xingke, School of Earth Science and Resources, Chang an University;;, ;Key Laboratory of West Mineral Resources and Geology Engineering Ministry of Education, Xi 'an;;Xi'an,

Shaanxi;;Shaanxi 710054;;710054.

地址: 韩珂, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

杨龙伟, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

张健, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李斌, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

阮仕琦, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

安乐, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

高云峰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

杨兴科, 长安大学地球科学与资源学院;;长安大学, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: 877415765@qq.com; xky61@163.com

电子邮件地址: 877415765@qq.com; xky61@163.com

使用次数 (最近 180 天): 0

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作者: Luan Yan; He Ke; Tan Xijuan

作者: 栾燕; 何克; 谭细娟

标题: In situ U- Pb dating and trace element determination of standard zircons by LA- ICP- MS

标题: LA-ICP-MS 标准锆石原位微区 U-Pb 定年及微量元素的分析测定

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作者关键词: LA-ICP-MS; LA-ICP-MS; standard zircons; U-Pb dating; trace element

作者关键词: 标准锆石; U-Pb 定年; 微量元素

摘要: The age and trace elements of 91500, GJ-1, Plesovice and Qinghu standard zircons were analyzed simultaneously by using Agilent 7700X inductively coupled plasma-mass spectrometry (ICP-MS) and Photo Machines Analyte Excite 193nm laser ablation at the laboratory of mineralization and dynamics, Chang'an University, with the laser frequency being 5Hz and laser ablation spot size being 35μm. According to the results obtained, the $^{206}\text{Pb}/^{238}\text{U}$ age range of 20 test points of 91500 zircon is between 1059Ma and 1070Ma, and its weighted average of $^{206}\text{Pb}/^{238}\text{U}$ age is 1063.8 ± 6.6Ma; the $^{206}\text{Pb}/^{238}\text{U}$ age range of 28 test points of

GJ- 1 zircon is between 601Ma and 610Ma, and its weighted average of $^{206}\text{Pb}/^{238}\text{U}$ age is 605.43.0Ma; the $^{206}\text{Pb}/^{238}\text{U}$ age range of 28 test points of Plesovice zircon is between 336Ma and 341Ma, and its weighted average of $^{206}\text{Pb}/^{238}\text{U}$ age is 338.81.4Ma; the $^{206}\text{Pb}/^{238}\text{U}$ age range of 40 test points of Qinghu zircon is between 158Ma and 165Ma, and its weighted average of $^{206}\text{Pb}/^{238}\text{U}$ age is 159.90.7Ma. The results show that the $^{206}\text{Pb}/^{238}\text{U}$ age ranges of four standard zircons 91500, GJ- 1, Plesovice and Qinghu are in accordance with the recommended values within reasonable error range, and the weighted average age shows an excellent agreement with the previously reported data. All the trace element compositions of four standard zircons fall into the range of the literature available. Chondritenormalized REE distribution curves of these standard zircons show that the relative content of rare earth elements obtained is accurate. The above results show that in situ U-Pb dating and trace element determination of zircon can be carried out by using the method established in this study, and the results are accurate and reliable.

摘要: 利用长安大学成矿作用及其动力学实验室 Agilent 7700X 四极杆等离子体质谱 (ICP-MS)和 Photo Machines Analyte Excite 193nm 激光,在激光频率为 5Hz,束斑直径为 35 μm 条件下,对 91500、GJ-1、Plesovice 和 Qinghu 4 个标准锆石进行了原位微区 U-Pb 同位素和微量元素测定.结果显示,91500 标准锆石 20 个测试点的 $^{206}\text{Pb}/^{238}\text{U}$ 年龄范围为 1059~1070Ma, $^{206}\text{Pb}/^{238}\text{U}$ 年龄加权平均值为 1063.86.6Ma;GJ-1 标准锆石 28 个测试点的 $^{206}\text{Pb}/^{238}\text{U}$ 年龄范围为 601~610Ma, $^{206}\text{Pb}/^{238}\text{U}$ 年龄加权平均值为 605.43.0Ma;Plesovice 标准锆石 28 个测试点的 $^{206}\text{Pb}/^{238}\text{U}$ 年龄范围为 336~341Ma, $^{206}\text{Pb}/^{238}\text{U}$ 年龄加权平均值为 338.81.4Ma; Qinghu 标准锆石 40 个测试点的 $^{206}\text{Pb}/^{238}\text{U}$ 年龄范围为 158~165Ma, $^{206}\text{Pb}/^{238}\text{U}$ 年龄加权平均值为 159.90.7Ma. 上述结果表明,91500、GJ-1、Plesovice 和 Qinghu 4 个标准锆石的 $^{206}\text{Pb}/^{238}\text{U}$ 年龄都在误差范围内,且年龄加权平均值与前人报道的年龄在误差范围内一致.同时,4 个标准锆石的微量元素结果基本落在前人文献报道的范围内.从 4 个标准锆石的稀土元素球粒陨石标准化曲线可以看出,稀土元素的相对含量较准确.以上结果表明,建立的测试方法实现了对锆石原位微区 U-Pb 定年及微量元素的同时测定,分析数据结果准确、可靠.

入藏号: CSCD:6538877

地址: Luan Yan, School of Earth Science and Resources,Chang'an University;;Laboratory of Mineralization and Dynamics,Chang'an University, ;; Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

He Ke, School of Earth Science and Resources,Chang'an University;;Laboratory of Mineralization and Dynamics,Chang'an University, ;; Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Tan Xijuan, School of Earth Science and Resources,Chang'an University;;Laboratory of Mineralization and Dynamics,Chang'an University, ;; Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

地址: 栾燕, 长安大学地球科学与资源学院;;长安大学成矿作用及其动力学实验室, ;; 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

何克, 长安大学地球科学与资源学院;;长安大学成矿作用及其动力学实验室, ;; 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

谭细娟, 长安大学地球科学与资源学院;;长安大学成矿作用及其动力学实验室, ;; 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: luanyan1234@163.com

电子邮件地址: luanyan1234@163.com

使用次数 (最近 180 天): 0

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作者: Wu Tiantian; Lei Wanshan; Jiao Jiangang; Zhao Taiping; Gao Xinyu

作者: 武甜甜; 雷万杉; 焦建刚; 赵太平; 高昕宇

标题: Geochemical characteristics,U-Pb ages and tectonic setting of the Muce Monzonite in Xiong'er Mountains

标题: 熊耳山地区穆册二长岩体地球化学特征、U-Pb 年龄及构造背景

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作者关键词: Muce monzonite; Paleoproterozoic; island-arc magma; Xiong'er Mountains; North China craton

作者关键词: 穆册二长岩; 古元古代; 岛弧岩浆; 熊耳山; 华北克拉通南缘

摘要: Objectives: The Muce monzonite in Xiong'er Mountains is distributed in the southern margin of the North China Craton. It is of great geological significance to study the tectonic evolution of the southern margin of the North China Craton. Combined with petrological study,geochemical characteristics of the monzonite and the LA-ICP-MS zircon U-Pb age,we briefly discuss the formation age,origin and tectonic background of the monzonite. Methods: Based on the field work,through the microscope observation,the whole rock chemical analysis and LA-IPC-MS U-Pb zircon dating of Muce monzonitic feldspar and monzogranite were carried out. Results: The geochemical analysis of the Muce monzonite shows that that belongs to type A genetic type and is formed in the rifting environment under the extensional structure. The monzonite is riched in large ion lithophile elements (LILEs) Rb,Ba,Sr,Pb and light rare earth elements (LREEs). The monzonite is deficient in high field strength elements (HFSEs) Th,Nb,Zr,and strong depletion of Ti and Ta,which show the characteristics of typical island arc magmatic rocks. LA-ICP-MS U-Pb zircon dating of the monzonite samples yield the ages of 2172 8 Ma (MSWD= 0.58,n = 17) and 21867 Ma(MSWD= 0.60,n = 19). Respectively,monzogranite sample gets a LA-ICP-MS U-Pb zircon age of 21748 Ma(MSWD= 0.45,n = 19),indicating the Muce monzonite was formed in Paleoproterozoic. Conclusions: Combined with the previous study,it is considered that the Muce monzonite was formed in the Paleoproterozoic and may have

experienced the influence of rifting and island arc.

摘要: 华北克拉通古元古代的构造格局是学术界关注的焦点之一,位于华北克拉通南缘的穆册二长岩体为该研究提供了新的证据。穆册岩体主体为黑云角闪二长岩,边部见二长斑岩,并被同期二长花岗岩脉侵入。二长岩的 LA-ICP-MS 锆石 U-Pb 定年为 21728 Ma(MSWD= 0.58,n= 17)和 21867 Ma(MSWD= 0.60,n = 19),二长花岗岩年龄为 21748 Ma(MSWD= 0.45,n= 19),显示该二长岩体形成于古元古代。穆册二长岩不仅具有造山后地球化学特征,还具有典型的岛弧岩浆岩的地球化学特征。综合分析,穆册二长岩可能在古元古代经历了岛弧和裂谷两种环境的共同影响。

入藏号: CSCD:6528350

地址: Wu Tiantian, School of Earth Science and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Lei Wanshan, School of Earth Science and Resources,Chang'an University;;Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Jiao Jiangang, School of Earth Science and Resources,Chang'an University;;Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering,Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Zhao Taiping, Guangzhou Institute of Geochemistry,Chinese Academy of Sciences, Key Laboratory for Metallogenic Dynamics, Guangzhou, Guangdong 510640, China.

Gao Xinyu, Guangzhou Institute of Geochemistry,Chinese Academy of Sciences, Key Laboratory for Metallogenic Dynamics, Guangzhou, Guangdong 510640, China.

地址: 武甜甜, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

雷万杉, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, ;; 710054;;710054.

焦建刚, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, ;; 710054;;710054.

赵太平, 中国科学院广州地球化学研究所, 广州, 广东 510640, 中国.

高昕宇, 中国科学院广州地球化学研究所, 广州, 广东 510640, 中国.

电子邮件地址: 774934425@qq.com; 4730431@qq.com

电子邮件地址: 774934425@qq.com; 4730431@qq.com

使用次数 (最近 180 天): 0

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作者: Wang Xiaofeng; Lesimuchu; Zhang Mingming

作者: 王晓峰; 勒斯木初; 张明明

标题: Ecosystem pattern change and its influencing factors of two barriers and three belts

标题: 两屏三带生态系统格局变化及其影响因素

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作者关键词: ecological barrier; ecosystem pattern; geographical detector; driving force

作者关键词: 生态屏障区; 生态系统格局; 地理探测器; 驱动力

摘要: The two barriers and three belts is an important part of China's national ecological security strategic pattern. Understanding the spatial-temporal distribution and transformation of ecosystem types in the barrier is important for the sustainable development of the barrier and the construction of ecological civilization. Based on the land use data of 30-m resolution in 2000, 2005, 2010 and 2015, the spatial and temporal changes of ecosystem types in barrier areas from 2000 to 2015 were analyzed by the methods of ecosystem pattern change analysis, land transfer matrix, PNTIL model and geographical detectors model. Furthermore, the influencing factors of forward/reverse transformation of ecosystems were discussed. Urban expansion and agricultural land change were the most significant phenomena in the process of ecosystem change from 2000 to 2015. The negative conversion rate of ecosystems in barrier was slightly higher than the positive conversion rate. The negative transformation of ecosystems in barrier had obvious directions of population development, economic development and industrial development. The impacts of natural environmental factors on the positive transformation of ecosystems were significantly greater than those of socio-economic factors. There was a significantly positive correlation between socioeconomic factors and the reverse transformation of ecosystems, but no significant correlation between socioeconomic factors and the positive transformation of ecosystems. As the natural constraining force of ecosystem changes, the natural environmental factors had a significant correlation with the reverse or positive transformation of ecosystems.

摘要: 两屏三带生态屏障区是国家生态安全战略格局的重要组成部分,深入认识和探讨屏障区生态系统类型时空分布和转化机理对屏障区可持续发展,建设生态文明具有深远意义。基于2000年、2005年、2010年和2015年土地利用数据,运用生态系统格局变化分析方法、土地转移矩阵、PNTIL模型、地理探测器等模型,综合分析2000-2015年屏障区生态系统类型时空演变特征,探讨生态系统正向/逆向转化的影响因素。结果表明:2000-2015年生态系统变化过程中城市扩张、农用地变化现象最为显著;屏障区生态系统逆向转化率略高于正向转化率;屏障区生态系统逆向转化具有明显的人口发展、经济发展和工业发展指向,自然环境因素对生态系统正向转化的影响力明显大于社会经济要素;社会经济要素与生态系统逆向转化呈显著正相关,但与正向转化率之间不存在明显的相关关系。自然环境要素作为生态系统变化的天然约束力,对生态系统正向/逆向转化有显著的相关性。

入藏号: CSCD:6529325

地址: Wang Xiaofeng, School of Earth Sciences and Resources, Changan University; ; Shaanxi Provincial Key Laboratory of Land Engineering, ; ; Shaanxi Provincial Key Laboratory of Land

Engineering, Xian;;Xian, ;; 710054;;710054.

Lesimuchu, School of Earth Sciences and Resources,Changan University, Xian, 710054.

Zhang Mingming, School of Earth Sciences and Resources,Changan University, Xian, 710054.

地址: 王晓峰, 长安大学地球科学与资源学院;;陕西省土地工程重点实验室, ;;陕西省土地工程重点实验室, 西安;;西安, ;; 710054;;710054.

勒斯木初, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

张明明, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

电子邮件地址: wangxf@chd.edu.cn

电子邮件地址: wangxf@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Guo Siqi; Han Lei; Zhao Yonghua; Yuan Xuefeng; Wang Da; Li Yunqi

作者: 郭思琪; 韩磊; 赵永华; 员学锋; 王达; 李蕴琪

标题: Spatiotemporal variation and landscape pattern of soil erosion in Qinling Mountains

标题: 秦岭地区土壤侵蚀时空变化及景观格局

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作者关键词: RUSLE; soil erosion; spatiotemporal variation; landscape pattern; RUSLE

作者关键词: 土壤侵蚀; 时空变化; 景观格局

摘要: Soil erosion is an important factor restricting the sustainable development of Qinling Mountains region. This study aims to explore the soil erosion status and landscape pattern change in Qinling Mountains. Based on the results of remote sensing interpretation in 2005, 2010 and 2015, the general soil erosion equation (RUSLE) was used to calculate the soil erosion in those three years. After that, soil erosion status of the five major watersheds in Qinling Mountains was quantified. The relationships among soil erosion, land use, and topographic factors were analyzed, and the changes of soil erosion landscape pattern in the study area were clarified. Intensity and area of the soil erosion in Qinling Mountains significantly decreased from 2005 to 2015. The total erosion amounts in 2005 and 2015 were 0.90×10^8 and 0.33×10^8 t

respectively,with a reduction of 63.33%.Soil erosion decreased from west to east and from south to north.Soil erosion was the most serious in the Jialing River basin,situated in the western part of the study area.The soil erosion modulus in 2005,2010 and 2015 were 3872.80,1454.31 and 1461.91 t·km⁻²·a⁻¹,respectively.The soil erosion modulus was positively correlated with topographic factors such as slope and elevation,and showed obvious temporal and spatial variations.Soil erosion showed a weakening trend in different land use types in the region,with the most obvious reduction for the unused land.The fragmentation degree of the overall erosion landscape and the total number of patches in Qinling Mountains reduced,and the fragmentation index and the landscape heterogeneity decreased.The anthropogenic disturbance on the landscape of Qinling Mountains weakened over time,and the ecological environment was developing in a benign direction.

摘要: 土壤侵蚀是制约秦岭地区可持续发展的重要因素,为了解秦岭地区的土壤侵蚀状况及景观格局的变化,基于 2005 年、2010 年和 2015 年遥感解译结果,采用通用土壤侵蚀方程 RUSLE 计算各年的土壤侵蚀量,分析研究区土壤侵蚀的时空变化特征,量化秦岭地区 5 个流域的土壤侵蚀状况,探讨土壤侵蚀与土地利用及地形因子之间的关系,并对研究区土壤侵蚀景观格局变化进行分析。结果表明:2005-2015 年秦岭地区土壤侵蚀强度及面积均有明显改善,2005 年和 2015 年总侵蚀量分别为 0.90×10^8 和 0.33×10^8 t,减少了 63.33%;研究区内土壤侵蚀在空间上呈现由西向东、由南至北减弱的特征;位于研究区西部的嘉陵江流域土壤侵蚀最为严重,其 2005 年、2010 年和 2015 年土壤侵蚀模数分别为 3872.80、1454.31 和 $1461.91 \text{ t} \cdot \text{km}^{-2} \cdot \text{a}^{-1}$;土壤侵蚀模数与坡度、高程等地形因子呈正相关,具有明显的时空变化特征;区内不同土地利用类型的土壤侵蚀均有减弱的趋势,其中未利用土地土壤侵蚀的降低最为明显;秦岭地区的整体侵蚀景观破碎化程度有所降低,斑块总数减少,破碎度指数变小,景观异质性降低,人类活动对秦岭地区景观的干扰随时间而减弱,生态环境向良性方向发展。

入藏号: CSCD:6529328

地址: Guo Siqi, School of Earth Science and Resources/School of Land Engineering,Changan University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xian;;Xian, ;; 710054;;710054.

Han Lei, School of Earth Science and Resources/School of Land Engineering,Changan University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xian;;Xian, ;; 710054;;710054.

Zhao Yonghua, School of Earth Science and Resources/School of Land Engineering,Changan University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xian;;Xian, ;; 710054;;710054.

Yuan Xuefeng, School of Earth Science and Resources/School of Land Engineering,Changan University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xian;;Xian, ;; 710054;;710054.

Wang Da, School of Earth Science and Resources/School of Land Engineering,Changan University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xian;;Xian, ;; 710054;;710054.

Li Yunqi, School of Earth Science and Resources/School of Land Engineering,Changan University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xian;;Xian, ;; 710054;;710054.

地址: 郭思琪, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室, ;;陕西省土地整治重点实验室, 西安;;西安, ;; 710054;;710054.

韩磊, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室,;;陕西省土地整治重点实验室, 西安;;西安,;; 710054;;710054.

赵永华, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室,;;陕西省土地整治重点实验室, 西安;;西安,;; 710054;;710054.

员学锋, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室,;;陕西省土地整治重点实验室, 西安;;西安,;; 710054;;710054.

王达, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室,;;陕西省土地整治重点实验室, 西安;;西安,;; 710054;;710054.

李蕴琪, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室,;;陕西省土地整治重点实验室, 西安;;西安,;; 710054;;710054.

电子邮件地址: 503520511@qq.com; yonghuaz@chd.edu.cn

电子邮件地址: 503520511@qq.com; yonghuaz@chd.edu.cn

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作者: Zhou Yujie; Zhao Yonghua; Li Wanying

作者: 周煜杰; 赵永华; 李宛莹

标题: A brief introduction to ecological problems and the research progress of soil remediation in the northern foot of Qinling Mountains

标题: 秦岭北麓生态问题及土壤修复研究进展

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作者关键词: northern slope of Qinling Mountains; ecological civilization; land remediation; soil microorganism

作者关键词: 秦岭北麓; 生态文明; 土地整治; 土壤微生物

摘要: Qinling Mountains is one of the key areas of ecological conservation in China.As an important part of the Qinling Mountains,the northern foot of the Qinling Mountains (Xian section) is related to the ecological environment and economic development quality of Xian City.The special location,over-exploitation of mineral resources,illegal construction of private villas,free

discharge of domestic waste,have led to a series of soil pollution problems,with serious environmental damage in the northern foot of Qinling Mountains.In view of the ecological problems such as diverse pollution types and varying pollution levels in the northern foot of Qinling Mountains,it is necessary to use remote sensing monitoring to carry out in-depth investigation,with the aim to promote the restoration and evaluation of contaminated land and realize the rational utilization of land resources and further improvement of soil quality.According to different soil properties and pollution conditions,physicochemical,biological and new soil remediation techniques are used to establish effective remediation system in the aspects of pollution source and pollution degree,and to carry out long-term dynamic monitoring.In addition,through land science and technology innovation,the research in microbes and trace elements,the theoretical study of land science and engineering,we will establish ecological protection standard system and ecological redline in the northern root of Qinling Mountains,which will help the government to be self-regulated and improved,thus realizing the land resource classification management,soil quality improvement,and environment management optimization and providing guidance and operable strategies for ecological restoration in the northern foot of Qinling Mountains.

摘要: 秦岭是中国生态保护的重点区域之一,其生物种类繁多,环境意义重大。秦岭北麓(西安段)作为秦岭重要组成部分,关乎着西安市生态环境状况和经济发展质量,但就实际情况来看,其生态环境相对脆弱,治理难度较大。特殊的地理位置、过度的矿物开发、不合理的景区规划、违规建设私人别墅、生活垃圾排放随意等导致的一系列土壤污染问题,造成秦岭北麓生态环境严重破坏。针对秦岭北麓污染类型多样、污染程度不一等生态问题,应当运用遥感监测等技术手段深入调研,来推进污损土地修复与评价工作,从而实现秦岭北麓的土地资源合理利用、土壤质量进一步提升;根据不同的土壤性状及污染状况,利用物理化学、生物、新兴土壤修复技术,集中在污染来源、污染程度等方面不断实践并建立有效的修复体系,并进行长期动态监测。此外,通过土地科技创新、微生物与微量元素标准研究、土地科学与工程理论研究,建立生态保护标准体系和制定秦岭北麓生态红线,配合政府自我规范和完善,从而实现土地资源分类治理、土壤质量修复完善、环境优化管理,多方面多维度多层次地指导秦岭北麓生态环境恢复工作,为秦岭北麓的生态建设提供符合实际的具有可操作性的对策。

入藏号: CSCD:6529334

地址: Zhou Yujie, College of Earth Sciences and Resources/College of Land Engineering,Changan University, Xian, 710054.

Zhao Yonghua, College of Earth Sciences and Resources/College of Land Engineering,Changan University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xian;;Xian, ;; 710054;;710054.

Li Wanying, College of Earth Sciences and Resources/College of Land Engineering,Changan University;;Shaanxi Provincial Land Engineering Construction Group, ;; Xian;;Xian, ;; 710054;;710075.

地址: 周煜杰, 长安大学地球科学与资源学院/土地工程学院, 西安, 陕西 710054, 中国.

赵永华, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室, ;;陕西省土地整治重点实验室, 西安;;西安, ;; 710054;;710054.

李宛莹, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地工程建设集团, ;;, 西安;;西安, ;; 710054;;710075.

电子邮件地址: 1035265756@qq.com; yonghuaz@chd.edu.cn

电子邮件地址: 1035265756@qq.com; yonghuaz@chd.edu.cn

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作者: Tian Ge; Han Lei; Zhao Yonghua

作者: 田鸽; 韩磊; 赵永华

标题: Application of the actual 3D model from multi-source data fusion in land consolidation

标题: 多源数据融合的实景三维建模在土地整治中的应用

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作者关键词: land consolidation; unmanned aerial vehicle (UAV); actual 3D model

作者关键词: 土地整治; 无人机; 实景三维模型

摘要: Since the beginning of 21st century,land consolidation projects have rapidly developed under the background of ecological civilization construction in China.With the rapid development of unmanned aerial vehicle (UAV),the technology of the oblique photography measurement comes into the publics vision and has been widely used in the land consolidation projects.Based on the method of multi-source data fusion,using multi-len cameras,UAV takes pictures for the buildings from different angles and regain the forms of the tops and sides of the buildings efficiently.More accurate details of models can be achieved.This technology can provide basic geographic data for land consolidation projects.Such data can be applied to many areas,such as planning,design and construction of land consolidation projects.Here,we introduce the use of actual 3D model technology from multi-source data fusion into land consolidation projects,and propose related solutions and technical processes.

摘要: 进入 21 世纪以来,在生态文明建设背景下,中国的土地整治项目迅速发展。同时,随着近几年无人机的高速发展,倾斜摄影测量技术逐渐走进人们视野,并被广泛应用在土地整治项目中。基于多源数据融合的方法,利用无人机搭载多镜头相机,从各个角度拍摄建筑物,能快速高效地还原出建筑物顶部以及立面形态,模型效果更为精细,可为土地整治工程提供基础地理数据,并应用在土地整治项目的规划、设计、施工等全过程。本文将多源数据融合的实景三维建模技术引入土地整治中,提出了相关解决方案和技术流程,并对实景三维模型在土地整治方面的应用做了介绍。

入藏号: CSCD:6529336

地址: Tian Ge, School of Earth Science and Resources/School of Land Engineering,Changan University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xian;;Xian, ;; 710054;;710054.

Han Lei, School of Earth Science and Resources/School of Land Engineering,Changan University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xian;;Xian, ;; 710054;;710054.

Zhao Yonghua, School of Earth Science and Resources/School of Land Engineering,Changan University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xian;;Xian, ;; 710054;;710054.

地址: 田鸽, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室, ;;陕西省土地整治重点实验室, 西安;;西安, ;; 710054;;710054.

韩磊, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室, ;;陕西省土地整治重点实验室, 西安;;西安, ;; 710054;;710054.

赵永华, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室, ;;陕西省土地整治重点实验室, 西安;;西安, ;; 710054;;710054.

电子邮件地址: nngz94626025@163.com; yonghuaz@chd.edu.cn

电子邮件地址: nngz94626025@163.com; yonghuaz@chd.edu.cn

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作者: Wang Meng; Qian Jiahui; Zhang Jinjiang; Zhang Bo

作者: 王盟; 钱加慧; 张进江; 张波

标题: Zircon U-Pb age and Lu-Hf isotope characteristics of the granitic augen gneiss from the Longquanguan shear zone, and their geological significance

标题: 龙泉关剪切带眼球状花岗质片麻岩锆石 U-Pb 年代学和 Lu-Hf 同位素特征及其地质意义

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作者关键词: zircon U-Pb age; Hf isotope; Longquanguan shear zone; North China Craton

作者关键词: 锆石 U-Pb 年龄; Hf 同位素; 龙泉关剪切带; 华北克拉通

摘要: The Hengshan-Wutai-Fuping area, located in the middle part of the Trans-North China Orogen with large outcrop of Precambrian rocks, is becoming an ideal place to reveal the early-phase evolutionary history of the North China Craton. The Longquanguan shear zone situated in the junction area of the Wutai and Fuping Complex, and the main rock types are granitic augen gneiss and amphibolite. We conducted LA-ICP-MS zircon U-Pb dating and Lu-Hf isotope analysis for the granitic augen gneiss from the Longquanguan shear zone. The protolith of the Longquanguan granitic augen gneiss was crystallized at 2547 Ma, with $\epsilon_{\text{Hf}}(t)$ values from +2.7 to +9.2, indicating that the rocks were derived from relatively juvenile continental crust with similar features of the late Archean granitic rocks from the Wutai complex. According to the two-stage Hf model, the zircon ages from the Longquanguan granitic augen gneiss varied from 2872 to 2477 Ma and peaked at 2.58 Ga, 2.71 Ga and 2.81 Ga, coinciding with the Neoproterozoic continental crustal growth events of the North China Craton.

摘要: 恒山五台阜平地区地处华北克拉通中部造山带的中段, 早前寒武纪地体出露较好, 是解析华北克拉通早前寒武纪演化过程的最佳地段。龙泉关剪切带位于五台杂岩和阜平杂岩的交接部位, 其主要岩石类型为眼球状花岗质片麻岩、变粒岩和斜长角闪岩。本文利用 LA-ICP-MS 方法对龙泉关剪切带中的眼球状花岗质片麻岩进行了锆石 U-Pb 年龄和 Lu-Hf 同位素的测试。结果显示, 龙泉关眼球状花岗质片麻岩原岩结晶年龄为 (2547) Ma, 其 $\epsilon_{\text{Hf}}(t)$ 值介于 +2.7~+9.2, 表明其源区主要为相对年轻的地壳物质, 与五台地区新太古代花岗岩非常相似。龙泉关花岗质眼球状片麻岩中锆石两阶段 Hf 模式年龄 (TDM2) 为 2477~2872 Ma, 具有 2.58 Ga、2.71 Ga 和 2.81 Ga 三个峰值, 记录了华北克拉通新太古代初始地壳生长事件。

入藏号: CSCD:6520127

地址: Wang Meng, School of Earth Science and Resources, Chang'an University, School of Earth and Space Sciences, Peking University, Xi'an, Beijing 710054; 100871.

Qian Jiahui, School of Earth Sciences and Engineering, Sun Yat-sen University, Guangzhou, Guangdong 510275, China.

Zhang Jinjiang, School of Earth and Space Sciences, Peking University, Beijing 100871, China.

Zhang Bo, School of Earth and Space Sciences, Peking University, Beijing 100871, China.

地址: 王盟, 长安大学地球科学与资源学院; 北京大学地球与空间科学学院, 西安, 陕西; 北京 710054; 100871, 中国.

钱加慧, 中山大学地球科学与工程学院, 广州, 广东 510275, 中国.

张进江, 北京大学地球与空间科学学院, 北京 100871, 中国.

张波, 北京大学地球与空间科学学院, 北京 100871, 中国.

电子邮件地址: wangyelei110@163.com

电子邮件地址: wangyelei110@163.com

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作者: Feng Yonggang; Wang Yiqian; Zhang Ze; Liang Ting; Zhou Yi; Gao Jinggang; Teng Jiabin

作者: 凤永刚; 王艺茜; 张泽; 梁婷; 周义; 高景刚; 腾家欣

标题: Geochemistry of triphylite in Dahongliutan lithium pegmatites, Xinjiang: implications for pegmatite evolution

标题: 新疆大红柳滩伟晶岩型锂矿床中磷铁锂矿地球化学特征及其对伟晶岩演化的指示意义

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作者关键词: LA-ICP-MS; triphylite; spodumene pegmatite; LA-ICP-MS; Dahongliutan; Western Kunlun

作者关键词: 磷铁锂矿; 锂辉石伟晶岩; 大红柳滩; 西昆仑

摘要: This contribution presents a detailed petrographic and mineralogical study of triphylite from the wall zone and coarse-grained spodumene-muscovite-quartz zone (intermediate zone) of No. 90-1 spodumene pegmatite at Dahongliutan, Xinjiang. Triphylite occurs as dendritic or rounded aggregates in the pegmatite. Electron probe micro-analyzer (EPMA) and laser ablation-inductively coupled plasma-mass spectrometer (LA-ICP-MS) were used to determine the concentrations of major and trace elements in triphylite. Our results show that, besides major elements P, Fe, Mn, and Li, the triphylite contains subordinate Mg, Ca, and Zn. Moreover, HFSE and REE concentrations of the triphylite are extremely low. Integrating the EPMA and LA-ICP-MS data, our study indicates that the triphylite has been partially oxidized and that its composition has evolved towards ferrisicklerite. From the wall zone towards the intermediate zone, the triphylite shows decreased Mg and Zn contents but becomes relatively Mn-enriched as the Mn/(Mn+Fe) ratios of triphylite increase from 0.388 to 0.409. Such a compositional evolutionary trend is consistent with the typical Mn-Fe fractionation trend in many pegmatites according to the literature. Similarly, the columbite-group minerals in the same pegmatite show increasing Mn/(Mn+Fe) ratios at early stages. In addition, the triphylite is partially replaced by fluorapatite, which suggests that the activities of Ca and F increased at the late hydrothermal stage. This suggests that triphylite has potential to document magmatic and hydrothermal evolution of pegmatites.

摘要: 新疆大红柳滩伟晶岩型锂矿床近年来找矿取得了新进展.我们在该地区典型锂矿脉(90-1号)首次鉴定出磷铁锂矿,其在伟晶岩中呈树枝状、团簇状集合体分布岩脉的边缘带和中部.边缘带尤为富集磷铁锂矿,含量可达10%~15%.本文系统地开展了磷铁锂矿的岩相学和矿物学研究.利用电子探针和激光剥蚀等离子质谱测定了脉体边缘带和中间粗粒锂辉石-白云母-石英带磷铁锂矿的主微量元素含量.结果表明,磷铁锂矿除含有主要元素P、Fe、Mn及Li外,还含有较高的Mg、Ca和Zn,几乎不含高场强元素、稀土元素.综合电子探针和LA-ICP-MS分析结果,认为伟晶岩脉中部分磷铁锂矿已被氧化,成分向铁磷锂锰矿过渡.从脉体的边缘带往中间带,磷铁锂矿中Mg和Zn平均含量下降,而Mn/(Mn+Fe)比值由0.388升至0.409,显示逐渐富Mn特点,与前人关于花岗伟晶岩熔体演化过程中Fe-Mn的分离趋势一致,也与该伟晶岩

脉中铌钽铁矿早期演化阶段 Mn/(Mn+Fe)比值变化趋势相同;磷铁锂矿被晚期氟磷灰石部分交代,反映伟晶岩演化至热液阶段 F、Ca 活度增加.表明该矿物可以很好的记录伟晶岩岩浆及热液阶段的演化.

入藏号: CSCD:6522277

地址: Feng Yonggang, School of Earth Science and Resources, Chang'an University;; Laboratory of Mineralization and Dynamics, Chang'an University, ;; Xi'an;; Xi'an, ;; 710054;; 710054.

Wang Yiqian, School of Earth Science and Resources, Chang'an University;; Laboratory of Mineralization and Dynamics, Chang'an University, ;; Xi'an;; Xi'an, ;; 710054;; 710054.

Zhang Ze, School of Earth Science and Resources, Chang'an University;; Laboratory of Mineralization and Dynamics, Chang'an University, ;; Xi'an;; Xi'an, ;; 710054;; 710054.

Liang Ting, School of Earth Science and Resources, Chang'an University;; Laboratory of Mineralization and Dynamics, Chang'an University, ;; Xi'an;; Xi'an, ;; 710054;; 710054.

Zhou Yi, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Gao Jinggang, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Teng Jiabin, Xi'an Center of China Geological Survey, 710054.

地址: 凤永刚, 长安大学地球科学与资源学院;; 长安大学成矿作用及其动力学实验室, ;; 西安;; 西安, ;; 710054;; 710054.

王艺茜, 长安大学地球科学与资源学院;; 长安大学成矿作用及其动力学实验室, ;; 西安;; 西安, ;; 710054;; 710054.

张泽, 长安大学地球科学与资源学院;; 长安大学成矿作用及其动力学实验室, ;; 西安;; 西安, ;; 710054;; 710054.

梁婷, 长安大学地球科学与资源学院;; 长安大学成矿作用及其动力学实验室, ;; 西安;; 西安, ;; 710054;; 710054.

周义, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

高景刚, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

滕家欣, 中国地质调查局西安中心, 西安, 陕西 710054, 中国.

电子邮件地址: ygfeng@chd.edu.cn; liangt@chd.edu.cn

电子邮件地址: ygfeng@chd.edu.cn; liangt@chd.edu.cn

使用次数 (最近 180 天): 1

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作者: Tan Xijuan; Liang Ting; Zhang Ze; Zhou Yi; Wang Yiqian; Feng Yonggang; San Jinzhu

作者: 谭细娟; 梁婷; 张泽; 周义; 王艺茜; 凤永刚; 三金柱

标题: Quantification accuracy study of lithium in spodumene between ICP-MS and ICP-AES

标题: 锂辉石单矿物中锂含量 ICP-MS 和 ICP-AES 分析方法准确性对比研究

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作者关键词: ICP-MS; ICP-AES; spodumene mineral; lithium determination; ICP-MS; ICP-AES; accuracy comparing study

作者关键词: 锂辉石单矿物; 锂含量测定; 方法准确性对比

摘要: Lithium is one of the well-known strategy metal resources in China. Among various minerals in lithium deposits,spodumene is the major mineral showing great commercial value. For effective estimation of lithium levels and deep investigation of the mining process of lithium deposits,accurate lithium determination is of pivotal significance. In this present work, with spodumene mineral in Kaluan,Dahongliutan and Jingerquan lithium deposits of Xinjiang province as the research subject, we first study the analytical accuracies of ICP-MS and ICP-AES for lithium in detail. Herein, 22 representative spodumene samples from the three lithium mining zones are decomposed using high-pressure closed acidic digestion method and taken for lithium analysis by ICP-MS and ICP-AES. The operating parameters,such as nebulizer gas flow rate,auxiliary gas flow rate and plasma gas flow rate, are well studied. With lithium quantification in the same digestion solution analyzed by both methods,results reveal that there exists systematical error of ICP-MS technique, showing an error coefficient of around 2.8 to the data that from ICP-AES analytical method. Furthermore,the possible reasons causing the systematic bias of ICP-MS technique are fully discussed, and it can be inferred that ICP-MS solution analysis, which has analytical loss of approximately 64.8% for lithium in spodumene samples,isn't recommended in the study of lithium minerals, whilst ICP-AES is an attractive technique with merits of higher accuracy, internal standard free and easier operations.

摘要: 锂是我国重要的战略金属资源,锂辉石是伟晶岩型锂矿床中最重要的工业矿物之一.有效、合理圈定锂矿体、评价锂矿床的开发利用价值、深入研究锂矿成矿机制,锂元素含量的准确测定具有重要意义.本文以新疆维吾尔自治区的卡鲁安、大红柳滩和镜儿泉锂矿床中锂辉石单矿物为研究对象,首次开展了伟晶岩型锂矿床中锂辉石单矿物锂元素 ICP-MS 和 ICP-AES 分析方法准确性对比研究.本文选取三个锂矿床共 22 件具有代表性的锂辉石单矿物样品,采用高压密闭湿法消解法,对 ICP-MS 和 ICP-AES 分析方法测定锂元素的工作条件(包括雾化气流速、辅助气流速、等离子体流速等)进行了详细探讨.测定结果表明,针对同一份锂辉石单矿物消解溶液,ICP-MS 分析方法得到的锂元素存在系统性误差,较 ICP-AES 分析结果,结果偏差约 2.8 倍,锂元素含量损失近 64.8%.同时进一步对 ICP-MS 测定锂元素结果的系统误差可能来源作了分析,提出目前技术条件下 ICP-MS 溶液分析方法用于测定锂辉石单矿物的锂元素含量尚不可取,宜采用操作简单、耐盐度高、无需内标校正的 ICP-AES 分析技术.

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地址: Tan Xijuan, College of Earth Sciences and Land Resources, Chang'an University;; Laboratory of Mineralization and Dynamics, Chang'an University, ;; Xi'an;; Xi'an, ;; 710054;; 710054.

Liang Ting, College of Earth Sciences and Land Resources, Chang'an University;; Laboratory of

Mineralization and Dynamics, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Ze, College of Earth Sciences and Land Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhou Yi, College of Earth Sciences and Land Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Yiqian, College of Earth Sciences and Land Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Feng Yonggang, College of Earth Sciences and Land Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

San Jinzhu, Xinjiang Nonferrous Geological Exploration Bureau, Xinjiang 831000, China.

地址: 谭细娟, 长安大学地球科学与资源学院;; 长安大学成矿作用及其动力学实验室, 西安;; 西安, 710054;; 710054.

梁婷, 长安大学地球科学与资源学院;; 长安大学成矿作用及其动力学实验室, 西安;; 西安, 710054;; 710054.

张泽, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

周义, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

王艺茜, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

凤永刚, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

三金柱, 新疆有色地质勘探局, 乌鲁木齐, 新疆 831000, 中国.

电子邮件地址: tanxijuan@hotmail.com; liangt@chd.edu.cn

电子邮件地址: tanxijuan@hotmail.com; liangt@chd.edu.cn

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作者: Zhu Yingying; Han Lei; Zhao Yonghua; Ao Yong; Li Junjun; Xu Kaibo; Liu Bing; Ge Yuanyuan

作者: 朱莹莹; 韩磊; 赵永华; 奥勇; 李军军; 许凯波; 刘冰; 葛媛媛

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作者关键词: BP neural network; meteorological factor; Hurst index; NPP

作者关键词: BP 神经网络; 气象要素; Hurst 指数; 净初级生产力

摘要: The data production of MOD17A3 NPP in northwest China is seriously deficient, with consequences on further research on vegetation net primary productivity (NPP) in this region. Based on the meteorological data, DEM, NDVI, and MOD17A3 NPP with high quality, the BP neural network model was constructed to simulate vegetation NPP and fill the areas without NPP data in northwest China from 2000 to 2014. Its spatio-temporal variations and relationships with meteorological factors were analyzed using unitary linear regression, R/S analysis, and partial correlation analysis. The results showed that: (1) Coefficients of determination (R^2), mean absolute error (MAE), mean relative error (MRE) and root mean square error (RMSE) between MODIS NPP and simulated NPP were 0.833-0.906, 25.84-40.1, 0.16-0.23, 34.57-59.36, respectively, which well met the accuracy requirements. The BP neural network model was suitable for vegetation NPP simulation in northwest China. (2) The annual mean NPP had a strong spatial variation, showing a gradual decline from southeast to northwest and a high-value block area in the northwest of Xinjiang. (3) The annual mean NPP ranged between 106.64 and 156.17 $\text{g C}\cdot\text{m}^{-2}\cdot\text{a}^{-1}$ from 2000 to 2014, with a slightly fluctuating downward trend in the interannual variation. (4) From 2000 to 2014, the change of NPP in northwest China had spatial heterogeneity, which was mainly reduced. Only 10.79% of the areas passed the significance test. NPP change was weakly persistent. The future change trend of NPP is mainly uncertain, supplemented by improved and declined areas, with the improved area being larger than the declined area. (5) Responses of vegetation NPP to temperature and precipitation varied spatially, which were generally more closely related to precipitation.

摘要: 中国西北地区 MOD17A3NPP 数据产品缺失严重,影响了该区域植被净初级生产力的进一步研究。本研究利用气象数据、高程数据、NDVI 和质量好的 MOD17A3NPP,构建 BP 神经网络模型,模拟 2000-2014 年西北地区植被 NPP,填补数据缺失区域。利用一元线性回归分析法、R/S 分析法、偏相关分析法等,分析了植被 NPP 的时空变化特征及其与气象要素的关系。结果表明:(1)MODIS NPP 产品值与 BP 神经网络模拟值的决定系数 R^2 、平均绝对误差 MAE、平均相对误差 MRE、均方根误差 RMSE 分别在 0.833~0.906、25.84~40.10、0.16~0.23 和 34.57~59.36,满足精度要求,BP 神经网络模型适用于模拟西北地区植被 NPP。(2)植被年均 NPP 具有较强的空间差异,呈现出由东南向西北递减,而新疆西北部地区出现条块状高值区特征。(3)2000-2014 年西北地区植被年均 NPP 在 106.64~156.17 $\text{g C}\cdot\text{m}^{-2}\cdot\text{a}^{-1}$,年际变化上呈现波动下降趋势。(4)2000-2014 年西北地区植被 NPP 变化具有空间异质性,以减少为主,仅 10.79% 的区域通过了显著性检验。植被 NPP 变化具有较弱的持续性特征,未来发展方向以不确定为主,有利和不利为辅,其中有利区域面积大于不利区域。(5)植被 NPP 对气温和降水的响应具有空间差异,总体上与降水关系更密切。

入藏号: CSCD:6508743

地址: Zhu Yingying, College of Earth Sciences and Resources/College of Land Engineering, Changan University;; Shaanxi Key Laboratory of Land Consolidation, ;; Shaanxi Key Laboratory of Land Consolidation, Xian;; Xian, ;; 710054;; 710054.

Han Lei, College of Earth Sciences and Resources/College of Land Engineering, Changan University;; Shaanxi Key Laboratory of Land Consolidation, ;; Shaanxi Key Laboratory of Land Consolidation, Xian;; Xian, ;; 710054;; 710054.

Zhao Yonghua, College of Earth Sciences and Resources/College of Land Engineering,Changan University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xian;;Xian, ;; 710054;;710054.

Ao Yong, College of Earth Sciences and Resources/College of Land Engineering,Changan University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xian;;Xian, ;; 710054;;710054.

Liu Bing, College of Earth Sciences and Resources/College of Land Engineering,Changan University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xian;;Xian, ;; 710054;;710054.

Ge Yuanyuan, College of Earth Sciences and Resources/College of Land Engineering,Changan University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xian;;Xian, ;; 710054;;710054.

Li Junjun, College of Earth Sciences and Resources/College of Land Engineering,Changan University, Xian, 710054.

Xu Kaibo, College of Earth Sciences and Resources/College of Land Engineering,Changan University, Xian, 710054.

地址: 朱莹莹, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室, ;;陕西省土地整治重点实验室, 西安;;西安, ;; 710054;;710054.

韩磊, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室, ;;陕西省土地整治重点实验室, 西安;;西安, ;; 710054;;710054.

赵永华, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室, ;;陕西省土地整治重点实验室, 西安;;西安, ;; 710054;;710054.

奥勇, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室, ;;陕西省土地整治重点实验室, 西安;;西安, ;; 710054;;710054.

刘冰, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室, ;;陕西省土地整治重点实验室, 西安;;西安, ;; 710054;;710054.

葛媛媛, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室, ;;陕西省土地整治重点实验室, 西安;;西安, ;; 710054;;710054.

李军军, 长安大学地球科学与资源学院/土地工程学院, 西安, 陕西 710054, 中国.

许凯波, 长安大学地球科学与资源学院/土地工程学院, 西安, 陕西 710054, 中国.

电子邮件地址: zhuyy1132450135@163.com; yonghuaz@chd.edu.cn

电子邮件地址: zhuyy1132450135@163.com; yonghuaz@chd.edu.cn

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作者: Wang Xiaofeng; Zhang Mingming; Yin Lichang; Huang Pengcheng; Lesi Muchu; Zhou Chaowei

作者: 王晓峰; 张明明; 尹礼唱; 黄鹏程; 勒斯木初; 周潮伟

标题: Study on the Driving Factors in Desertification Process in Arid and Semi-arid Region of China from 2000 to 2015

标题: 2000-2015 年中国干旱半干旱地区沙漠化进程驱动力研究

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作者关键词: 中国干旱半干旱地区; 沙漠化进程; 驱动力; 地理探测器

摘要: The arid and semi-arid region of China is an important bond connecting China and the countries along the Silk Road economic belt, but severe situation of land desertification restricts the sustainable development in the region. It is of great significance to study the process and driving mechanism of desertification in order to prevent and control desertification. On the basis of the desertification in the northern part of China in 2000 and 2015, meteorological data, population, GDP, DEM and soil types, the paper studied on the driving factors in desertification process in arid and semi-arid region of China by geographical detectors method. Results were as follows: (1) From 2000 to 2015, desertification decreased by 97700 km². Slight desertification and extremely severe desertification decreased by 62000 km² and 130600 km², respectively. Besides, moderate desertification and severe desertification increased by 21500 km² and 73400 km², respectively. Generally, the area of desertification reversal was 386300 km², and the area where desertification obviously reversed was 239000 km², and the area where desertification slightly reversed was 147300 km². The area of desertification development was 421800 km², and the area where desertification evidently developed was 142200 km², and the area where desertification slightly developed was 279600 km². (2) From 2000 to 2015, desertification process was a comprehensive result that was pushed by physical factors and human activity, but main driving forces were physical factors. Desertification was particularly sensitive to climatic factors, and precipitation had a greatest impact on desertification processes, and mean relative humidity merely had a less effect than precipitation. And (3) the interaction among climatic factors had an evident effect on the desertification process, and the interaction between mean relative humidity, precipitation, sunshine hours and other climatic factors was greater obvious.

摘要: 中国干旱半干旱地区是连接中国与丝绸之路经济带沿线国家的重要纽带, 严峻的土地沙漠化形势制约其可持续发展。研究沙漠化进程及驱动机制对防治沙漠化具有重要意义。基于 2000 年和 2015 年两期中国北方沙漠化土地、气象数据、人口、GDP、DEM、土壤类型数据, 运用地理探测器方法研究了干旱半干旱地区沙漠化进程驱动力。结果表明, (1) 2000-2015 年, 沙漠化面积减少了 97700 km², 其中轻度、极重度沙漠化面积分别减少了

62000 km² 和 130600 km²,而中度和重度沙漠化面积分别增加了 21500 km² 和 73400 km²。整体上,沙漠化逆转面积为 386300 km²,其中明显逆转 239000 km²,不明显逆转 147300 km²,而沙漠化发展面积为 421800 km²,其中明显发展 142200 km²,不明显发展 279600 km²。(2)2000-2015 年,沙漠化进程是自然和人为因素共同作用的结果,但以自然因素为主要驱动力,其中沙漠化对气候因素响应尤为敏感,而降水量对沙漠化进程影响最大,平均相对湿度的影响次之。(3)气候因素间的交互作用对沙漠化进程影响显著,而平均相对湿度、降水量、日照时数与其他气候因素的交互作用更明显。

入藏号: CSCD:6511368

地址: Wang Xiaofeng, The School of Earth Science and Resources,Chang'an University;;Shaanxi Provincial Key Laboratory of land engineering, ;;Shaanxi Provincial Key Laboratory of land engineering, Xi'an;;Xi'an, ;; 710054;;710054.

Zhang Mingming, The School of Earth Science and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Yin Lichang, The School of Earth Science and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Lesi Muchu, The School of Earth Science and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Zhou Chaowei, The School of Earth Science and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Huang Pengcheng, The Faculty of Geomatics,Lanzhou Jiaotong University, Lanzhou, Gansu 730070, China.

地址: 王晓峰, 长安大学地球科学与资源学院;;陕西省土地工程重点实验室, ;;陕西省土地工程重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

张明明, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

尹礼唱, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

勒斯木初, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

周潮伟, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

黄鹏程, 兰州交通大学测绘与地理信息学院, 兰州, 甘肃 730070, 中国.

电子邮件地址: wangxf@chd.edu.cn

电子邮件地址: wangxf@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Mu Kebin; Lian Zhiyi; Wang Xueyin

作者: 穆可斌; 连志义; 王学银

标题: Geological Characteristics, Metallogenic Conditions and Prospecting Signs of the Baishitougou Graphite Deposit in the Southern Margin of the Altun, Gansu

标题: 甘肃阿尔金南缘白石头沟石墨矿地质特征、成矿条件及找矿标志

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作者关键词: Dunhuang group; geological feature; metallogenic condition; ore-prospecting sign; Baishitougou graphite deposit; southern margin of the Altun; Gansu Province

作者关键词: 敦煌岩群; 地质特征; 成矿条件; 找矿标志; 白石头沟石墨矿; 阿尔金南缘; 甘肃

摘要: The Baishitougou graphite deposit is located at the Dunhuang block in the southern margin of the Altun, and occurs in marble and quartz schist of the Precambrian Dunhuang group. So far, 33 ore bodies, including 2 main ore bodies, have been delineated. As an ideal stratum for study of the Baishitougou graphite deposit, the Dunhuang group is a set of metamorphic magmatic complexes dominated by metamorphic clastic sedimentary rocks and metamorphic basic rocks. This article presents a preliminary discussion on the genesis of the deposit and summarizes the ore-prospecting signs from the perspective of the deposit and regional geological survey data, in combination with previous work. It is also based on the research of mineralization geological background of the deposit, features of the deposit and ore-bodies, analysis of composite samples, ore mineral occurrence state and characteristics. The research shows that the Baishitougou graphite deposit can be divided into two types: marble type and quartz schist type. It is a sedimentary metamorphic deposit formed by regional dynamic hydrodynamic metamorphism in the Palaeoproterozoic. The ore-forming material was mainly derived from the protolith of the metamorphic clastic sedimentary rocks (marine terrigenous clastic rock and carbonate). Its metallogenic environment was an ancient active continental margin. The ore-prospecting signs in this area have special horizons, lithology, mineralization, and geophysical features.

摘要: 甘肃白石头沟石墨矿位于阿尔金南缘敦煌地块,赋存于前寒武纪敦煌岩群大理岩和石英片岩之中,目前圈定矿体33条,主要矿体2条。作为研究白石头沟石墨矿理想地层的敦煌岩群,是一套以变质碎屑沉积岩和变质基性岩为主的变质岩浆杂岩。本文从矿床角度出发,立足于区域地质勘查资料,结合前人研究成果,在对白石头沟石墨矿成矿地质背景、矿床及矿体特征、组合样化学分析、矿石矿物赋存状态及特征研究的基础上,对矿床的成因进行初步探讨并归纳区域找矿标志。研究表明,白石头沟石墨矿可分为大理岩型和石英片岩型两种类型,是古元古代经历区域动力热液变质作用而形成的沉积变质型矿床,成矿物质主要来源于变质碎屑沉积岩类的原岩(海相陆源碎屑岩和碳酸盐岩)本身,成矿环境为古老活动大陆边缘。找矿标志具有特定层位、岩性、矿化及物探特征。

入藏号: CSCD:6503712

地址: Mu Kebin, School of Earth Sciences and Resources, Chang'an University, Xi'an, Shaanxi 710064, China.

Lian Zhiyi, No.4 Geology and Mineral Exploration Team, Gansu Bureau of Mineral Exploration

and Development, Jiuquan, Gansu 735000, China.

Wang Xueyin, No.4 Geology and Mineral Exploration Team, Gansu Bureau of Mineral Exploration and Development, Jiuquan, Gansu 735000, China.

地址: 穆可斌, 长安大学地球科学与资源学院, 西安, 陕西 710064, 中国.

连志义, 甘肃省地矿局第四地质矿产勘查院, 酒泉, 甘肃 735000, 中国.

王学银, 甘肃省地矿局第四地质矿产勘查院, 酒泉, 甘肃 735000, 中国.

电子邮件地址: mukebin000@163.com

电子邮件地址: mukebin000@163.com

使用次数 (最近 180 天): 1

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作者: Li Jianfeng; Ye Huping; Zhang Zongke; Kong Jinling; Wei Xianhu; Somasundaram Deepakrishna; Wang Fali

作者: 李健锋; 叶虎平; 张宗科; 孔金玲; 魏显虎; Somasundaram Deepakrishna; 王法涑

标题: Spatiotemporal Change Analysis of Sri Lanka Inland Water based on Landsat Imagery

标题: 基于 Landsat 影像的斯里兰卡内陆湖库水体时空变化分析

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作者关键词: 斯里兰卡; 湖库; 海上丝绸之路; 水体提取; 时空变化; 大津法(OTSU)

摘要: Sri Lanka is an important node on the Maritime Silk Road, where rainfall is abundant in quantity but uneven in terms of spatiotemporal distribution. There is obvious seasonal water shortage. Monitoring the changes of water cover area in inland lakes and reservoirs is important for guiding the development and utilization of water resources. To understand the spatial distribution characteristics and temporal variations of lakes and reservoirs in Sri Lanka, this paper, based on Landsat series imagery, analyzed and compared the precision of different water extraction models on the images, following which the optimal algorithm was determined. A typical reservoir was chosen to analyze the interannual and monthly variations of the water cover

sizes. The optimal water extraction algorithm was applied to the inland lakes and reservoirs in 1995, 2005, and 2015. Lakes and reservoirs were divided into four grades by area. The number and area of lakes and reservoirs of different grades in each year were counted, and their spatiotemporal variation characteristics were examined. Conclusions can be made according to the results as the following statements: (1) The water body extraction model based on the Normalized Difference Water Index (NDWI) with threshold value from the Otsu method (OTSU) had the best accuracy and was suitable for the water body extraction in Sri Lanka. The overall classification accuracy is above 97% and it has the lowest mis-extraction rate and the missing rate. (2) The water cover area of typical reservoir showed a fluctuatingly increase trend in Augusts from 1988 to 2018. The smallest water cover area occurred in 1992, and the largest was in 2013. The water cover area of reservoir was also of large intra- annual fluctuations. In 2017, the biggest water cover area appeared in February, while the smallest appeared in September, with a discrepancy of 2.24 times between the cover area in February and September, exactly the ends of local rainy season and dry season, respectively. (3) From 1995 to 2015, the number and area of lakes and reservoirs of different grades increased to some extent, and the trend of lake and reservoir water resources was increasing. Findings of the research will provide necessary data support for the management and planning of soil and water resources in Sri Lanka.

摘要: 斯里兰卡是海上丝绸之路沿线重要节点,降雨量丰富但时空分布不均匀,存在明显季节性缺水,其内陆湖库水体面积变化监测对水资源开发利用具有重要指导作用。为了解斯里兰卡湖库水体空间分布特征与时间变化规律,本文基于 Landsat 系列影像数据,对比分析不同水体提取模型在影像上的水体提取精度,确定最优算法;选取典型湖库分析其面积年际和年内的动态变化特征。以 1995、2005 和 2015 年为基准研究年份,采用最优水体提取模型对全岛内陆湖库水体进行提取,利用面积将湖库分为 4 个等级,统计各年份不同等级湖库的数量和面积数据,分析其时空变化特征。研究结果表明:①基于大津法(OTSU)的归一化水体指数(NDWI)水体提取模型提取水体的精度最高,总体精度在 97%以上,误提率和漏提率最低,适合于斯里兰卡地区水体的提取;② 1988-2018 年同期 8 月的典型水库面积总体呈现波动增加的趋势,1992 年水库面积最小,2013 年水库面积最大;水库面积年内变化较大,其中 2017 年最大面积出现在 2 月,最小出现在 9 月,与雨季和旱季结束月份基本一致,且 2 月面积是 9 月面积的 2.24 倍;③ 1995-2015 年同期,斯里兰卡全国 4 个等级湖库的数量和面积不同幅度的增加,湖库水体资源量呈递增的趋势。研究结果可为斯里兰卡水土资源优化配置及水资源管理与规划提供科学依据。

入藏号: CSCD:6501770

地址: Somasundaram Deepakrishna, 中国科学院遥感与数字地球研究所;;中国科学院中国斯里兰卡水技术研究与示范联合中心;;中国科学院大学, ;;;, ;;;, 北京;;北京;;北京 100094;;100085;;100049, 中国.

Li Jianfeng, School of Earth Science and Resources, Chang'an University;;Institute of Remote Sensing and Digital Earth, ChineseAcademy of Sciences;;China-Sri Lanka Joint Research and Demonstration Center forWater Technology, Chinese Academy of Sciences, ;;;, Xi'an;;;;, ;Beijing;;Beijing 710054;;100094;;100085.

Ye Huping, Institute of Remote Sensing and Digital Earth, ChineseAcademy of Sciences;;China-Sri Lanka Joint Research and Demonstration Center forWater Technology, Chinese Academy of Sciences;;Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, ;;;State Key Laboratory of Resources and Environmental Information System, ;;;, Beijing;;Beijing;;Beijing 100094;;100085;;100101.

Zhang Zongke, Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences;;China-Sri Lanka Joint Research and Demonstration Center for Water Technology, Chinese Academy of Sciences, ;, ;, Beijing;;Beijing 100094;;100085.

Wei Xianhu, Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences;;China-Sri Lanka Joint Research and Demonstration Center for Water Technology, Chinese Academy of Sciences, ;, ;, Beijing;;Beijing 100094;;100085.

Kong Jinling, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Somasundaram Deepakrishna, Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences;;China-Sri Lanka Joint Research and Demonstration Center for Water Technology, Chinese Academy of Sciences;;University of Chinese Academy of Sciences, ;, ;, ;, ;, Beijing;;Beijing;;Beijing 100094;;100085;;100049.

Wang Fali, Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences;;China-Sri Lanka Joint Research and Demonstration Center for Water Technology, Chinese Academy of Sciences;;University of Chinese Academy of Sciences, ;, ;, ;, ;, Beijing;;Beijing;;Beijing 100094;;100085;;100049.

地址: 李健锋, 长安大学地球科学与资源学院;;中国科学院遥感与数字地球研究所;;中国科学院中国斯里兰卡水技术研究与示范联合中心, ;, ;, ;, ;, 西安 ;, ;, ;, ;, 北京 ;, ;, 北京 710054;;100094;;100085.

叶虎平, 中国科学院遥感与数字地球研究所;;中国科学院中国斯里兰卡水技术研究与示范联合中心;;中国科学院地理科学与资源研究所, ;, ;, ;, ;, 资源与环境信息系统国家重点实验室, ;, ;, ;, ;, 北京;;北京;;北京 100094;;100085;;100101, 中国.

张宗科, 中国科学院遥感与数字地球研究所;;中国科学院中国斯里兰卡水技术研究与示范联合中心, ;, ;, ;, ;, 北京;;北京 100094;;100085, 中国.

魏显虎, 中国科学院遥感与数字地球研究所;;中国科学院中国斯里兰卡水技术研究与示范联合中心, ;, ;, ;, ;, 北京;;北京 100094;;100085, 中国.

孔金玲, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

王法凜, 中国科学院遥感与数字地球研究所;;中国科学院中国斯里兰卡水技术研究与示范联合中心;;中国科学院大学, ;, ;, ;, ;, ;, ;, ;, ;, 北京;;北京;;北京 100094;;100085;;100049, 中国.

电子邮件地址: ljf_chd@163.com; yeyp@radi.ac.cn

电子邮件地址: ljf_chd@163.com; yeyp@radi.ac.cn

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作者: 王玮; 闫慧敏; 杨艳昭; 杜文鹏

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作者关键词: 西藏; 膳食营养需求; 食物供给; 食物消耗; 土地资源承载力

摘要: "Food nutrition safety" is an important component of "food safety".At present,the evaluation index of "grain" as the carrying capacity of land resources can only reflect part of the carrying capacity,and the assessment from the perspective of dietary nutrition is more in line with the actual land resource carrying status.Based on the dynamic balance between supply and demand,this paper selects calorie and protein as key parameters to construct the land resource carrying capacity (LCC) calculation and land resource carrying index (LCCI) evaluation model,and the land resource carrying capacity of Tibet Autonomous Region at county level in 2015.Quantitative evaluation of the land resources carrying status provides a scientific basis for the realization of the balance of calorie and protein supply and demand in Tibet,and lays the foundation for the study of the changes,mechanisms and countermeasures of the nutritional needs of residents in the region.The results show that:(1) The land resource carrying capacity of Tibet is generally surplus.The land resources of the "Yarlung Zangbo River and its two tributaries" basin in the southeastern part of Tibet have high carrying capacity,while those in the counties of Naqu and Ali in the northwest of the study area have low carrying capacity.(2) According to the evaluation results of land carrying capacity based on the actual consumption of calorie and protein,in farming counties,semi-farming and semipastoral counties,and pastoral counties,the carrying capacity of protein indicators is 8.83%,22.51% and 67.78% more than that of calorie indicators,respectively,and there are 13 pastoral counties and farming and pastoral areas with calorie overloaded and without protein overloaded.The reason is that the animal food calorie supply ratio is high in the pastoral counties and the farming and pastoral counties,and the food protein supply capacity is stronger than the calorie supply capacity.(3) According to the per capita calorie and protein intake standards recommended by residents' dietary pagodas,the carrying capacity of land resources based on calorie and protein demand in farming counties,semi- farming and semi- pastoral counties and pastoral counties is higher than the actual nutrient intake of residents,or carrying 35.22% and 12.5% more of the population,respectively.The assessment results reflect the differences in the carrying capacity and carrying status of each county under the actual consumption and dietary standard scenarios and between different nutritional indicators.It is possible for us to seek to improve the regional human food balance and the dietary nutrition level of residents by adjusting population structure and dietary structure.

摘要: 食物营养安全是食物安全的重要组成,而当前单纯以粮食作为土地资源承载力的评价

指标只能反映部分承载能力,从膳食营养角度评估更切合其实际土地资源承载状况。以供给与需求的动态平衡为基本思路,选取热量和蛋白质为关键参量构建土地资源承载力(LCC)测算与土地资源承载指数(LCCI)评价模型,对2015年西藏自治区县域土地资源承载力与土地资源承载状况进行定量评价,以期为实现西藏地区居民热量与蛋白质供需平衡对策提供科学依据,同时也为该区域居民营养需求的变化、机理及对策研究奠定基础。结果表明:(1)西藏县域尺度下土地资源承载力总体呈盈余状态,位于西藏东南部的一江两河流域县域土地资源承载力高,而位于西北部的那曲和阿里等地区县域土地资源承载力相对较低。(2)根据以当前热量和蛋白质实际消耗量为依据对土地承载力的评价结果,农区县、半农半牧区县和牧区县基于蛋白质需求的土地承载力比基于热量需求的承载力分别多8.83%、22.51%和67.78%,其中有13个牧区县和半农半牧区县以热量指标判断为超载状态,但以蛋白质指标判断却未超载,其原因在于牧区县和农牧区县动物性食物供给比例高,食物蛋白质供给能力相较热量供给能力更强。(3)若按照居民膳食宝塔推荐的人均热量和蛋白质摄入量标准,农区县、半农半牧区县和牧区县基于热量和蛋白质需求的土地资源承载力较实际营养摄入量下的承载力可分别多承载35.22%和12.5%的人口。评估结果体现了实际消耗和膳食标准情景下以及不同营养指标之间各县域承载力及承载状态的差异,可为通过调整人口结构、膳食结构等措施寻求提升区域人粮平衡水平和居民膳食营养水平对策提供依据。

入藏号: CSCD:6499762

地址: Wang Wei, College of Earth Science and Resources, Chang'an University; Institute of Geographic Sciences and Natural Resources Research, CAS, Xi'an, Beijing 710054; 100101.

Yan Huimin, Institute of Geographic Sciences and Natural Resources Research, CAS; University of Chinese Academy of Sciences, Beijing; Beijing 100101; 100049.

Yang Yanzhao, Institute of Geographic Sciences and Natural Resources Research, CAS; University of Chinese Academy of Sciences, Beijing; Beijing 100101; 100049.

Du Wenpeng, Institute of Geographic Sciences and Natural Resources Research, CAS; University of Chinese Academy of Sciences, Beijing; Beijing 100101; 100049.

地址: 王玮, 长安大学地球科学与资源学院; 中国科学院地理科学与资源研究所, 西安, 北京 710054; 100101.

闫慧敏, 中国科学院地理科学与资源研究所; 中国科学院大学, 北京; 北京 100101; 100049, 中国.

杨艳昭, 中国科学院地理科学与资源研究所; 中国科学院大学, 北京; 北京 100101; 100049, 中国.

杜文鹏, 中国科学院地理科学与资源研究所; 中国科学院大学, 北京; 北京 100101; 100049, 中国.

电子邮件地址: ww1630619@163.com; yanhm@igsnr.ac.cn

电子邮件地址: ww1630619@163.com; yanhm@igsnr.ac.cn

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作者: Liu Zhixing; Pang Chongjin; Wang Xuance; Krapez Bryan

作者: 刘志兴; 庞崇进; 王选策; Krapez Bryan

标题: Research progress on the composition and provenance of hadal trench sediments

标题: 海斗深渊沉积物组成特征及其物质来源研究进展

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作者关键词: hadal trench; sediment characteristics; provenance analysis; Mariana Trench; West Pacific

作者关键词: 海斗深渊; 沉积物特征; 物源分析; 马里亚纳海沟; 西太平洋

摘要: Hadal trenches are the deepest parts of the world's oceans, having water depths ranging from 6000-11, 000 m. They are characterized by extreme physical and chemical conditions. Trench sediments are mainly clay, and therefore their study requires a combination of microscopic and geochemical analyses. This paper summarizes the recent studies regarding the characteristics of hadal zones, including their morphology, physical and chemical characteristics, and hydrodynamics. We also summarize sediment characteristics, such as the grain size, mineralogy, and paleontology. In addition, this study explored techniques to assess the provenance of trench sediments. In general, there are multiple sources for trench sediments; therefore, their study should include multiple disciplines.

摘要: 海斗深渊是海洋中最深的区域,由水深范围在 6000~11000 m 范围内的深部海沟组成,以极端的物理化学条件为特征,其沉积物以深海黏土为主。基于目前关于马里亚纳海沟及其沉积物的研究进展,总结了海斗深渊的地貌、物理化学和水动力等方面的特征;归纳了海斗深渊沉积物的粒度特征、矿物组成和古生物特征;探讨了海斗深渊沉积物的物质来源及主要分析方法。海斗深渊沉积物的物质来源具有多源性,综合多种方法示踪是准确揭示其物质物源的关键。

入藏号: CSCD:6488951

地址: Krapez Bryan, 桂林理工大学, 广西隐伏金属矿产勘查重点实验室;;广西有色金属隐伏矿床勘查及材料开发协同创新中心, 桂林, 广西 541004, 中国.

Liu Zhixing, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Xuance, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Pang Chongjin, Guilin University of Technology, Guangxi Key Laboratory of Hidden Metallic Ore Deposits Exploration;;Collaborative Innovation Center for Exploration of Hidden Nonferrous Metal Deposits and Development of New Materials in Guangxi, Guilin, Guangxi 541004, China.

Krapez Bryan, Guilin University of Technology, Guangxi Key Laboratory of Hidden Metallic Ore Deposits Exploration;;Collaborative Innovation Center for Exploration of Hidden Nonferrous Metal Deposits and Development of New Materials in Guangxi, Guilin, Guangxi 541004, China.

地址: 刘志兴, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

王选策, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

庞崇进, 桂林理工大学, 广西隐伏金属矿产勘查重点实验室;;广西有色金属隐伏矿床勘查及材料开发协同创新中心, 桂林, 广西 541004, 中国.

电子邮件地址: 2016127073@chd.edu.cn; X.Wang4@uq.edu.au

电子邮件地址: 2016127073@chd.edu.cn; X.Wang4@uq.edu.au

使用次数 (最近 180 天): 0

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作者: Ge Yuanyuan; Han Lei; Zhao Yonghua; Ao Yong; Ding Juan; Zhu Yingying; Liu Bing

作者: 葛媛媛; 韩磊; 赵永华; 奥勇; 丁娟; 朱莹莹; 刘冰

标题: Spatiotemporal analysis of urban expansion in Xi'an from 1984 to 2016

标题: 19842016 年西安市城市扩张时空度量分析

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作者关键词: GIS; urban expansion; urban construction land; driving force; Xi'an; GIS

作者关键词: 城市扩张; 城镇建设用地; 驱动力; 西安市

摘要: Based on the Landsat TM/OLI remote sensing images and social statistical data of Xi'an in 1984,1996,2006 and 2016,the construction land information in the main urban area of Xi'an City was extracted through the ArcGIS 10.5.The spatiotemporal expansion characteristics of Xi'an City were analyzed using expansion intensity,fractal dimension,and elasticity coefficient.The driving forces and the urban sprawl trend of Xi'an were also studied.The results showed that the construction land increased by 478.62 km² from 1984 to 2016,being 3.27 times larger than that in 1984.The average annual expansion intensity was 6.88% with a growth rate of 14.50 km²·a⁻¹.The Bary-center of Xi'an City moved toward the northwest by 1.53 km.There were two types of urban expansion pattern including filling and expansion.The urban spatial expansion was unbalance.The city was expanded from center areas (Lianhu district,Xincheng district,Beilin district) to periphery suburb (Baqiao district,Yanta district,Weiyang district and Chang'an district).In general,the coordination relationship between the urban expansion and population growth was weak,with faster urban expansion than the population growth.Under the scenarios of

the restriction of land space planning and the delimitation of urban boundary line,the core construction of Xi'an City should focus on protecting the historical culture.The development of population,environment,and economy should be coordinated and population distribution should be rationally planned,with the aim to build a unique national modern central city.

摘要: 基于 1984 年、1996 年、2006 年和 2016 年的 Landsat TM/OLI 遥感影像和社会统计数据,使用 ArcGIS10.5 等软件提取了西安市主城区建设用地的信息,在计算扩张强度、分形维数、弹性系数等基础上,分析了研究区的时空扩张特征,以期揭示西安市城市扩张规律及驱动力。结果表明:在 1984-2016 年,研究区的建设用地增加了 478.62 km²,总体增加了 3.27 倍,年均扩张速度 14.50 km²·a⁻¹,扩张强度为 6.88%,城市重心向西北迁移了 1.53 km;在填充型和延伸型两种城市扩张模式下,城市空间扩张具有不均衡性,由中心城区(莲湖区、新城区、碑林区)向周围城郊(灞桥区、雁塔区、未央区和长安区)扩张;城市用地扩张和人口增长之间协调性弱,扩张速度大于人口增长速度。在国土空间规划约束和城市边界线划定前提下,未来西安市城市建设应以保护历史文化名城为核心,统筹人口、环境、经济等要素协调发展,合理规划人口布局,加强区域与城乡协调发展,建设独具特色的现代化国家中心城市。

入藏号: CSCD:6489615

地址: Ge Yuanyuan, College of Earth Sciences and Resources/College of Land Engineering,Chang'an University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xi'an;;Xi'an, ;; 710054;;710054.

Han Lei, College of Earth Sciences and Resources/College of Land Engineering,Chang'an University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xi'an;;Xi'an, ;; 710054;;710054.

Zhao Yonghua, College of Earth Sciences and Resources/College of Land Engineering,Chang'an University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xi'an;;Xi'an, ;; 710054;;710054.

Ao Yong, College of Earth Sciences and Resources/College of Land Engineering,Chang'an University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xi'an;;Xi'an, ;; 710054;;710054.

Zhu Yingying, College of Earth Sciences and Resources/College of Land Engineering,Chang'an University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xi'an;;Xi'an, ;; 710054;;710054.

Liu Bing, College of Earth Sciences and Resources/College of Land Engineering,Chang'an University;;Shaanxi Key Laboratory of Land Consolidation, ;;Shaanxi Key Laboratory of Land Consolidation, Xi'an;;Xi'an, ;; 710054;;710054.

Ding Juan, Shaanxi Ruihai Land Planning and Evaluation Engineering Limited Liability Company, Xi'an, Shaanxi 710000, China.

地址: 葛媛媛, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室, ;;陕西省土地整治重点实验室, 西安;;西安, ;; 710054;;710054.

韩磊, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室, ;;陕西省土地整治重点实验室, 西安;;西安, ;; 710054;;710054.

赵永华, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室, ;;陕西省土地整治重点实验室, 西安;;西安, ;; 710054;;710054.

奥勇, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室, ;;陕西省土地整治重点实验室, 西安;;西安, ;; 710054;;710054.

朱莹莹, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室, ;;陕西

省土地整治重点实验室, 西安;;西安,;; 710054;;710054.

刘冰, 长安大学地球科学与资源学院/土地工程学院;;陕西省土地整治重点实验室,;;陕西省土地整治重点实验室, 西安;;西安,;; 710054;;710054.

丁娟, 陕西瑞海土地规划评估工程有限责任公司, 西安, 陕西 710000, 中国.

电子邮件地址: geyuanyuan220@163.com; yonghuaz@chd.edu.cn

电子邮件地址: geyuanyuan220@163.com; yonghuaz@chd.edu.cn

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作者: Qin Jiachen; Liu Yunhuan; Liu Mingjin; Zhang Hu; Zhang Yanan; Wang Qi; Shao Tiejuan; Wu Xieting; Gao Zhenli; Zhang Xiang

作者: 秦嘉琛; 刘云焕; 刘明金; 张虎; 张亚楠; 王琪; 邵铁全; 吴谐婷; 高振丽; 张响

标题: MAIKHANELLID AND SIPHOGONUCHITIDS FROM THE CAMBRIAN XIXIANG LAGERSTATTEN IN SOUTHERN SHAANXI, CHINA

标题: 陕南寒武纪西乡化石库的马哈螺和棱管壳研究

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作者关键词: 马哈螺; 棱管壳; 单板纲; 西乡化石库; 寒武纪; 陕南

摘要: The fossils of maikhanellid and siphogonuchitids found in the Cambrian Xixiang Lagerstätten in South Shaanxi Province, China were statistically described, and the new characteristics of maikhanellid genera was added. A new species *Ramentoides xixiangensis* sp. nov. is described in this paper. The surface decoration of maikhanellid and siphogonuchitids is different and they are not the fallen bone slices from the same species. The new characteristics of maikhanellid are contradictory to the spicule-shell hypothesis. The maikhanellid exhibits the most primitive characteristics of molluscs in morphology, while the siphogonuchitids has close affinity with halkieriids. This paper reports the new morphology of maikhanellid, enriches the knowledge of maikhanellid and siphogonuchitids, and provides new material for establishing the relationship

and systematic position of maikhanellid and siphonochitids.

摘要: 对陕南西乡化石库发现的马哈螺类化石和棱管壳类化石做了统计和描述,补充了马哈螺类新的属征,建立新种西乡拟鳞锥 *Ramentoides xixiangensis* sp.nov.。马哈螺和棱管壳表面装饰存在差异,并非同一物种上掉落的骨片,本文展示的马哈螺新的特征与骨针壳假说存在矛盾,马哈螺在形态上表现出软体动物单板类最原始的特征,而棱管壳则与 *halkieriids* 存在密切的亲缘关系。本文报道了马哈螺类化石的新形态,丰富了对马哈螺类和棱管壳类的认识,对确立马哈螺和棱管壳的亲缘关系和分类位置提供了新的材料。

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地址: Qin Jiachen, Earth Science Faculty, Chang'an University;; Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences;; Shaanxi Key Laboratory of Early Life and Environments, ;; State Key Laboratory of Palaeobiology and Stratigraphy;; Shaanxi Key Laboratory of Early Life and Environments, Xi'an;; Nanjing;; Xi'an, ;;; 710054;; 210008;; 710069.

Liu Yunhuan, Earth Science Faculty, Chang'an University;; Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences;; Shaanxi Key Laboratory of Early Life and Environments, ;; State Key Laboratory of Palaeobiology and Stratigraphy;; Shaanxi Key Laboratory of Early Life and Environments, Xi'an;; Nanjing;; Xi'an, ;;; 710054;; 210008;; 710069.

Zhang Hu, Earth Science Faculty, Chang'an University;; Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences;; Shaanxi Key Laboratory of Early Life and Environments, ;; State Key Laboratory of Palaeobiology and Stratigraphy;; Shaanxi Key Laboratory of Early Life and Environments, Xi'an;; Nanjing;; Xi'an, ;;; 710054;; 210008;; 710069.

Zhang Yanan, Earth Science Faculty, Chang'an University;; Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences;; Shaanxi Key Laboratory of Early Life and Environments, ;; State Key Laboratory of Palaeobiology and Stratigraphy;; Shaanxi Key Laboratory of Early Life and Environments, Xi'an;; Nanjing;; Xi'an, ;;; 710054;; 210008;; 710069.

Wang Qi, Earth Science Faculty, Chang'an University;; Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences;; Shaanxi Key Laboratory of Early Life and Environments, ;; State Key Laboratory of Palaeobiology and Stratigraphy;; Shaanxi Key Laboratory of Early Life and Environments, Xi'an;; Nanjing;; Xi'an, ;;; 710054;; 210008;; 710069.

Shao Tiequan, Earth Science Faculty, Chang'an University;; Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences;; Shaanxi Key Laboratory of Early Life and Environments, ;; State Key Laboratory of Palaeobiology and Stratigraphy;; Shaanxi Key Laboratory of Early Life and Environments, Xi'an;; Nanjing;; Xi'an, ;;; 710054;; 210008;; 710069.

Liu Mingjin, Earth Science Faculty, Chang'an University, Xi'an, Shaanxi 710054, China.

Wu Xieting, Earth Science Faculty, Chang'an University, Xi'an, Shaanxi 710054, China.

Gao Zhenli, Earth Science Faculty, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Xiang, Earth Science Faculty, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 秦嘉琛, 长安大学地球科学与资源学院;; 中国科学院南京地质古生物研究所;; 陕西省早期生命与环境重点实验室, ;; 现代古生物学和地层学国家重点实验室;; 陕西省早期生命与环境重点实验室, 西安;; 南京;; 西安, ;;; 710054;; 210008;; 710069.

刘云焕, 长安大学地球科学与资源学院;; 中国科学院南京地质古生物研究所;; 陕西省早期生命与环境重点实验室, ;; 现代古生物学和地层学国家重点实验室;; 陕西省早期生命与环境重点实验室, 西安;; 南京;; 西安, ;;; 710054;; 210008;; 710069.

张虎, 长安大学地球科学与资源学院;; 中国科学院南京地质古生物研究所;; 陕西省早期生命与环境重点实验室, ;; 现代古生物学和地层学国家重点实验室;; 陕西省早期生命与环境重点

实验室, 西安;;南京;;西安, ;;; 710054;;210008;;710069.

张亚楠, 长安大学地球科学与资源学院;;中国科学院南京地质古生物研究所;;陕西省早期生命与环境重点实验室, ;现代古生物学和地层学国家重点实验室;;陕西省早期生命与环境重点实验室, 西安;;南京;;西安, ;;; 710054;;210008;;710069.

王琪, 长安大学地球科学与资源学院;;中国科学院南京地质古生物研究所;;陕西省早期生命与环境重点实验室, ;现代古生物学和地层学国家重点实验室;;陕西省早期生命与环境重点实验室, 西安;;南京;;西安, ;;; 710054;;210008;;710069.

邵铁全, 长安大学地球科学与资源学院;;中国科学院南京地质古生物研究所;;陕西省早期生命与环境重点实验室, ;现代古生物学和地层学国家重点实验室;;陕西省早期生命与环境重点实验室, 西安;;南京;;西安, ;;; 710054;;210008;;710069.

刘明金, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

吴谐婷, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

高振丽, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

张响, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

电子邮件地址: stotto@163.com

电子邮件地址: stotto@163.com

使用次数 (最近 180 天): 0

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作者: Ruan Shiqi; Yang Xingke; Zhu Wei; Gao Yunfeng; Han Ke

作者: 阮仕琦; 杨兴科; 朱伟; 高云峰; 韩珂

标题: Study on Characteristics of Ore-forming Fluids in Qipangou Tungsten Mining Area, Western of Zhenan, Shaanxi

标题: 陕西镇安西部棋盘沟钨矿区成矿流体特征研究

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作者关键词: 镇安西部; 流体包裹体; 钨矿; 稳定同位素; 成矿流体; 棋盘沟矿区; 陕西省

摘要：The western part of Zhenan is an important tungsten molybdenum polymetallic metallogenic belt in Qinling Mountains, and its metallogenic geological conditions are very favorable. A number of tungsten molybdenum deposits have been discovered in this area in recent years. At present, the study of tungsten deposits in this area mainly focuses on the geological characteristics, ore-controlling factors, mineral assemblages, resource prediction, metallogenic model and prospecting prospects. However, research about systematic fluid inclusions and isotope geochemistry is still lacking. This paper chooses Qipangou mining area in western Zhenan as a typical mining area, mainly studies the characteristics of fluid inclusions and discusses the properties of ore-forming fluids in the mining area. The main tungsten ore bodies in Qipangou are quartz vein scheelite, which occurs in the near north-south faults of the mining area. The metallic minerals in the ore are mainly scheelite. The ore bodies are large in scale and high in grade, but no magmatic rock bodies are found in the mining area. Therefore, the key to understand the genesis of the deposit is to clarify the source of its mineralizing material. In this study, experimental samples of scheelite-bearing quartz veins in Qipangou mining area were taken, and fluid inclusions, pyrite sulfur isotopes, hydrogen and oxygen isotopes were analyzed. The experimental results show that the gas-liquid two-phase water-soluble inclusions are mainly developed in scheelite and quartz grains which formed in the main metallogenic stage of Qipangou. The homogenization temperature of inclusions is mainly between 291.4~423.7 °C, the hydrothermal salinity is 5.1%~7.7% [w(NaCl)], and the density of fluid is between 0.52~1.08 g/cm³. The inclusion temperature data show that the ore-forming fluids in the mining area belong to medium-high temperature and low salinity fluids, which is similar to the physical and chemical conditions of fluid in Shizhuyuan super-large tungsten deposit in Nanling area. Hydrogen and oxygen isotope results show that the main source of fluids is magmatic water, and sulfur isotope test results fall into the range of sulfur isotope composition of magmatic rocks, reflecting that tungsten deposits in the mining area are derived from magmatic hydrothermal solution. Compared with the temperature measurement results of fluid inclusions in the near-east-west layered tungsten deposits in the surrounding mining areas, the homogenization temperature of ore-forming fluids in the Qipangou mining area is obviously higher. This result reflects that the near-north-south structure in the area is the main channel for the migration of ore-forming hydrothermal fluids. The migration process of ore-forming fluids first moves along the near-north-south faults, then along the north-south faults. Then the ore-forming fluids pour into the interbedded fissures to form the lamellar scheelite, and the temperature decreases with the migration of hydrothermal fluids. The study results of ore-forming fluids shows that the Qipangou scheelite deposit is mainly hydrothermal quartz vein type, controlled by NEE-trending faults. The NEE-trending faults are important structures for tungsten mineralization in this area, and are the main channel for ore-forming hydrothermal migration, which is of great significance for indicating prospecting.

摘要：镇安西部棋盘沟矿区内的钨矿体主要为石英脉型钨矿，产于区内近SN向断裂中，矿石中金属矿物以白钨矿为主，矿体规模大且品位高，但区内未见有岩浆岩体出露，因此明确其成矿流体来源是理解矿床成因的关键。为了探究成矿流体特征，分析了主成矿阶段形成的白钨矿与石英颗粒中主要发育的气液两相包裹体，结果显示包裹体均一温度介于291.4~423.7 °C之间，热液盐度[w(NaCl)]为5.1%~7.7%，流体的密度范围为0.52~1.08 g/cm³。这表明矿区成矿流体属于中高温、低盐度流体，与典型热液钨矿流体相似，H、O同位素测定结果显示其主要来源为岩浆水，S同位素落入岩浆岩S同位素组成范围内，反映矿区钨矿来源于岩浆热液。与周边矿区似层状钨矿流体包裹体相比，棋盘沟矿区成矿流体均一温度明显较

高,说明近 SN 向构造是成矿热液运移的主要通道,在成矿流体运移过程中,顺着该区 NNE 向断裂裂隙上升,形成石英脉型白钨矿。随着成矿热液温度持续降低,矿液沿层间裂隙灌入形成似层状型白钨矿。

入藏号: CSCD:6485465

地址: Ruan Shiqi, School of Earth Sciences and Resources,Changan University, Xian, Shaanxi 710054, China.

Yang Xingke, School of Earth Sciences and Resources,Changan University, Xian, Shaanxi 710054, China.

Gao Yunfeng, School of Earth Sciences and Resources,Changan University, Xian, Shaanxi 710054, China.

Han Ke, School of Earth Sciences and Resources,Changan University, Xian, Shaanxi 710054, China.

Zhu Wei, Shaanxi Geological Survey Center, Xian, Shaanxi 710054, China.

地址: 阮仕琦, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

杨兴科, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

高云峰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

韩珂, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

朱伟, 陕西省地质调查中心, 西安, 陕西 710054, 中国.

电子邮件地址: 773946220@qq.com; xky61@163.com

电子邮件地址: 773946220@qq.com; xky61@163.com

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作者: Li Peng; Pei Xianzhi; Li Ruibao; Li Zuochen; Yang Yunjun; Chen Youxin; Liu Chengjun; Wang Meng; Pei Lei; Gao Feng; Su Zhenguo; Liang Guobing; Gao Xiangyu

作者: 栗朋; 裴先治; 李瑞保; 李佐臣; 杨运军; 陈有炘; 刘成军; 王盟; 裴磊; 高峰; 苏联国; 梁国冰; 高翔宇

标题: Zircon U-Pb Geochronology, Geochemistry and Geological Significance of Daan Granite in Northwestern Margin of Yangtze Block

标题: 扬子板块西北缘大安花岗岩体锆石 U-Pb 年代学、地球化学特征及其地质意义

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作者关键词: 扬子板块西北缘; 后龙门山构造带; 大安花岗岩体; 锆石 U-Pb 定年; 地球化学; 构造环境

摘要: Located in the Ningqiang area of the northwest margin of the Yangtze block, the Daan granite consists mainly of biotite granodiorite. However, the petrogenesis and geological significances of the Daan pluton remain unclear in addition to the controversial formation age. In this paper, a detailed study of LA-ICP-MS zircon U-Pb geochronology and geochemistry is presented for the Daan granite. The results show that the age of granodiorite is 212.31.6Ma and 212.480.43Ma, belonging to the Late Triassic. Geochemically, the Daan granites have relatively high SiO_2 (67.61%-69.02%) and Al_2O_3 (16.14%-16.80%) contents, and are enriched in LILE (Cs, Ba) and LREE. The samples display an insignificant negative Eu anomaly, low Y (3.10×10^{-6} ~ 3.90×10^{-6}) contents, and high Sr contents (538×10^{-6} ~ 907×10^{-6}) and Sr/Y ratios (138-291), exhibiting marked geochemical features of adakite. Combined with regional geological data, it is proposed that the Daan granite was formed in a post-collisional tectonic environment. The extensional regime after collision between the North China block and the Yangtze block induced the upwelling of mantle material, resulting in the dehydration and melting of thickened basic lower crust and formed the adakitic magma.

摘要: 位于扬子板块西北缘宁强地区的大安花岗岩体, 岩石类型主要为黑云母花岗闪长岩, 但其形成时代却有一定的争议, 成因及地质意义尚未明确. 对大安花岗岩体进行详细的 LA-ICP-MS 锆石 U-Pb 年代学和岩石地球化学研究. 结果表明, 花岗闪长岩年龄为 212.31.6Ma 和 212.480.43Ma, 属晚三叠世. 地球化学特征显示花岗闪长岩相对高硅 (67.61%~69.02%)、高 Al_2O_3 (16.14%~16.80%), $\text{Na}_2\text{O} > \text{K}_2\text{O}$, 富集大离子亲石元素 (Cs、Ba) 和轻稀土元素, Eu 负异常不明显, 强烈富集 Sr (538×10^{-6} ~ 907×10^{-6}) 和亏损 Y (3.10×10^{-6} ~ 3.90×10^{-6}), 高 Sr/Y 比值 (138~291), 表现出明显的埃达克质岩石的地球化学特征. 综合区域地质资料认为, 大安花岗岩体形成于后碰撞构造环境, 是在华北板块与扬子板块碰撞后期伸展体制下, 由于地幔物质上涌带来的热量导致加厚基性下地壳脱水熔融, 形成了具有埃达克质性质的岩浆.

入藏号: CSCD:6479362

地址: Li Peng, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Gao Feng, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Su Zhenguo, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Liang Guobing, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Gao Xiangyu, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Pei Xianzhi, School of Earth Science and Resources, Chang'an University;; Key Laboratory of Western Mineral Resources and Geological Engineering, Ministry of Education, ;; Key Laboratory of Western Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;; Xi'an, ;; 710054;; 710054.

Li Ruibao, School of Earth Science and Resources, Chang'an University;; Key Laboratory of

Western Mineral Resources and Geological Engineering,Ministry of Education, ;;Key Laboratory of Western Mineral Resources and Geological Engineering,Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Li Zuochen, School of Earth Science and Resources,Chang'an University;;Key Laboratory of Western Mineral Resources and Geological Engineering,Ministry of Education, ;;Key Laboratory of Western Mineral Resources and Geological Engineering,Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Chen Youxin, School of Earth Science and Resources,Chang'an University;;Key Laboratory of Western Mineral Resources and Geological Engineering,Ministry of Education, ;;Key Laboratory of Western Mineral Resources and Geological Engineering,Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Liu Chengjun, School of Earth Science and Resources,Chang'an University;;Key Laboratory of Western Mineral Resources and Geological Engineering,Ministry of Education, ;;Key Laboratory of Western Mineral Resources and Geological Engineering,Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Wang Meng, School of Earth Science and Resources,Chang'an University;;Key Laboratory of Western Mineral Resources and Geological Engineering,Ministry of Education, ;;Key Laboratory of Western Mineral Resources and Geological Engineering,Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Pei Lei, School of Earth Science and Resources,Chang'an University;;Key Laboratory of Western Mineral Resources and Geological Engineering,Ministry of Education, ;;Key Laboratory of Western Mineral Resources and Geological Engineering,Ministry of Education, Xi'an;;Xi'an, ;; 710054;;710054.

Yang Yunjun, Shaanxi Center of Geological Survey, Xi'an, Shaanxi 710065, China.

地址: 栗朋, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

高峰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

苏联国, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

梁国冰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

高翔宇, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

裴先治, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

李瑞保, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

李佐臣, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

陈有炘, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

刘成军, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

王盟, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

裴磊, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

杨运军, 陕西省地质调查中心, 西安, 陕西 710065, 中国.

电子邮件地址: 997846193@qq.com; peixzh@163.com

电子邮件地址: 997846193@qq.com; peixzh@163.com

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作者: Gao Xiangyu; Pei Xianzhi; Li Zuochen; Li Ruibao; Wei Liyong; Wang Meng; Liu Chengjun; Gao Feng; Liang Guobing; Shao Jiakun; Mu Kebin

作者: 高翔宇; 裴先治; 李佐臣; 李瑞保; 魏立勇; 王盟; 刘成军; 高峰; 梁国冰; 邵嘉坤; 穆可斌

标题: Age and Provenance of Upper Shilidun Formation, Lintan, West Qinling Orogen: Constraints from LA-ICP-MS U-Pb Dating of Detrital Zircons

标题: 西秦岭临潭地区十里墩组上段形成时代及物源: 来自 LA-ICP-MS 碎屑锆石 U-Pb 年龄的证据

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作者关键词: West Qinling orogen; Lintan area; Shilidun Formation; zircon LA-ICP-MS U-Pb dating; petrology

作者关键词: 西秦岭造山带; 临潭地区; 十里墩组; LA-ICP-MS 锆石 U-Pb 定年; 岩石学

摘要: According to previous studies, there are short of standard fossils to define the formed age of Shilidun Formation, which leads to many disputes about the deposition time, and correlation studies on the provenance of Shilidun Formation are rare. LA-ICP-MS detrital zircon U-Pb dating was conducted for clastic rocks in the upper Shilidun Formation, Lintan area, to investigate the age and provenance in this study. The results show that the weighted mean age of the youngest zircon age group in the two samples is 265.765 Ma, representing the maximum depositional age of the upper Shilidun Formation. Taking the paleontological data into consideration, it is suggested that the upper Shilidun Formation was deposited in the Middle-Late Permian. The detrital zircon ages are divided into 4 groups: ① Phanerozoic age group (265-467 Ma); ② Neoproterozoic age group (564-996 Ma), with a small peak at 955 Ma; ③ Mesoproterozoic age group (1099-1539 Ma); ④ Paleoproterozoic-Archaean age group (1622-3153 Ma), which can be subdivided into two groups: the Middle and Late Paleoproterozoic age group (1622-2194 Ma), with an obvious peak at

1 902Ma;the Early Paleoproterozoic age group(2 343-3 153Ma),with an obvious peak at 2 516Ma.According to the characteristics of the detrital zircon spectra,it is thought that the upper Shilidun Formation has multi-sources,including the southern margin of the North China block,the eastern section of the Qilian orogenic belt, the northern margin of the West Qinling tectonic zone,and ancient basement of the southern margin of the North China block is main source region.Based on the sedimentary facies,lithofacies paleogeography and regional tectonic evolution,it is proposed that the upper Shilidun Formation should be formed in the northern slope of the back arc basin formed by the subduction of the Yangtze plate and the convergence of the Mianlue Ocean.

摘要: 从前人的研究来看,十里墩组缺少限定其形成时代的标准化石,这导致其沉积时限尚有诸多争议,并且对于该套地层物源的相关研究甚少.以西秦岭临潭地区十里墩组上段碎屑岩为研究对象,进行 LA-ICP-MS 锆石 U-Pb 年代学研究,探讨其形成时代及物源.结果表明:十里墩组上部层位的 2 个样品中最小锆石年龄组加权平均年龄为 265.76.5Ma,即十里墩组上段沉积时代应不晚于 265.76.5Ma,综合古生物化石信息将其形成年代厘定为中晚二叠世.所获得碎屑锆石年龄可划分为 4 组:①显生宙年龄组,265~467Ma;②新元古代年龄组,564~996Ma,该组有小段峰值,峰值年龄为 955Ma;③中元古代年龄组,1 099~1 539Ma;④古元古代-太古代年龄组,1 622~3 153Ma,该组年龄又可细分为古元古代中晚期年龄段:1 622~2 194Ma,峰值为 1 902Ma;古元古代早期-太古代年龄段:2 343~3 153Ma,峰值为 2 516Ma.综合研究认为,十里墩组上段的物源具多元性,包括华北板块南缘、祁连造山带东段以及西秦岭北缘构造带,且华北板块南缘古老基底为其主要物源.据沉积相、岩相古地理以及区域构造演化分析认为,十里墩组上段沉积于扬子板块俯冲伴随勉略洋收敛所形成的弧后盆地北缘斜坡地带.

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地址: Gao Xiangyu, School of Earth Science and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Gao Feng, School of Earth Science and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Liang Guobing, School of Earth Science and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Shao Jiakun, School of Earth Science and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Mu Kebin, School of Earth Science and Resources,Chang'an University, Xi'an, Shaanxi 710054, China.

Pei Xianzhi, School of Earth Science and Resources,Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,Ministry of Land and Resources, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,Ministry of Land and Resources, Xi'an;;Xi'an, ;; 710054;;710054.

Li Zuochen, School of Earth Science and Resources,Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,Ministry of Land and Resources, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,Ministry of Land and Resources, Xi'an;;Xi'an, ;; 710054;;710054.

Li Ruibao, School of Earth Science and Resources,Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,Ministry of Land and Resources, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits,Ministry of Land and Resources, Xi'an;;Xi'an, ;; 710054;;710054.

Wang Meng, School of Earth Science and Resources, Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, Xi'an;;Xi'an, ;; 710054;;710054.

Liu Chengjun, School of Earth Science and Resources, Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, Xi'an;;Xi'an, ;; 710054;;710054.

Wei Liyong, No.5 Gold Geological Party of the Chinese Armed Police Force, Xi'an, Shaanxi 710100, China.

地址: 高翔宇, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

高峰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

梁国冰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

邵嘉坤, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

穆可斌, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

裴先治, 长安大学地球科学与资源学院;;国土资源部岩浆作用与找矿重点实验室, ;;国土资源部岩浆作用与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

李佐臣, 长安大学地球科学与资源学院;;国土资源部岩浆作用与找矿重点实验室, ;;国土资源部岩浆作用与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

李瑞保, 长安大学地球科学与资源学院;;国土资源部岩浆作用与找矿重点实验室, ;;国土资源部岩浆作用与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

王盟, 长安大学地球科学与资源学院;;国土资源部岩浆作用与找矿重点实验室, ;;国土资源部岩浆作用与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

刘成军, 长安大学地球科学与资源学院;;国土资源部岩浆作用与找矿重点实验室, ;;国土资源部岩浆作用与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

魏立勇, 中国人民武装警察部队黄金第五支队, 西安, 陕西 710100, 中国.

电子邮件地址: 1442279819@qq.com; peixzh@163.com

电子邮件地址: 1442279819@qq.com; peixzh@163.com

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作者: Su Zhen'guo; Pei Xianzhi; Li Ruibao; Li Zuochen; Yang Yunjun; Pei Lei; Wang Meng; Liu Chengjun; Chen Youxin; Gao Feng; Li Peng; Gao Xiangyu; Liang Guobing

作者: 苏联国; 裴先治; 李瑞保; 李佐臣; 杨运军; 裴磊; 王盟; 刘成军; 陈有焯; 高峰; 栗

册; 高翔宇; 梁国冰

标题: Detrital Zircon U-Pb Ages and Geological Significance of Metasedimentary Rocks from Guanjiagou Formation in Huoshenmiao Area, Mianlue Tectonic Belt of South Qinling

标题: 南秦岭勉略构造带火神庙地区关家沟组变质沉积岩系碎屑锆石 U-Pb 年龄及地质意义

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作者关键词: 南秦岭; 勉略构造带; 关家沟组; 碎屑锆石; 锆石 LA-ICP-MS U-Pb 定年; 岩石学

摘要: A suit of gray-green sericite-chlorite-quartz phyllite, gray-white sericite-albite-quartz phyllite and gray biotite-quartz phyllite is exposed in the Huoshenmiao area, Lueyang County. The sequence is previously regarded as the Guanjiagou Formation, but the depositional age and tectonic setting of the protolith are still in dispute. In this paper, detrital zircons from the metasedimentary rocks of the Guanjiagou Formation in the Huoshenmiao area were tested by LA-ICP-MS zircon U-Pb dating. The zircon U-Pb ages range from 932 to 723 Ma, and the main age groups are 727 to 723 Ma, 760 to 758 Ma, 897 to 809 Ma and 932 Ma, respectively; a peak at 848 Ma and the secondary peak ages at 725 Ma, 758 Ma and 932 Ma. The youngest age group is 723 Ma to 727 Ma (725 Ma on average), which indicates that the depositional age of this formation was not earlier than the Nanhua period. Combined with the regional geological data, it is proposed that the detrital material is mainly sourced from magmatic rocks within the Mianlue tectonic belt and Bikou microblock, and less from magmatic rocks exposed in the Hannan area and the northern margin of the Yangtze plate. It should be noticed that the ages of the detrital zircons are fairly concentrated, from Qingbaikou to Nanhua period. Combined with data of the sedimentary strata in this area, it is suggested that this sedimentary sequences might be deposited in a rift environment.

摘要: 南秦岭勉略构造带南缘的略阳火神庙地区发育一套灰绿色绢云绿泥石石英千枚岩、灰白色绢云钠长石英千枚岩和灰色黑云石英千枚岩的岩石组合。该套变质沉积岩系被前人划归关家沟组,但其原岩成岩时代和形成的构造环境都存在争议。采用 LA-ICP-MS 锆石 U-Pb 测年方法对从略阳火神庙地区关家沟组变质沉积岩中获得的碎屑锆石进行了研究,结果表明碎屑锆石的年龄介于 932~723 Ma,主要年龄谱分别为 727~723 Ma、760~758 Ma、897~809 Ma 和 932 Ma,主要峰值年龄为 848 Ma,次要峰值年龄为 725 Ma、758 Ma 和 932 Ma,最年轻的一组年龄为 723~727 Ma(平均年龄为 725 Ma),表明该地层的沉积时代应不早于南华纪。结合区域地质资料认为其碎屑物质的来源比较明确,主要来自勉略构造带和南侧碧口微地块内的岩浆岩,扬子板块北缘汉南地区出露的岩浆岩也为该地层提供了有限的物质。此次获得的碎屑锆石年龄较为集中,反映的皆为青白口纪到南华纪的年龄信息,结合前人对该区沉积地层的研究资料,认为其可能为一套裂谷环境的沉积地层。

入藏号: CSCD:6479367

地址: Su Zhen'guo, Faculty of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Gao Feng, Faculty of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054,

China.

Li Peng, Faculty of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Gao Xiangyu, Faculty of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Liang Guobing, Faculty of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Pei Xianzhi, Faculty of Earth Science and Resources, Chang'an University;; Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, ;; Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, Xi'an;; Xi'an, ;; 710054;; 710054.

Li Ruibao, Faculty of Earth Science and Resources, Chang'an University;; Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, ;; Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, Xi'an;; Xi'an, ;; 710054;; 710054.

Li Zuochen, Faculty of Earth Science and Resources, Chang'an University;; Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, ;; Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, Xi'an;; Xi'an, ;; 710054;; 710054.

Pei Lei, Faculty of Earth Science and Resources, Chang'an University;; Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, ;; Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, Xi'an;; Xi'an, ;; 710054;; 710054.

Wang Meng, Faculty of Earth Science and Resources, Chang'an University;; Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, ;; Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, Xi'an;; Xi'an, ;; 710054;; 710054.

Liu Chengjun, Faculty of Earth Science and Resources, Chang'an University;; Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, ;; Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, Xi'an;; Xi'an, ;; 710054;; 710054.

Chen Youxin, Faculty of Earth Science and Resources, Chang'an University;; Key Laboratory of

Western China's Mineral Resources and Geological Engineering, Ministry of Education, Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, ;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, Xi'an;;Xi'an, ;; 710054;;710054.

Yang Yunjun, Shaanxi Mineral Resources and Geological Survey, Xi'an, Shaanxi 710065, China.

地址: 苏联国, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

高峰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

栗朋, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

高翔宇, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

梁国冰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

裴先治, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, 国土资源部岩浆作用成矿与找矿重点实验室, ;;西部矿产资源与地质工程教育部重点实验室;;国土资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

李瑞保, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, 国土资源部岩浆作用成矿与找矿重点实验室, ;;西部矿产资源与地质工程教育部重点实验室;;国土资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

李佐臣, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, 国土资源部岩浆作用成矿与找矿重点实验室, ;;西部矿产资源与地质工程教育部重点实验室;;国土资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

裴磊, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, 国土资源部岩浆作用成矿与找矿重点实验室, ;;西部矿产资源与地质工程教育部重点实验室;;国土资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

王盟, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, 国土资源部岩浆作用成矿与找矿重点实验室, ;;西部矿产资源与地质工程教育部重点实验室;;国土资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

刘成军, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, 国土资源部岩浆作用成矿与找矿重点实验室, ;;西部矿产资源与地质工程教育部重点实验室;;国土资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

陈有炘, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室, 国土资源部岩浆作用成矿与找矿重点实验室, ;;西部矿产资源与地质工程教育部重点实验室;;国土资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

杨运军, 陕西省地质调查中心, 西安, 陕西 710065, 中国.

电子邮件地址: 553400970@qq.com; peixzh@163.com

电子邮件地址: 553400970@qq.com; peixzh@163.com

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作者: Wang Yan; Wang Mengxi; Jiao Jiangang

作者: 王岩; 王梦玺; 焦建刚

标题: MINERAL COMPOSITION AND PLATINUM-GROUP ELEMENTS OF THE NEOPROTEROZOIC WANGJIANGSHAN LAYERED INTRUSION AT THE NORTHERN MARGIN OF THE YANGTZE BLOCK: IMPLICATIONS FOR THE PROCESSES OF MAGMA EVOLUTION AND TECTONIC SETTING

标题: 扬子地块北缘新元古代望江山层状岩体矿物成分和铂族元素特征: 对岩浆演化过程和构造环境的制约

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作者关键词: 矿物成分; 铂族元素; 硫化物熔离; 望江山层状岩体; 扬子地块北缘

摘要: The Wangjiangshan layered intrusion occurs in the Neoproterozoic Hannan arc at the northern margin of the Yangtze Block, and it is composed of ultramafic to intermediate rocks from the bottom to the top. The lower zone is mainly composed of pyroxenite and troctolite, the middle zone is olivine gabbro and gabbro, and the upper zone is gabbro and diorite. This study focuses on olivine norite gabbro, norite gabbro and gabbro in the middle zone. The compositions of olivine, pyroxene and bulk-rock suggest that the Wangjiangshan intrusion was derived from subcontinental lithospheric mantle which was mainly composed of spinel lherzolite and metasomatized by subducted slab-derived fluids. The parental magma of the middle zone was tholeiitic basalt with high oxygen fugacity, inferring from the in-situ compositions of ilmenite-magnetite mineral pair. The shallow magma chamber was about 12.9 to 18 km in depth in terms of clinopyroxene geobarometry. The modeling result shows that olivine from the middle zone was a product of ~28% crystallization of the parental magma. In addition, the PGE pattern of the rocks from this study indicates a lack of large-scale sulfide segregation due to the absence of crustal contamination. The composition of clinopyroxene is akin to those from island arc, but different from clinopyroxene from the rifting. Moreover, rocks from the middle zone have bulk-rock Th/Yb and Nb/Yb ratios similar to ratios of island arc basalts. Therefore, the Wangjiangshan intrusion could be formed in island arc environment. We argue that the tearing and breakoff of subduction oceanic slab resulted in asthenosphere upwelling during the Neoproterozoic long-term subduction beneath the northern margin of Yangtze. This provided a heat source for the partial melting of the metasomatized subcontinental lithospheric mantle and subsequent formation of mafic magma with island arc characteristics, which ascended in an extensional environment to form mafic-ultramafic layered intrusions in the Hannan arc.

摘要: 望江山层状岩体位于扬子地块北缘新元古代汉南杂岩带中, 岩体从底部到顶部由超镁

铁质岩过渡为中性岩:底部主要由辉石岩和橄长岩组成;中部为辉长苏长岩和辉长岩;上部为辉长岩和闪长岩。研究以中部岩相带橄榄辉长苏长岩、辉长苏长岩和辉长岩为对象,通过主要矿物的主微量元素和全岩主微量元素的分析,查明望江山岩体来源于尖晶石二辉橄榄岩组成的大陆下岩石圈地幔,并且地幔源区受到了来自俯冲板片流体的交代,岩体中部带的母岩浆为拉斑玄武质岩浆。钛铁矿磁铁矿矿物对成分计算表明,母岩浆在形成时具有较高氧逸度。通过单斜辉石压力计得到岩体的侵位深度约为 12.9 ~ 18 km。对岩体母岩浆橄榄石分离结晶过程的模拟计算表明,中部带橄榄石为母岩浆经过~28%分离结晶的产物。此外,铂族元素(PGE)组成暗示岩体并未经历过大规模的硫化物熔离,可能与缺乏地壳物质混染有关。岩体中单斜辉石与岛弧环境堆晶岩中单斜辉石成分相似,不同于裂谷环境中堆晶单斜辉石的成分;同时,全岩 Th/Yb 和 Nb/Yb 比值也与岛弧玄武岩比值相似,因此矿物和全岩成分均说明望江山层状岩体应形成于岛弧环境。研究认为扬子北缘在新元古代长期的俯冲过程中,大洋板片断离导致软流圈上涌,提供热源使交代大陆下岩石圈地幔部分熔融形成具有岛弧特征的镁铁质岩浆,在局部伸展环境中上升侵位形成汉南杂岩带中镁铁超镁铁质层状岩体。

入藏号: CSCD:6476722

地址: Wang Yan, School of Earth Science and Resources, Chang'an University, Xi'an, Shannxi 710064.

Wang Mengxi, School of Earth Science and Resources, Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources, Xi'an;;Xi'an, Shannxi;;Shannxi 710064;;710064.

Jiao Jiangang, School of Earth Science and Resources, Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, Ministry of Land and Resources;;Key Laboratory of Western China's Mineral Resources and Geological Engineering, Ministry of Education, Xi'an;;Xi'an;Xi'an, Shannxi;;Shannxi;;Shannxi 710064;;710064;;710064.

地址: 王岩, 长安大学地球科学与资源学院, 西安, 陕西 710064, 中国.

王梦玺, 长安大学地球科学与资源学院;;国土资源部岩浆作用成矿与找矿重点实验室, ;;国土资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

焦建刚, 长安大学地球科学与资源学院;;国土资源部岩浆作用成矿与找矿重点实验室;;教育部西部矿产资源与地质工程重点实验室, ;;国土资源部岩浆作用成矿与找矿重点实验室;;教育部西部矿产资源与地质工程重点实验室, 西安;;西安;;西安, 陕西;;陕西;;陕西 710064;;710064;;710064, 中国.

电子邮件地址: wy974920352@163.com; mxwang@chd.edu.cn

电子邮件地址: wy974920352@163.com; mxwang@chd.edu.cn

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作者: Wang Longjiang; Li Yongjun; Wang Zuopeng; Ning Wentao; Tao Xiaoyang; Xu Qian

作者: 王龙江; 李永军; 王祚鹏; 宁文涛; 陶晓杨; 徐倩

标题: Zircon LA-ICP-MS U-Pb Dating of Volcanics in Batamayineishan Formation of Kalamaili Area, Eastern Junggar

标题: 东准噶尔卡拉麦里地区巴塔玛依内山组火山岩 LA-ICP-MS 锆石 U-Pb 年龄

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文献类型: Article

作者关键词: Batamayineishan Formation; Zircon U-Pb age; Kalamaili area; Eastern Junggar

作者关键词: 巴塔玛依内山组; 锆石 U-Pb 测年; 卡拉麦里地区; 东准噶尔

摘要: Batamayineishan Formation is a set of continental volcanic-sedimentary strata dominated by volcanic rocks. It is widely distributed in eastern Junggar, with a huge scale and a long-standing controversy about its age. The U-Pb zircon U-Pb age of Batamayineishan Formation in Kalamaili area is (338.77.7) Ma (MSWD=0.24) by LA-ICP-MS dating of basalts in the middle and lower strata of the Formation. The CL images of the zircons show obvious oscillatory zonal structure, and the Th/U ratios of the zircons are between 0.11 and 0.95, all of which are greater than 0.10. The Th/U average of 13 zircons is 0.56. There is a positive correlation between the Th/U values, indicating that the zircons belong to magmatic zircons and represent the formation age of the Batamayineishan Formation. Based on previous chronological data and fossil data, the age of the Batamayineishan Formation is defined as the middle of the Early Carboniferous to the early stage of the Late Carboniferous. It is considered that the lower strata should be no later than 338.7 Ma. This result further constrains the age of continental volcanic strata and provides a new chronological basis for the study of volcanic magmatism and tectonic evolution in the eastern Junggar tectonic belt.

摘要: 巴塔玛依内山组是一套以火山岩为主的陆相火山-沉积地层, 在东准噶尔地区广泛分布, 规模巨大, 且形成时代久存争议。通过对卡拉麦里地区巴塔玛依内山组层型剖面的重新实测, 以及对该组中下部层位玄武岩进行 LA-ICP-MS 测年, 获得锆石 U-Pb 年龄为 (338.77.7) Ma (MSWD=0.24)。所测锆石的 CL 图像上可见明显的震荡环带结构, 且锆石 Th/U 比值为 0.11~0.95, 均大于 0.10, 13 颗锆石的 Th/U 平均值为 0.56, Th/U 呈正相关, 说明属岩浆锆石, 指示其代表了巴塔玛依内山组的形成时代。结合前人的年代学数据及化石资料, 将巴塔玛依内山组时代确定为早石炭世中期晚石炭世初期, 认为其中下部层位时代不晚于 338.7 Ma。该成果进一步约束了区内陆相火山地层的时代, 并为研究东准噶尔构造带的火山岩浆作用及其构造演化提供了新的年代学依据。

入藏号: CSCD:6474755

地址: Wang Longjiang, School of Earth Science & Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Zuopeng, School of Earth Science & Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Ning Wentao, School of Earth Science & Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Tao Xiaoyang, School of Earth Science & Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Xu Qian, School of Earth Science & Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Yongjun, School of Earth Science & Resources, Chang'an University;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposit, MLR, ;;Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposit, MLR, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

地址: 王龙江, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

王祚鹏, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

宁文涛, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

陶晓杨, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

徐倩, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李永军, 长安大学地球科学与资源学院;;国土资源部岩浆作用成矿与找矿重点实验室, ;;国土资源部岩浆作用成矿与找矿重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: 139442099@qq.com; yongjunl@chd.edu.cn

电子邮件地址: 139442099@qq.com; yongjunl@chd.edu.cn

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作者: Ding Kun; Wang Ruiting; Qin Xishe; Liang Ting; Yang Xiuqing; Luan Yan; Zheng Cuiyong; Fan Xinxiang

作者: 丁坤; 王瑞廷; 秦西社; 梁婷; 杨秀清; 栾燕; 郑崔勇; 樊新祥

标题: C, H, O, S, Sr isotopic geochemistry of Chenjiaba Cu-Pb-Zn polymetallic deposit, Shaanxi Province

标题: 陕西陈家坝铜铅锌多金属矿床 C、H、O、S、Sr 同位素地球化学示踪

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作者关键词: 地球化学; 碳、氢、氧、硫、锶同位素组成; 成矿物质来源; 陈家坝 Cu-Pb-Zn 多金属矿床; 陕西

摘要: The Chenjiaba Cu-Pb-Zn polymetallic deposit in Shaanxi Province, located in Mian(xian)-Lue(yang)-Ning (qiang) Cu-Au-Ni ore concentration area, is a newly discovered deposit. In this paper, C, H, O, S and Sr isotopic geochemistry was systematically studied in order to understand comprehensively the source of ore-forming materials. The analytical results show that $\delta^{13}\text{C}_{\text{PDB}}$ and $\delta^{18}\text{O}_{\text{(v-smow)}}$ values of surrounding rocks are between -0.93 and 1.44 and 14.14 and 27.49, respectively, suggesting that the surrounding rocks were derived from marine carbonate dissolution, the $\delta^{13}\text{C}_{\text{PDB}}$ values of gangue dolomite samples are in the range of -0.53~-0.89, and the $\delta^{18}\text{O}_{\text{(v-smow)}}$ values in the range of 12.12~13.23. In the Chenjiaba Cu-Pb-Zn polymetallic deposit, the CO_2 in the ore-forming fluid was mainly derived from magmatic water, with a small amount from marine carbonate dissolution. The $\delta\text{D}_{\text{SMOW}}$ of the quartz fluid inclusions is between -91 and -72, the $\delta^{18}\text{OH}_2\text{O}$ is between 6.7 and 9.4, and the $\delta\text{D}-\delta^{18}\text{OH}_2\text{O}$ diagram shows that the main source of ore-forming fluid was magmatic water. Water-rock reaction between ore-forming fluid and surrounding rock was the main mechanism resulting in the precipitation and crystallization of dolomite, sphalerite, chalcopyrite and galena in Chenjiaba Cu-Pb-Zn polymetallic deposit, Shaanxi. Sulfur isotopic compositions ($\delta^{34}\text{S}$ from 4.88 to 8.90, 7.37 on average) are both magmatic sulfur and seawater sulfur, consistent with the data of the typical Xujiagou Cu deposit in this area. The results indicate that sulfur sources were mainly sourced from magmatic sulfur with the addition of small amounts of seawater sulfur. The $^{87}\text{Sr}/^{86}\text{Sr}$ ratio of pyrite in the ore is 0.7187, higher than $^{87}\text{Sr}/^{86}\text{Sr}$ ratio (0.7083) of surrounding rock and similar to the ratio of continental crust (0.719), suggesting that ore-forming fluid probably migrated through the formation of Xuehuataiping Formation, and experienced water-rock reaction and isotope exchange between the ore fluid and the dolomite which had high $^{87}\text{Sr}/^{86}\text{Sr}$ values.

摘要: 陈家坝铜铅锌多金属矿床为近年来在陕西勉(县)-略(阳)-宁(强)铜金镍矿化集中区新发现的铜铅锌多金属矿床。为了查明陈家坝矿床成矿物质来源,笔者开展了系统的 C、H、O、S 和 Sr 同位素地球化学研究。结果表明,陈家坝矿区的围岩的 $\delta^{13}\text{C}_{\text{(PDB)}}$ 值范围 -0.93~1.44, 平均值为 0.35, $\delta^{18}\text{O}_{\text{(v-smow)}}$ 值范围 14.14~27.49, 平均 22.1, 为沉积成因海相碳酸盐岩。脉石矿物白云石的 $\delta^{13}\text{C}_{\text{PDB}}$ 范围在 -0.53~-0.89, $\delta^{18}\text{O}_{\text{v-SMOW}}$ 值范围 12.12~13.23, 指示成矿流体中的 CO_2 主要来自岩浆水, 少量 CO_2 来源于围岩海相碳酸盐岩的溶解作用。成矿流体中 δD 值范围 -91~-72, $\delta^{18}\text{OH}_2\text{O}$ 值范围 6.7~9.4, 在 $\delta\text{D}-\delta^{18}\text{OH}_2\text{O}$ 图解中主要落于原生岩浆水范围内, 成矿流体以岩浆流体为主。成矿流体与围岩的水-岩反应是导致该区铜铅锌床中白云石和黄铜矿、闪锌矿和方铅矿矿物沉淀结晶的主要机制。矿石金属硫化物 $\delta^{34}\text{S}$ 值范围 4.88~8.90, 平均值为 7.37, 介于岩浆硫与海水硫之间, 且与矿集区内典型的徐家沟铜矿床矿石矿物 $\delta^{34}\text{S}$ 变化区间重叠, 表明硫主要来自于岩浆硫, 部分硫来自海水硫酸盐。矿石中黄铁矿的初始锶同位素比值 $^{87}\text{Sr}/^{86}\text{Sr}$ 比值为 0.72, 高于赋矿围岩锶同位素比值, 接近大陆地壳的 $^{87}\text{Sr}/^{86}\text{Sr}$ 比值 (0.719), 指示了成矿流体流经了雪花太坪组地层, 并与其中具有高 $^{87}\text{Sr}/^{86}\text{Sr}$ 比值的白云岩进行水岩反应及同位素交换。

入藏号: CSCD:6471958

地址: Ding Kun, School of Earth Sciences and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Liang Ting, School of Earth Sciences and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Yang Xiuqing, School of Earth Sciences and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Ruiting, Northwest Nonferrous Geological Mining Group Co., Ltd.;;School of Earth Sciences and Resources, Chang'an University, ;;, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Qin Xishe, Northwest Nonferrous Geological Mining Group Co., Ltd., Xi'an, Shaanxi 710054, China.

Luan Yan, School of Earth Sciences and Resources, Chang'an University;;Northwest Nonferrous Geological Mining Group Co., Ltd., ;;, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Zheng Cuiyong, Northwest Nonferrous No. 711 Geological Party of Hanzhong, Hanzhong, Shaanxi 723000, China.

Fan Xinxiang, Fourth Institute of Geological and Mineral Exploration, Gansu Provincial Bureau of Geological and Mineral Exploration and Development, Jiuquan, Gansu 735000, China.

地址: 丁坤, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

梁婷, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

杨秀清, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

王瑞廷, 西北有色地质矿业集团有限公司;;长安大学地球科学与资源学院, ;;, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

秦西社, 西北有色地质矿业集团有限公司, 西安, 陕西 710054, 中国.

栾燕, 长安大学地球科学与资源学院;;西北有色地质矿业集团有限公司, ;;, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

郑崔勇, 汉中西北有色七一一总队有限公司, 汉中, 陕西 723000, 中国.

樊新祥, 甘肃省地质矿产勘查开发局第四地质矿产勘查院, 酒泉, 甘肃 735000, 中国.

电子邮件地址: 1003492885@qq.com; wryf@163.com

电子邮件地址: 1003492885@qq.com; wryf@163.com

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作者: Han Ling; Zhang Tingyu; Zhang Heng

作者: 韩玲; 张庭瑜; 张恒

标题: Landslide Susceptibility Mapping Based on IOE and SVM Model in Fugu Town

标题: 基于 IOE 和 SVM 模型的府谷镇滑坡易发性分区

来源出版物: 水土保持研究 卷: 26 期: 3 页: 367-372 出版年: 2019

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作者关键词: geology; susceptibility mapping; index of entropy; support vector machine; landslide

作者关键词: 地质学; 易发性分区; 熵权; 支持向量机; 滑坡

摘要: Fugu Town, Fugu County, Shannxi Province, was taken as the reasearch area. Through field investigation, 47 landslides have been mapped in landslide inventory map. Based on GIS software and statistical analysis model, study of landslide susceptibility mapping was carried out. Then, slope aspect, slope angle, altitude, distance to fault, distance to road, distance to river, lithology, land use, NDVI and rainfall were selected as conditioning factors to extract the factor layer. The landslide susceptibility index was calculated using the index of entropy model (IOE) and the support vector machine model (SVM), respectively. The natural break method was used to divide the study area into low, moderate, high, and very high region. Finally, the area under the ROC sensitivity curve (AUC) was used to test the partition results obtained by these two models. The results show that the AUC values of success rate and prediction rate are between 0.70 and 0.90, indicating that the two landslide susceptibility maps have high accuracy and can provide reference for landslide control in study area. The AUC values of SVM model are the highest in the training and validating samples, which means that the SVM model is suitable for landslide prediction research in the study area than IOE model.

摘要: 将陕西省府谷县府谷镇作为研究区,通过野外实地调查,圈定了47个滑坡点,制作了研究区滑坡编录图。以GIS软件和统计分析模型为基础,开展研究区滑坡易发性分区研究。首先通过GIS软件将滑坡点随机分成训练样本(70%)和测试样本(30%)两组。然后选择坡度、坡向、高程、距断层的距离、距道路的距离、距河流的距离、岩性、土地利用、NDVI、降雨量作为影响因子,提取因子图层。分别应用熵权模型(IOE)和支持向量机模型(SVM)计算滑坡易发性指数,利用自然间断点法将研究区划分为低易发区、中易发区、高易发区和极高易发区。最后利用ROC敏感度曲线下的面积(AUC)分别检验两种模型所得到的分区结果,结果表明,成功率曲线和预测度曲线的AUC值均在0.70~0.90,表明两种模型所得到的分区结果具有较高的精度,都可以为研究区的滑坡防治提供参考。在训练样本和测试样本中SVM模型的AUC值均最高,说明SVM模型比IOE模型适合在研究区开展滑坡预测研究。

入藏号: CSCD:6463879

地址: Han Ling, Chang'an University, School of Earth Science and Resources, Key Laboratory of Degraded and Unutilized Land Remediation Engineering, Ministry of Land and Resources;; Shaanxi Provincial Key Laboratory of Land Rehabilitation, Xi'an, 710064.

Zhang Tingyu, Chang'an University, School of Earth Science and Resources, Key Laboratory of Degraded and Unutilized Land Remediation Engineering, Ministry of Land and Resources;; Shaanxi Provincial Key Laboratory of Land Rehabilitation, Xi'an, 710064.

Zhang Heng, Chang'an University, School of Earth Science and Resources, Key Laboratory of Degraded and Unutilized Land Remediation Engineering, Ministry of Land and Resources;; Shaanxi Provincial Key Laboratory of Land Rehabilitation, Xi'an, 710064.

地址: 韩玲, 长安大学地球科学与资源学院, 国土资源部退化及未利用土地整治工程重点实验室;;陕西省土地整治重点实验室, 西安, 陕西 710064, 中国.

张庭瑜, 长安大学地球科学与资源学院, 国土资源部退化及未利用土地整治工程重点实验室;;陕西省土地整治重点实验室, 西安, 陕西 710064, 中国.

张恒, 长安大学地球科学与资源学院, 国土资源部退化及未利用土地整治工程重点实验室;;陕西省土地整治重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: 2016027003chd.edu.cn; ztyymy@live.com

电子邮件地址: 2016027003chd.edu.cn; ztyymy@live.com

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作者: Li Huanhuan; Song Wei; Chen Baiming; Zhang Yan

作者: 李换换; 宋伟; 陈百明; 张艳

标题: REVIEW OF THE RESEARCH ON THE EVOLUTION SIMULATION OF SPATIAL-TEMPORAL PATTERNS IN RURAL SETTLEMENTS

标题: 农村居民点时空格局演化模拟研究综述

来源出版物: 中国农业资源与区划 卷: 40 期: 1 页: 79-88 出版年: 2019

文献号: 1005-9121(2019)40:1<79:NCJMDS>2.0.TX;2-G

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作者关键词: rural settlements; pattern evolution; driving force; simulation model; review

作者关键词: 农村居民点; 格局演化; 驱动力; 模拟模型; 综述

摘要: At present,with the rapid urbanization in China,the differentiation and reorganization trends of rural settlement are becoming more and more obvious.In order to achieve a reasonable layout for rural settlements,it is imperative to quantitatively reveal the determinants that influence the spatial evolution of rural settlements,accurately understand its evolution process and furtherly predict their future layout by modeling and simulation approaches.Therefore,it is necessary to master the current status of research on simulating the evolution of rural settlement patterns and evaluate the applicability of models that can be used to simulate the rural settlement evolution.Taking the main contents of the research on the rural settlement evolution simulation as a mainline,using the methods of literature summary and comparative analysis,this paper reviews the evolution patterns and driving mechanism of rural settlements and compares the advantages

and disadvantages of their methods and models. Findings from our systemic review are showed as follows. As the reasons of scattered distribution in rural settlement, diversity of its participants, and complex driving factors, the application of conventional land-use change models in simulating rural settlement is facing great challenges. The selection of the simulation model of rural settlement strongly associates with the selections of driving forces and spatial scale. In conclusion, the simulation model of land use change can provide an effective reference on the simulation of rural settlements evolution. However, the more accurate evolution simulation of rural settlements requires a further consideration of the model mechanism. As a consequence, to analyze the main decision-making body in the rural settlement evolution through coupling spatial approach and social approach, and additionally, construct a multi-agent model will be an important future direction of the rural settlements' evolution simulation.

摘要: [目的]在我国城镇化快速发展的大背景下,农村居民点分化重组趋势日益明显。利用模型模拟的手段定量揭示农村居民点空间格局演化的驱动因素,准确理解其演化过程和未来时期的布局态势,以期达到农村居民点的合理布局势在必行。为此,需要对目前农村居民点演化模拟的研究现状,以及应用的农村居民点演化模拟模型的适用性有一定的把握和认识。[方法]文章利用文献资料法和对比分析法,以农村居民点演化模拟研究的主要内容为主线,梳理和总结了农村居民点演化发展趋势、农村居民点演化模拟驱动机制,以及农村居民点演化模拟方法和模型,评述了不同演化模型的模拟原理及其优缺点。 [结果]由于农村居民点的斑块空间破碎化、参与主体多样性、驱动因素复杂等原因,常规的土地利用变化模型在农村居民点模拟的应用上遇到了很大的挑战;农村居民点演化模拟模型的选择仍具有较强的驱动力和尺度依赖性。[结论]土地利用变化模型可为农村居民点演化模拟研究提供有效参考,但是更加准确的农村居民点演化模拟需要注重机理模型的研发。通过空间途径和社会途径的耦合,解析农村居民点格局演化过程中的主要决策主体,构建农村居民点演化多主体模型,将是未来农村居民点演化模拟的重要方向。

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地址: Li Huanhuan, School of Earth Science and Resource, Chang'an University;; Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, ;; Key Laboratory of Land Surface Pattern and Simulation, Xi'an;;, Shaanxi;; Beijing 710054;; 100101.

Song Wei, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Key Laboratory of Land Surface Pattern and Simulation, Beijing 100101, China.

Chen Baiming, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Key Laboratory of Land Surface Pattern and Simulation, Beijing 100101, China.

Zhang Yan, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 李换换, 长安大学地球科学与资源学院;; 中国科学院地理科学与资源研究所, ;; 陆地表层格局与模拟中国科学院重点实验室, 西安;;, 陕西;; 北京 710054;; 100101, 中国.

宋伟, 中国科学院地理科学与资源研究所, 陆地表层格局与模拟中国科学院重点实验室, 北京 100101, 中国.

陈百明, 中国科学院地理科学与资源研究所, 陆地表层格局与模拟中国科学院重点实验室, 北京 100101, 中国.

张艳, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

电子邮件地址: songw@igsnr.ac.cn

电子邮件地址: songw@igsnr.ac.cn

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作者: Wang Xing; Pei Xianzhi; Li Ruibao; Liu Chenjun; Chen Youxin; Li Zuochen; Zhang Yu; Hu Chenguang; Yan Quanzhi; Peng Sizhong

作者: 王兴; 裴先治; 李瑞保; 刘成军; 陈有炘; 李佐臣; 张玉; 胡晨光; 颜全治; 彭思钟

标题: Conglomerate source and source area property of Lower Hongshuichuan Formation in the East Kunlun Mountains: Evidence from conglomerate characteristics and U-Pb dating

标题: 东昆仑东段下三叠统洪水川组砾岩源区研究:来自砾岩特征及锆石 U-Pb 年龄的证据

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文献类型: Article

作者关键词: East Kunlun; Hongshuichuan Formation; conglomerate; Buqingshan-A'nimaqing Ocean

作者关键词: 东昆仑东段; 洪水川组; 砾岩; 锆石 U-Pb 年龄; 布青山-阿尼玛卿古特提斯洋

摘要: The lower Hongshuichuan Formation is mainly distributed around Tuosuo River between Middle Kunlun orogen and South Kunlun orogen in eastern Kunlun Mountains. In this paper, the authors made a comparative study of the conglomerate of Lower Hongshuichuan Formation distributed in Baoriherie area and Kekesha area in components, psephicity and granularity of gravel. The results show that the main components of the gravel are limestone and metamorphic rock in Kekesha area. The main components of gravel in Baoriherie area are granite and metamorphic rock. LA-ICP-MS zircon U-Pb dating of granite yielded magmatic crystallization age of (464.99.3)Ma(MSWD=2.9) from Baoriherie area. The characteristics of gravel show that the source of the Kekesha area is Halaguole Formation in Qingshuiquan area, whereas the source of the Baoriherie area is Caledonian magmatic rock. These data indicate that the source of Lower Hongshuichuan Formation is Caledonian magmatic rock rather than arc granite of late Hercynian-Indosinian period. Combined with previous data, the authors hold that the Buqingshan-A'nimaqing Ocean began the northward subduction in late Permian, and the Hongshuichuan Formation was a set of sedimentary products in the fore-arc basin. It is held that Buqingshan-A'nimaqing Ocean began its subduction in early Triassic.

摘要: 东昆仑东段下三叠统洪水川组主要分布于东昆南断裂带和东昆中断裂带之间的红水

川一托索河一带。笔者分别对出露于宝日禾日俄地区和可可沙地区洪水川组底部层位砾岩的砾石成分、磨圆度和粒度进行综合统计对比分析。结果显示:可可沙地区砾石成分主要为灰岩和变质岩,宝日禾日俄地区砾石成分主要为花岗岩和变质岩。从宝日禾日俄地区花岗岩砾石中获得的 LA-ICP-Ma 锆石 U-Pb 年龄为(464.9 ± 9.3) Ma(MSWD=2.9)。砾石特征表明可可沙地区物源来自可可沙地区下伏地层哈拉郭勒组,而宝日禾日俄地区物源主要为早古生代岩浆岩,表明洪水川组底部层位物源主要为加里东期弧岩浆岩,而晚滇西一印支期弧岩浆岩并未提供沉积物质。结合前人资料认为,布青山一阿尼玛卿古特提斯洋于晚二叠世开始向北俯冲,洪水川组为一套弧前盆地的沉积产物,早三叠世早期布青山一阿尼玛卿古特提斯洋处于向北俯冲初始阶段。

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地址: Wang Xing, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Yu, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

Hu Chenguang, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

Yan Quanzhi, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

Peng Sizhong, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

Pei Xianzhi, School of Earth Science and Resource, Chang'an University;;Key Laboratory of Western Mineral Resources and Geological Engineering of Ministry of Education, ;;Key Laboratory of Western Mineral Resources and Geological Engineering of Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Li Ruibao, School of Earth Science and Resource, Chang'an University;;Key Laboratory of Western Mineral Resources and Geological Engineering of Ministry of Education, ;;Key Laboratory of Western Mineral Resources and Geological Engineering of Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Liu Chenjun, School of Earth Science and Resource, Chang'an University;;Key Laboratory of Western Mineral Resources and Geological Engineering of Ministry of Education, ;;Key Laboratory of Western Mineral Resources and Geological Engineering of Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Chen Youxin, School of Earth Science and Resource, Chang'an University;;Key Laboratory of Western Mineral Resources and Geological Engineering of Ministry of Education, ;;Key Laboratory of Western Mineral Resources and Geological Engineering of Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Li Zuochen, School of Earth Science and Resource, Chang'an University;;Key Laboratory of Western Mineral Resources and Geological Engineering of Ministry of Education, ;;Key Laboratory of Western Mineral Resources and Geological Engineering of Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

地址: 王兴, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

张玉, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

胡晨光, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

颜全治, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

彭思钟, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.
裴先治, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室,;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
李瑞保, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室,;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
刘成军, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室,;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
陈有炘, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室,;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
李佐臣, 长安大学地球科学与资源学院;;西部矿产资源与地质工程教育部重点实验室,;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.
电子邮件地址: E-mail: 569343534@qq.com; E-mail: peixzh@263.net
电子邮件地址: E-mail: 569343534@qq.com; E-mail: peixzh@263.net
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作者: Li Junjun; Cao Jiannong; Liao Juan; Cheng Beibei

作者: 李军军; 曹建农; 廖娟; 程贝贝

标题: High spatial resolution remote sensing imagery edge extraction based on multi - direction wavelet transform

标题: 多方向小波变换高分影像边缘提取

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作者关键词: edge extraction; wavelet transform; Directionlet transform; modulus maximum method

作者关键词: 边缘提取; 小波变换; Directionlet 变换; 模极大值法

摘要: In view of the low resolution in direction of wavelet transform, the rich geometric structure of high spatial resolution remote sensing imagery (HSR) and the existence of edge in various directions which causes shortcomings in edge extraction of wavelet transform on objects with

complex geometric structure,the authors proposed a HRS image edge extraction method of multi - direction wavelet transform based on Directionlet theory and modulus maximum method. The method first decomposes original image based lattice to obtain one - dimensional line set,then carries out wavelet transform and obtains the high frequency directional sub - band by restore image format. The edge result is obtained by using improved module maximum and the dual threshold method. Finally,the mathematical morphology is used to refine and connect edge results. Experiment result shows that the proposed method can get more complete edge compared with traditional method and standard two - dimensional wavelet transform.

摘要: 由于小波变换方向分辨率较低,而高分影像中地物几何结构丰富,边缘存在于各个方向,导致了图像小波变换的频率系数仅被分解到水平、垂直和对角 3 个方向子带上,使得小波变换对具有复杂几何结构的地物边缘提取存在不足。为此提出一种 Directionlet 变换理论结合模极大值法的高分影像边缘提取方法。首先,对原始影像进行基于格的分解获得任意方向一维线集合,再进行小波变换并恢复图像格式得到高频方向子带;然后,利用改进模极大值法和双阈值法对系数进行处理得到边缘结果;最后,采用数学形态学方法对边缘提取结果进行细化连接等后处理,从而实现对高分影像边缘的提取。实验结果表明,该方法与传统边缘检测方法和小波变换相比,边缘提取更加完整,定位精度更高。

入藏号: CSCD:6441887

地址: Li Junjun, School of Earth Science and Resources,Changan University, Xi'an, Shaanxi 710054, China.

Cao Jiannong, School of Earth Science and Resources,Changan University, Xi'an, Shaanxi 710054, China.

Liao Juan, School of Earth Science and Resources,Changan University, Xi'an, Shaanxi 710054, China.

Cheng Beibei, School of Earth Science and Resources,Changan University, Xi'an, Shaanxi 710054, China.

地址: 李军军, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

曹建农, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

廖娟, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

程贝贝, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

电子邮件地址: ljj19921592@163.com; caojiannong@126.com

电子邮件地址: ljj19921592@163.com; caojiannong@126.com

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作者: Lai Chenxi; Yan Huimin; Du Wenpeng; Hu Yunfeng

作者: 赖晨曦; 闫慧敏; 杜文鹏; 胡云锋

标题: The Variations and Causes of Grassland Distribution in Kazakhstan from the Global Land Cover Datasets

标题: 全球土地覆被数据集中哈萨克斯坦草地分布的异同及其成因

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作者关键词: 全球土地覆被数据; 草地资源; 空间一致性; 类型混淆; 哈萨克斯坦

摘要: Affected by social institutional transformation and climate change, Kazakhstan is the most significant country with ecological degradation and grass-livestock contradiction in Central Asia. Over the past century, the distinct characteristics of various grassland ecosystems have changed due to agricultural reclamation, changes in grazing patterns, and climate change in Kazakhstan. Therefore, it is important to study the process and mechanisms of grassland degradation in Kazakhstan in order to understand the responses of grassland ecosystems to climate change and human activities in Central Asia. These findings may also support regional ecological sustainable development in the construction of green silk roads. Ecological change research is based on the land cover statistics. However, there are significant differences between the current widely-used global data sets, leading to uncertainty in the understanding of ecological variation and the simulation of future change. This study compared the similarities and differences of grassland distribution using five types of global land cover data (UMD 1992-1993, MCD12Q1 2001, GLC 2000, CCI-LC 2000, Glob Cover 2005). Grassland type identification, consistency of spatial distribution and the cause of spatial distribution variation were used to provide the basis for selection of land cover datasets in Kazakhstan. Results showed that: ① the primary cause of differences in grassland definitions were differing remote sensing data sources, ancillary data, classification methods, verification methods, and data within the five data sets. The MCD12Q1 data had the largest difference in grassland distribution area; ② the area of grassland distribution overlaps within the five data sets (complete consistency) or within the four data sets (high consistency) accounted for only 39.66% of the total, which were mainly located in the typical grassland and part of the semi-desert grassland. The spatial consistency gradually decreased from the inside to the outside around the typical grassland distribution zone. An inconsistent zone within the five data sets accounted for 26.78%, mainly located in the desert grassland; ③ CCI-LC2000 data had the highest areas of overlap compared to other types of data. There were 76% of the grassland overlapped with areas of complete consistency or high consistency in the five data sets. In the inconsistent areas, the most easily confused land cover types were mainly rainfed cropland, irrigated cropland, mosaic cropland and natural vegetation, bare areas and shrub land.

摘要: 受社会制度变迁和气候变化的影响,哈萨克斯坦是中亚地区生态退化和草畜矛盾问题

最为突出的国家。近百年来,放牧方式的改变、农业开垦的占用、加之暖干化的气候变化影响,使得哈萨克斯坦各类草地生态系统变化的时空格局具有鲜明的特点。因此,研究哈萨克斯坦草地退化的过程与机制对认识中亚地区草地生态系统对气候变化和人类活动的响应尤为重要,也是对绿色丝路建设过程中区域生态可持续发展的科学支撑。土地覆被数据是生态变化研究的基础数据,但目前广泛使用的各套全球数据集间往往存在很大的差异,这会导致对生态变化成因的认知以及对未来变化的模型模拟产生更大的不确定性。本研究从对草地类型识别的定义、空间分布的一致性和空间分布差异的原因 3 方面对比 5 类全球土地覆被数据(UMD 1992-1993、MCD12Q1 2001、GLC 2000、CCI-LC 2000、Glob Cover 2005)中哈萨克斯坦草地分布的异同,以期为哈萨克斯坦的相关研究中土地覆被数据集的选择提供依据。研究结果表明:①分类系统中对草地类型的界定、遥感数据源、辅助分类数据、分类方法、验证数据和方法的不同是 5 套数据草地资源分布差异的主要原因,其中 MCD12Q1 数据与其他 4 套数据的草地分布面积相差最大;② 5 套数据中草地分布都重叠(完全一致)或四套数据重叠(高度一致)的区域仅占 39.66%,主要位于哈萨克斯坦典型草原带和部分半荒漠草原带;围绕典型草地分布区,空间一致性由内向外逐渐降低。5 套数据完全不一致区域占 26.78%,主要位于荒漠草原带;③ CCI-LC2000 数据与其他几类数据的重叠区域最高,有 76%的草地与 5 套数据的完全一致以及高度一致区重叠;在分布不一致区域中,极易造成混淆的土地覆被类型主要为旱作耕地、灌溉耕地、耕地与自然植被镶嵌体、裸地以及灌丛。

入藏号: CSCD:6451274

地址: Lai Chenxi, School of Earth Science and Resources, Chang'an University;;Institute of Geographic Sciences and Natural Research, Chinese Academy of Sciences, ;;, Xi'an;;, ;;Beijing 710054;;100101.

Yan Huimin, Institute of Geographic Sciences and Natural Research, Chinese Academy of Sciences;;University of Chinese Academy of Sciences, ;;, ;;, Beijing;;Beijing 100101;;100049.

Du Wenpeng, Institute of Geographic Sciences and Natural Research, Chinese Academy of Sciences;;University of Chinese Academy of Sciences, ;;, ;;, Beijing;;Beijing 100101;;100049.

Hu Yunfeng, Institute of Geographic Sciences and Natural Research, Chinese Academy of Sciences;;University of Chinese Academy of Sciences, ;;, ;;, Beijing;;Beijing 100101;;100049.

地址: 赖晨曦, 长安大学地球科学与资源学院;;中国科学院地理科学与资源研究所, ;;, 西安;;, ;;北京 710054;;100101.

闫慧敏, 中国科学院地理科学与资源研究所;;中国科学院大学, ;;, ;;, 北京;;北京 100101;;100049, 中国.

杜文鹏, 中国科学院地理科学与资源研究所;;中国科学院大学, ;;, ;;, 北京;;北京 100101;;100049, 中国.

胡云锋, 中国科学院地理科学与资源研究所;;中国科学院大学, ;;, ;;, 北京;;北京 100101;;100049, 中国.

电子邮件地址: laicxjxycja@126.com; yanhm@igsnr.ac.cn

电子邮件地址: laicxjxycja@126.com; yanhm@igsnr.ac.cn

使用次数 (最近 180 天): 0

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作者: Zhang Xiangxue; Wang Li; Yin Lichang; Xu Chengdong; Li Xia; Liu Yang

作者: 张湘雪; 王丽; 尹礼唱; 徐成东; 李霞; 刘杨

标题: Spatiotemporal Variation Analysis and Risk Determinants of Hand, Foot and Mouth Disease in Beijing-Tianjin-Tangshan, China

标题: 京津唐地区 HFMD 时空变异分析与影响因子探测

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作者关键词: 手足口病; 地理探测器; 时空异质性; 解释力; 气象因子

摘要: Hand, foot and mouth disease (HFMD) is a common infectious childhood disease. In recent years, the number of cases of HFMD in China has increased rapidly, and has received increasing attention. Although there are many related studies, only a few studies focus on the spatiotemporal heterogeneity of HFMD incidence and quantify the association between meteorological factors, socioeconomic variables, and HFMD incidence. Geodetector and Bayesian space-time hierarchical models were applied to analyze the spatiotemporal heterogeneity of the HFMD incidence from 2009 to 2013 within the Beijing-Tianjin-Tangshan region. These were used to quantify the determinant power of meteorological factors, socioeconomic variables, and the interactions between two of these factors. The Geodetector method has the axiom that if an explanatory variable (x) determined an explained variable (y), the explained variable would exhibit a spatial distribution similar to that of the explanatory variable. This method has been widely used to measure the determinant power of potential explanatory variables. The Bayesian space-time hierarchical model has the potential to show the spatiotemporal variation of a geographic phenomenon. The results showed that: (1) the highest incidence of HFMD occurred in late spring and summer (May to July), and the lowest incidence occurred in winter (December to February). (2) Spatial heterogeneity existed. In particular high risks areas were mainly concentrated in areas of high economic development. The population density and proportion of the tertiary industry determinants, play a lead role in contributing to the spatial heterogeneity of HFMD incidence (q values of 0.35 and 0.28, respectively, as calculated by GeoDetector). (3) The main meteorological factors affecting the temporal heterogeneity of HFMD incidence were average temperature, cumulative precipitation, and relative humidity (with a determinant powers calculated by GeoDetector of 0.38, 0.27 and 0.13, respectively). Additionally, the interactions were greater than the independent effects between socioeconomic variables or meteorological factors. For example, the interaction of average temperature and relative humidity, average

temperature and precipitation, average temperature and wind speed were 0.43, 0.40 and 0.42, respectively. The interaction of population density and proportion of the tertiary industry was 0.55. This result presented the strongest correlation with HFMD incidence. Temperature and relative humidity were also dominant factors influencing the spatiotemporal transmission of HFMD, along with areas of high economic development with high population density. This study provides a theoretical basis for the prevention and control of HFMD by detecting the spatiotemporal heterogeneity of the HFMD incidence and quantifying the impact factors within the study region.

摘要: 手足口病(HFMD)是一种多发于儿童的常见传染病。近年来,中国 HFMD 发病人数逐年上升,疾病疫情也日益受到社会广泛关注。虽已有不少相关研究,但对于探测其时空异质性及量化潜在影响因子解释力的研究仍然较少。本文采用地理探测器及贝叶斯时空层次模型,对 2009-2013 年京津唐地区 HFMD 发病率的时空异质性进行分析,并量化各影响因子及其两两交互作用对 HFMD 发病率的解释力。结果表明:① HFMD 的相对风险存在时间异质性,其发病风险在春夏季(5-7 月)达到峰值,而冬季(12-次年 2 月)发病风险最低;② HFMD 的相对风险存在空间异质性,在经济发达的地区 HFMD 发病率较高;③影响 HFMD 发病率时间异质性的主要气象因子为平均温度、累积降水、相对湿度,解释力分别为 0.38,0.27,0.13,且交互作用都大于独自影响的作用,如平均温度和相对湿度、平均温度和降水,平均温度和风速两两交互的解释力分别为 0.43, 0.40, 0.42。通过研究京津唐地区 HFMD 发病率的时空异质性以及影响因子的量化状况,为本地区 HFMD 的预防和控制提供理论依据。

入藏号: CSCD:6451276

地址: Zhang Xiangxue, The School of Earth Science and Resources, Chang'an University;;Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, ;;State Key Laboratory of Resources and Environmental Information System, Xi'an;;;;Beijing 710054;;100101.

Wang Li, The College of Environment and Planning of Henan University, Kaifeng, Henan 475004, China.

Yin Lichang, The School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Xia, The School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Xu Chengdong, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, State Key Laboratory of Resources and Environmental Information System, Beijing 100101, China.

Liu Yang, Guizhou Academy of Sciences;;China National Center for Food Safety Risk Assessment, ;;, Guiyang;;;;Beijing 550001;;100022.

地址: 张湘雪, 长安大学地球科学与资源学院;;中国科学院地理科学与资源研究所, ;;资源与环境信息系统国家重点实验室, 西安;;;;北京 710054;;100101.

王丽, 河南大学环境与规划学院, 开封, 河南 475004, 中国.

尹礼唱, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李霞, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

徐成东, 中国科学院地理科学与资源研究所, 资源与环境信息系统国家重点实验室, 北京 100101, 中国.

刘杨, 贵州科学院;;国家食品安全风险评估中心, ;;, 贵阳;;;;北京 550001;;100022.

电子邮件地址: zxx@lreis.ac.cn; wangli@lreis.ac.cn

电子邮件地址: zxx@lreis.ac.cn; wangli@lreis.ac.cn

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作者: Chang Haiqin; Fu Yalong; Lin Xin; Zhang Miaomiao; Meng Ganggang

作者: 常海钦; 付亚龙; 林鑫; 张苗苗; 孟刚刚

标题: Spatial Distribution and Controlling Factors of Chemical Weathering Intensity in Drainage Basins:A Case Study in the Yangtze River Basin and Pearl River Basin

标题: 流域盆地化学风化强度空间分布及控制因素研究:以长江和珠江为例

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作者关键词: 流域盆地; 化学风化强度; 趋势面分析; 长江流域; 珠江流域

摘要: Chemical weathering in large-scale drainage basins has significant effects on cycling of sea and land matters and climatic change on Earth. Various sediment geochemical proxies have been proposed to study the influencing factors of chemical weathering intensity. However, quantitative description of chemical weathering intensity and knowledge of controlling factors of chemical weathering are still insufficient. Exemplified by the sediment geochemical data from the Yangtze River and Pearl River Basins, the chemical weathering intensity was quantified by Chemical Index of Alteration(CIA) and Weathering Index of Parker (WIP). In addition, the spatial distribution characteristics were studied by using Trend Surface Analysis(TSA), and the correlation of the chemical weathering intensity with temperature and precipitation was completed based on Spatial Correlation Analysis(SCA). The following results were obtained: ① The average values of the CIA and WIP in the Yangtze River Basin are 72.9 and 34.2, indicating an intermediate weathering intensity. The average values of the CIA and WIP in the Pearl River Basin are 93.8 and 6.4, indicating a strong weathering degree. ② The TSA shows that the distribution of chemical weathering intensity has obvious latitude effect, that is, the lower the latitude, the stronger the chemical weathering. ③ The abnormal values of the CIA and WIP coincide with a higher annual temperature and precipitation in space. Meanwhile, the correlation coefficients of the CIA and WIP with annual precipitation and annual mean temperature are all above 0.85 in the study area. In conclusion, the chemical weathering in the Yangtze River and the Pearl River Basin is mainly

controlled by climatic conditions. The CIA and WIP can be used as a quantitative indicator for the chemical weathering intensity in drainage basins, and the trend surface analysis well depicts the regional and local distribution characteristics.

摘要: 大型流域盆地化学风化对全球海陆物质循环和气候变化有着显著影响。许多学者提出了不同的化学风化指数,并对影响因素进行了研究。然而,目前对化学风化强度的定量刻画以及化学风化控制因素的认识仍存在不足。以长江和珠江流域盆地水系沉积物地球化学数据为例,利用化学蚀变指数(CIA)和帕克风化指数(WIP)定量刻画了化学风化强度,利用趋势面分析完成了空间分布特征研究,同时基于空间相关分析完成了化学风化强度同气温和降水的相关性分析。获得了以下结果:①长江流域 CIA 平均值为 72.9, WIP 平均值为 34.2, 指示中等强度风化;珠江流域 CIA 平均值为 93.8, WIP 平均值为 6.4, 指示强风化。②趋势面分析显示化学风化强度存在由北向南逐渐增强的趋势。局部地区的 CIA 和 WIP 异常值与该地区较高的年降水量和年均气温相吻合。③长江和珠江流域的化学风化同气候条件紧密相关。研究区内 CIA 和 WIP 同年均降水量和年均气温的相关系数均在 0.85 以上。综上,认为 CIA 和 WIP 可以作为定量刻画流域盆地化学风化强度的指标,趋势面分析较好地刻画了区域及局部分布特征。

入藏号: CSCD:6438865

地址: Chang Haiqin, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Fu Yalong, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhang Miaomiao, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Meng Ganggang, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Lin Xin, School of Earth Science and Resources, Chang'an University; Xi'an Space-Time Geology and Mineral Technology Co., Ltd., Xi'an, Shaanxi 710054; 710068.

地址: 常海钦, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

付亚龙, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

张苗苗, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

孟刚刚, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

林鑫, 长安大学地球科学与资源学院; 西安时空地质矿产技术有限公司, 西安, 陕西 710054; 710068, 中国.

电子邮件地址: 2016127068@chd.edu.cn; xinlin@chd.edu.cn

电子邮件地址: 2016127068@chd.edu.cn; xinlin@chd.edu.cn

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作者: Pan Xuefeng; Jiao Jiangang; Wu Cailai; Gao Yuanhong; Zheng Kun; Gao Dong; Wu Di; Guo Wenfeng; Chen Hongjie

作者: 潘雪峰; 焦建刚; 吴才来; 郇源红; 郑坤; 高栋; 吴迪; 郭文峰; 陈红杰

标题: Zircon U-Pb dating and Hf isotope characteristics of the Aketishan granite in the southern margin of Altun and their tectonics implications

标题: 阿尔金南缘阿克提山岩体锆石 U-Pb 定年、 Hf 同位素特征及构造意义

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作者关键词: 锆石 U-Pb 定年; 锆石 Lu-Hf 同位素; I 型花岗岩; 新生地壳; 阿尔金走滑断裂; 减压熔融

摘要: The Aketishan granite is located in the southern margin of the Altun fault zone, but its formation age differs greatly from other rocks in the area and its strike is obviously controlled by the branch fractures of the Altun fault zone. Zircon LA-ICP-MS U-Pb dating of granites from Aketishan yielded a crystallization age of about 262 Ma. Its formation may be related to the large-scale linear tectonic movement in the south Altun area during the variscy-indosinian period. The granite consists mainly of quartz diorite and granodiorite, with dark minerals being mainly hornblende and biotite. The geochemical characteristics show that an average A/CNK value of < 1.1, indicating that the granite belongs to the typical high-K calcalkaline series with quasi-aluminous to weakly peraluminous. Large ion lithophile elements (Rb, Th and K) are relatively enriched and high field strength elements (Nb, Ta, P, Sr, Ti) are in distinct negative anomaly. The REE distribution patterns show medium negative Eu anomaly, with the mean δEu value of 0.73 and the mean $(La/Yb)_N$ value of 14.57. The trace discrimination diagram shows that the granite samples fall into the I-type granite area (VAG). The zircons Lu-Hf isotope analysis indicates that the $\epsilon_{Hf}(t)$ values of the granites are all positive and the average peak value of two-stage Hf model ages is 943 Ma, suggesting that the source rocks are partial melting of Neoproterozoic juvenile crustal materials. The strike-slip movement of the Altun fault started from the ductile deformation of the deep crust during the Indosinian period, subsequently followed by brittle fracturing in the shallow surface, thus forming a large-scale strike-slip fault zone. The formation of Aketishan granite was related to decompression melting of deep crust.

摘要: 阿克提山花岗岩体位于阿尔金断裂南缘, 其形成时代与区域内其他花岗岩体差异较大, 该岩体走向明显地受阿尔金断裂带分支断裂控制。锆石 LA-ICP-MS U-Pb 年代学分析表明, 该岩体结晶年龄约为 262 Ma, 其形成可能与南阿尔金地区在华力西期-印支期发生的大规模线性构造运动有关。岩体的岩性主要为石英闪长岩、花岗闪长岩, 其暗色矿物以角闪石、黑云母为主, 岩石 A/CNK 值均小于 1.1, 显示准铝质弱过铝质特征, 属于高钾钙碱性系列; 大离子亲石元素 Rb、Th、K 相对富集, 高场强元素 Nb、Ta、P、Sr、Ti 明显呈负异常; 稀土元素配分曲线具有中等负 Eu 异常, δEu 的平均值为 0.73, $(La/Yb)_N$ 平均值为 14.57, 说明该花岗岩体岩浆部分熔融程度较高。根据岩石学及地球化学特征可判断该岩体为 I 型花岗岩。锆石 Lu-Hf

同位素分析表明,锆石 $\epsilon_{\text{Hf}}(t)$ 值为+1.46~+9.14,均为正值,二阶段模式年龄的峰值平均为 943Ma,表明其源岩主要为新元古代新生地壳物质的部分熔融。阿尔金断裂在印支期的走滑运动是从地壳深部的韧性变形开始的,随后在浅地表发生脆性断裂形成大规模走滑断裂带。阿克提山岩体的形成与地壳深部减压熔融有关。

入藏号: CSCD:6448479

地址: Pan Xuefeng, School of Earth Sciences and Resources, Changan University, Xi'an, Shaanxi 710054, China.

Jiao Jiangang, School of Earth Sciences and Resources, Changan University, Xi'an, Shaanxi 710054, China.

Wu Cailai, Institute of Geology, Chinese Academy of Geological Sciences, State Key Laboratory of Continental Tectonics and Dynamics, Beijing 100037, China.

Gao Yuanhong, Institute of Geology, Chinese Academy of Geological Sciences, State Key Laboratory of Continental Tectonics and Dynamics, Beijing 100037, China.

Guo Wenfeng, Institute of Geology, Chinese Academy of Geological Sciences, State Key Laboratory of Continental Tectonics and Dynamics, Beijing 100037, China.

Chen Hongjie, Institute of Geology, Chinese Academy of Geological Sciences, State Key Laboratory of Continental Tectonics and Dynamics, Beijing 100037, China.

Zheng Kun, Institute of Geology, Chinese Academy of Geological Sciences;;School of Earth and Space Science, Peking University, State Key Laboratory of Continental Tectonics and Dynamics;;, ;, Beijing;;Beijing 100037;;100871.

Gao Dong, Institute of Geology, Chinese Academy of Geological Sciences;;School of Earth Sciences and Resources, China University of Geosciences (Wuhan), State Key Laboratory of Continental Tectonics and Dynamics;;, ;, Wuhan, Beijing;; 100037;;430074.

Wu Di, School of Earth Sciences and Resources, China University of Geosciences, Beijing 100083, China.

地址: 潘雪峰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

焦建刚, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

吴才来, 中国地质科学院地质研究所, 大陆构造与动力学国家重点实验室, 北京 100037, 中国.

郜源红, 中国地质科学院地质研究所, 大陆构造与动力学国家重点实验室, 北京 100037, 中国.

郭文峰, 中国地质科学院地质研究所, 大陆构造与动力学国家重点实验室, 北京 100037, 中国.

陈红杰, 中国地质科学院地质研究所, 大陆构造与动力学国家重点实验室, 北京 100037, 中国.

郑坤, 中国地质科学院地质研究所;;北京大学地球与空间科学学院, 大陆构造与动力学国家重点实验室;;, ;, 北京;;北京 100037;;100871, 中国.

高栋, 中国地质科学院地质研究所;;(武汉)中国地质大学地球科学与资源学院, 大陆构造与动力学国家重点实验室;;, ;, 武汉, 北京;; 100037;;430074, 中国.

吴迪, (北京)中国地质大学地球科学与资源学院, 北京 100083, 中国.

电子邮件地址: 274228038@qq.com; wucailai@hotmail.com

电子邮件地址: 274228038@qq.com; wucailai@hotmail.com

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作者: Ning Wentao; Li Yongjun; Wang Zhenyu; Wang Zuopeng; Li Ganyu

作者: 宁文涛; 李永军; 汪振宇; 王祚鹏; 李甘雨

标题: Geochemical characteristics of the bimodal volcanic rocks in Upper Carboniferous Yishijilike Formation in Tekes Daban area of Yining landmass

标题: 伊宁地块特克斯达坂晚石炭世伊什基里克组双峰式火山岩地球化学特征

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作者关键词: 双峰式火山岩; 地球化学特征; 伊什基里克组; 特克斯达坂; 伊宁地块

摘要: The bimodal volcanic rocks of Upper Carboniferous Yishijilike Formation from the Tekes Daban area in Yining landmass consist mainly of basalts and rhyolites. Their SiO₂ values range from 47.13% to 77.72%, and exhibit a gap of SiO₂ between 53.62% and 72.15%, displaying a typical bimodal geochemical affinity. The LA-ICP-MS zircon U-Pb ages of rhyolites yielded an age of 302.83.6 Ma, suggesting that these bimodal volcanic rocks were formed at the beginning of Late Carboniferous. Basalt samples have SiO₂ values of 47.13%~53.62%, with high Fe₂O₃ (TFe₂O₃ being 10.90%~17.40%) and MgO (3.74%~10.12%, 6.48% on average), high Na (2.84%~6.69%) and low K (0.48%~3.77%) values. The basalts are obviously enriched in light rare earth elements and depleted in heavy rare earth elements [(La/Yb)_N=1.58~4.94]. In contrast, the rhyolites samples have SiO₂ values of 72.15%~77.72%, high K (6.12%~9.48%) and low Na (0.40%~2.39%) concentrations. Compared with the basalts of bimodal volcanic rocks, they show significant depletion of Ba, Sr, P, Ti elements, obvious enrichment of light rare earth elements and relative depletion of heavy rare earth elements. They exhibit strongly negative Eu anomaly (deltaEu=0.18~0.44) and geochemical characteristics of A2 type granites. In addition, the basalts have high values of Mg[#], Co, Cr, Ni, with epsilonNd(t) of basalt samples being 3.45 and 3.55. These features indicate that basaltic magmas were derived from partial melting of a depleted mantle source. The rhyolites of the Yishkilike Formation have low Mg[#] and positive epsilonHf(t) values, suggesting that their formation was related to crustal melting during the process of basaltic magma underplating. Combined with the two-stage Hf model ages, it is suggested that the rhyolite source may be related to the reworking of Proterozoic metamorphic basement. These geochemical

characteristics together with structural tectonic discriminant diagrams show that the bimodal volcanic rocks of the Yishijilike Formation were formed in a post-orogenic extensional environment with intraplate genetic characteristics. The discovery of the typical bimodal volcanic rocks provides important information for further study of the Carboniferous tectonic evolution in Yining landmass.

摘要: 伊宁地块特克斯达坂一带出露的晚石炭世伊什基里克组双峰式火山岩主要由玄武岩、流纹岩两大端员组成,其 SiO_2 含量为 47.13%~77.72%,在 53.62%~72.15%之间存在明显的间断,具有双峰式火山岩的特征.LA-ICP-MS 锆石 U-Pb 定年获得流纹岩年龄为 302.83.6 Ma,表明该套火山岩形成于晚石炭世.玄武岩 SiO_2 含量为 47.13%~53.62%,具有低 SiO_2 、高 Fe_2O_3 ($\text{TFe}_2\text{O}_3=10.90\%\sim 17.40\%$)、高 MgO (3.74%~10.12%,平均为 6.48%) 和高 Na ($\text{Na}_2\text{O}=2.84\%\sim 6.69\%$)、低 K ($\text{K}_2\text{O}=0.48\%\sim 3.77\%$) 特征 ($\text{Na}_2\text{O}/\text{K}_2\text{O}=1.21\sim 12.18$),轻稀土元素富集而重稀土元素亏损 [$(\text{La}/\text{Yb})_N=1.58\sim 4.94$],具有弱的负 Eu 异常 ($\delta\text{Eu}=0.30\sim 1.10$),亏损 Ta、Nb、Th、Sr 等不相容元素.流纹岩 SiO_2 含量为 72.15%~77.72%,具有高 SiO_2 、高 K ($\text{K}_2\text{O}=6.12\%\sim 9.48\%$)、低 Na ($\text{Na}_2\text{O}=0.40\%\sim 2.39\%$) 特征 ($\text{Na}_2\text{O}/\text{K}_2\text{O}=0.04\sim 0.36$),K、Rb 和 LREE 显著富集 [$(\text{La}/\text{Yb})_N=2.46\sim 10.48$],相对亏损 Ba、Sr、P、Ti,且有基本一致的强负 Eu 异常 ($\delta\text{Eu}=0.18\sim 0.44$),具有 A2 型花岗岩地球化学特征.此外,玄武岩具有相对高的 $\text{Mg}\sim\#\text{值}$ 和 Co、Cr、Ni 含量,其 $\epsilon\text{Nd}(t)$ 值为 3.45、3.55,表明玄武岩来自于亏损地幔的部分熔融;而流纹岩具有低 $\text{Mg}\sim\#\text{值}$ 和正 $\epsilon\text{Hf}(t)$ 值,暗示其形成与玄武质岩浆底侵过程中的地壳熔融有关.结合二阶段锆石 Hf 模式年龄,认为源区可能与元古宙的变质结晶基底重熔有关.根据上述地球化学特征并结合构造判别图解,认为特克斯达坂一带伊什基里克组双峰式火山岩形成于造山后伸展环境,具有板内成因特征.该套典型双峰式火山岩的发现为进一步探讨伊宁地块石炭纪构造演化提供了重要依据.

入藏号: CSCD:6425727

地址: Ning Wentao, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Zhenyu, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Zuopeng, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Ganyu, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Yongjun, School of Earth Science and Resources, Chang'an University;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, MNR, Xi'an;; Key Laboratory for the Study of Focused Magmatism and Giant Ore Deposits, MNR, Xi'an;; Xi'an, ;; 710054;; 710054.

地址: 宁文涛, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

汪振宇, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

王祚鹏, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李甘雨, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

李永军, 长安大学地球科学与资源学院;; 自然资源部岩浆作用成矿与找矿重点实验室, ;; 自然资源部岩浆作用成矿与找矿重点实验室, 西安;; 西安, 陕西;; 陕西 710054;; 710054, 中国.

电子邮件地址: 18717333531@163.com; yongjunl@chd.edu.cn

电子邮件地址: 18717333531@163.com; yongjunl@chd.edu.cn

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作者: Ma Feng; Sun Xu; Gao Lianru; Fu Chengang

作者: 马冯; 孙旭; 高连如; 付晨罡

标题: Research on Orthorectification Accuracy of GF-4 Satellite Image

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作者关键词: "高分四号"卫星; 正射校正; 有理多项式系数; 有理函数模型; 航天遥感应应用

摘要: In this paper the influence of terrain factors, reference images and elevation data on the accuracy of orthographic correction is explored based on RFM model of GF-4 images without accurate control points, and an empirical summary about the GF-4 satellite Orthorectification is given. The Orthorectification experiments are executed for different terrains and landsat8 reference images with different resolution and different DEM data, and then the precision is analyzed in two aspects, i.e. the automatic generation of control point number and the RMSE. The correction effects of RMF model orthorectification are different for different terrains, and the overall effect of mountain area is slightly better than that of plain and city. When the spatial resolution ratio of panchromatic band of reference image for GF-4 satellite image is between 0.8-1.0, the orthophoto correction has the best effects. DEM has significant effect on vertical correction of GF-4 satellite images, and the effect is improved with the increase of the resolution. At last, some helpful conclusions are obtained in the paper, that is, the accuracy of orthophoto correction of GF-4 satellite image is not only related to the topography and landform contained in the image, but also affected by the resolution of its reference image and DEM elevation data. Additionally, the orthophoto correction can have better results while selecting reference image with similar resolution and DEM data with high resolution.

摘要: 探究"高分四号"(GF-4)卫星影像在无精确控制点情况下进行基于有理函数模型的正射校正时,地形因素、参考影像以及高程数据对其结果的精度影响,并给出最适合 GF-4 卫星正射校正的经验性结论;文章分别对不同地形、不同分辨率的 Landsat8 参考影像以及不同分辨率的 DEM 数据进行正射校正实验,并从自动生成的控制点个数以及均方根误差两方面进行

了精度分析。结果表明基于有理函数模型的正射校正对于不同的地形有着不同的校正效果,山地整体效果上略好于平原与城市;参考影像的全色波段与 GF-4 卫星影像的空间分辨率比例在 0.8~1.0 之间时,正射校正效果最佳;DEM 对于 GF-4 卫星影像垂直方向正射校正效果显著,且分辨率越高校正效果越好。GF-4 卫星影像的正射校正精度高低不仅与自身图像所包含的地形地貌有关,而且其参考影像与 DEM 数据的分辨率也会对精度有影响,宜选用分辨率相近的参考影像以及较高分辨率的 DEM 数据参与 GF-4 卫星的正射校正。

入藏号: CSCD:6446334

地址: Ma Feng, School of Earth Science and Resources, Chang'an University;;Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences;;Key Laboratory of Aerospace Information Applications of CETC, ;;Key Laboratory of Digital Earth Science, Chinese Academy of Sciences;;Key Laboratory of Aerospace Information Applications of CETC, Xi'an;;;Shijiazhuang, ;;Beijing;; 710054;;100101;;050081.

Sun Xu, Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences;;Key Laboratory of Aerospace Information Applications of CETC, Key Laboratory of Digital Earth Science, Chinese Academy of Sciences;;Key Laboratory of Aerospace Information Applications of CETC, ;;Shijiazhuang, Beijing;; 100101;;050081.

Gao Lianru, Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, Key Laboratory of Digital Earth Science, Chinese Academy of Sciences, Beijing 100101, China.

Fu Chengang, School of Information and Electronic, Beijing Institute of Technology, Beijing 100081, China.

地址: 马冯, 长安大学地球科学与资源学院;;中国科学院遥感与数字地球研究所;;中国电子科技集团公司航天信息应用技术重点实验室, ;;中国科学院数字地球重点实验室;;中国电子科技集团公司航天信息应用技术重点实验室, 西安;;;石家庄, ;;北京;; 710054;;100101;;050081.

孙旭, 中国科学院遥感与数字地球研究所;;中国电子科技集团公司航天信息应用技术重点实验室, 中国科学院数字地球重点实验室;;中国电子科技集团公司航天信息应用技术重点实验室, ;;石家庄, 北京;; 100101;;050081, 中国.

高连如, 中国科学院遥感与数字地球研究所, 中国科学院数字地球重点实验室, 北京 100101, 中国.

付晨罡, 北京理工大学信息与电子学院, 北京 100081, 中国.

电子邮件地址: mafeng07@chd.edu.cn

电子邮件地址: mafeng07@chd.edu.cn

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作者: Wang Yiqian; Liang Ting; Dai Shuang; Wang Chongli

作者: 王艺茜; 梁婷; 戴霜; 王崇礼

标题: Metamorphic Evolution of Basic Rock Series in Dongshengmiao Area, Inner Mongolia

标题: 东升庙地区基性岩系变质作用过程

来源出版物: 西北地质 卷: 52 期: 1 页: 23-40 出版年: 2019

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作者关键词: basic metamorphic rock; petrology; geologic thermometer; Langshan

作者关键词: 基性变质岩; 岩石学; 地质温度计; 狼山

摘要: The Langshan area is located in the western section of the northern margin of North China Craton. This area has experienced complex tectonic evolution, the different occurrence and different stages of basic metamorphic rocks in Langshan area provide important information for the inversion of their regional geological evolution history. The petrological and mineralogical characteristics of metamorphic rocks in various periods have been studied by the means of petrographic observation, chemical total analysis and electron probe. According to the age, occurrence of basic metamorphic rocks and their relationship with the metamorphism, deformation and migmatization of basic metamorphic rocks, these basic metamorphic rocks can be divided into four stages according to their sequence of formation. The petrological results show that the primary rocks except greenschist are basic volcanic rocks. In the first phase of the amphibolite enrichment, there is a significant depletion of Pb, K, Nb and Ta, with weak depletion of Hf, Zr and Ti. The difference between light and heavy rare earths is obvious, belonging to the island arc basalt. The second and third stages of amphibolite are characterized by intraplate and island arc transitions. In the fourth stage, the light rare earth elements of the amphibolite are relatively low, which is manifested by the emplacement environment in the intraplate tension crack environment. The greenschist is depleted in Sr, K, Rb, Ba, but enriched in Th, which is characterized by basalt in island arc or back-arc basin. The plagioclase and amphibole symbiotic minerals have been used to calculate the temperature and pressure of metamorphism experienced by amphibolite in various periods. The first stage of amphibolite calculation shows that the amphibolite belongs to the early high amphibolite facies-granulite facies; The second stage of basalt calculation shows that it represents the metamorphic process from the late amphibolite facies to the low amphibolite facies in the early stage; The third stage of amphibolite has been calculated to be a low amphibolite facies; The fourth stage of amphibolite belongs to the contact metamorphic green-curtain amphibolite facies.

摘要: 狼山地区位于华北克拉通北缘内蒙古狼山西段, 该区构造演化变形强烈, 根据基性变质岩系的产出地层时代、产状以及它们与不同期次的变质、变形乃至混合岩化作用的关系, 将基性岩系地体按形成时序划分出 4 个期次。不同产状及期次划分的基性系列变质岩为恢复区域地质演化史提供了重要信息。笔者通过岩相学观察、化学全分析和电子探针等手段对不同期次变质岩的岩石学和矿物学特征进行研究, 探讨其温压条件和构造背景。岩石学特征表明, 狼山基性变质岩除绿片岩外, 原岩都为基性火山岩。第一期斜长角闪岩富集 Pb、K、Nb、Ta, 存在明显亏损, Hf、Zr、Ti 弱亏损, 轻重稀土分异较明显, 属于岛弧玄武岩; 第二、三期斜长角

闪岩具有板内和岛弧过渡的特点;第四期脉状斜长角闪岩轻稀土相对较低,表现为产生在板内张裂环境侵位环境。绿片岩 Sr、K、Rb、Ba 亏损而 Th 的明显富集具有岛弧或弧后盆地玄武岩的特征。选用斜长石、角闪石共生矿物计算各期斜长角闪岩所经历过变质作用的温度和压力。第一期斜长角闪岩计算得出其属于早期高角闪岩相-麻粒岩相;第二期玄武岩计算得出其代表了早期为角闪岩相晚期向低角闪岩相退变的变质过程;第三期斜长角闪岩计算得出其属于低角闪岩相;第四期斜长角闪岩属于接触变质的绿帘角闪岩相。

入藏号: CSCD:6446207

地址: Wang Yiqian, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Liang Ting, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Chongli, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Dai Shuang, College of Earth and Environmental Sciences, Lanzhou University, Key Laboratory of Western China's Environmental Systems (Ministry of Education), Lanzhou, Gansu 730000, China.

地址: 王艺茜, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

梁婷, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

王崇礼, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

戴霜, 兰州大学资源环境学院, 西部环境教育部重点实验室, 兰州, 甘肃 730000, 中国.

电子邮件地址: 283836514@qq.com

电子邮件地址: 283836514@qq.com

使用次数 (最近 180 天): 0

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作者: Liang Jiwei; Ma Xiaojun; Liu Yalan; Tao Wenxing; Zhao Ya; Jiang Liuqing; Yu Zhenkun

作者: 梁积伟; 马晓军; 刘亚兰; 陶文星; 赵亚; 姜柳青; 宇振昆

标题: Deep-water Sedimentary Characteristics and Paleogeographic Analysis of the Pingliang Formation in Qishan Area, Southern Ordos Basin

标题: 鄂尔多斯盆地南部岐山地区上奥陶统平凉组深水沉积特征及古地理分析

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作者关键词: Ordos Basin; Qishan area; Late Ordovician; Pingliang Formation; deep-water deposit

作者关键词: 鄂尔多斯盆地; 岐山地区; 晚奥陶世; 平凉组; 深水沉积

摘要: The Pingliang Formation in Qishan area is composed of dark mudstone, siltstone and argillaceous limestone with imbedded thin layered bentonites. There are obvious differences between the Pingliang Formation and its overlying as well as underlying strata on rock type, sedimentary environment and tectonic background. The research on sedimentary characteristics, tectonic background and formation environment has theoretical significance for revealing Late Ordovician paleogeography, paleoclimate and paleotectonics in the Ordos Basin. Based on profile measurement and microscopic identification, the stratigraphy, petrology and sedimentary facies of the Pingliang Formation have been studied in detail. All of these results indicate that the Pingliang Formation can be divided into three sedimentary cycles according to the petrological features. The first sedimentary cycle mainly consists of mudstone and sandstone with relatively small quantity of limestone. The sedimentary facies are mainly composed of turbidite deposition, arenaceous contour current and argillaceous contour current deposits. In the second sedimentary cycle, the proportion between mudstone and limestone is similar. The sedimentary facies are mainly composed of argillaceous contour current deposits and cinereal contour current deposits. The third cycle comprises mainly sandstone and mudstone with small amount of limestone. The sedimentary facies are mainly composed of arenaceous contour current with a small amount of cinereal contour current deposits.

摘要: 岐山地区上奥陶统平凉组是一套颜色较深的泥岩、粉砂岩、泥质灰岩,夹有薄层斑脱岩的沉积岩系,与上覆和下伏地层在岩石类型、沉积环境和形成的构造背景方面都有明显的差别。研究平凉组的沉积特征,分析其形成环境和构造背景,对于揭示鄂尔多斯盆地晚奥陶世的古地理、古气候、古构造都具有重要的理论意义。通过剖面测制和镜下鉴定,对平凉组的地层学、岩石学和沉积相进行了精细研究。结果表明,平凉组按照岩石组合学特征可以分为3个旋回。第一旋回以泥岩和砂岩为主,灰岩相对较少,沉积作用以浊流沉积和砂质等深流、泥质等深流沉积为主;第二旋回泥岩和灰岩所占比例大致相等,沉积作用为泥质等深流和灰质等深流沉积;第三旋回以砂泥岩为主,少量灰岩,属于砂质等深流为主,少量灰质等深流,浊流沉积不发育。平凉组沉积作用及沉积特征表明,晚奥陶世,华北陆块南缘发生大规模裂陷,结束陆表海沉积,盆地的南部边缘形成大陆斜坡。

入藏号: CSCD:6446210

地址: Liang Jiwei, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

Ma Xiaojun, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

Liu Yalan, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

Tao Wenxing, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhao Ya, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

Jiang Liuqing, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

Yu Zhenkun, School of Earth Science and Resource, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 梁积伟, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

马晓军, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

刘亚兰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

陶文星, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

赵亚, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

姜柳青, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

宇振昆, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

电子邮件地址: jiweil@chd.edu.cn

电子邮件地址: jiweil@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Zhang Ze; Liang Ting; Feng Yonggang; Yang Xiuqing; Li Kan; Ding Kun; Wang Yiqian

作者: 张泽; 梁婷; 凤永刚; 杨秀清; 李侃; 丁坤; 王艺茜

标题: Geological Feature and Chronology Study of Kangxiwar Beryl-Bearing Muscovite Pegmatite in Weste Kunlun Orogen, Xinjiang

标题: 新疆西昆仑造山带康西瓦含绿柱石白云母伟晶岩的地质特征与年代学研究

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作者关键词: 西昆仑造山带; 康西瓦-大红柳滩矿田; 富绿柱石伟晶岩; 锆石 U-Pb 年代

摘要: The Kangxiwar-Dahongliutan pegmatite field is an important area with abundant LCT family rare-metal pegmatites in the West Kunlun Orogen. The Kangxiwar beryl-bearing muscovite pegmatite and Dahongliutan spodumene pegmatites are the representative beryllium deposit and lithium deposit, respectively in this pegmatite field. Previous studies were focused on the Dahongliutan granitic pluton and lithium deposits that were formed at 220~210Ma in the Dahongliutan area. Nevertheless, there are few studies on the Kangxiwar pegmatite. Based on the

field observation, this study summarizes geological features of the Kangxiwar beryl-bearing muscovite pegmatite and presents the latest zircon U-Pb dating results. According to our dating results, the crystallization age of the Kangxiwar beryl-bearing muscovite pegmatite is (2094.4) Ma, which is consistent with the ages of the Dahongliutan spodumene pegmatite and Dahongliutan granitic pluton, indicating that the beryl-bearing muscovite pegmatite, spodumene pegmatites and granite were likely the products of the same magmatic event. In addition, the zircon from the Kangxiwar pegmatite also has recorded a hydrothermal event around 200 Ma and a metamorphic event at ~160 Ma. Based on muscovite ^{40}Ar - ^{39}Ar dating, previous studies suggested that the age of the Kangxiwar pegmatite is 185~156 Ma. The reported ^{40}Ar - ^{39}Ar age is significantly younger than the crystallization ages of the beryl-bearing muscovite pegmatite, granitic pluton and spodumene pegmatites that had been obtained using U-Pb dating of zircon, cassiterite and columbite, but it is comparable to the age of the metamorphic zircon in this study, which suggested that the muscovite ^{40}Ar - ^{39}Ar isotope system of the Kangxiwar pegmatite underwent thermal disturbance due to the metamorphic event in the Kangxiwar-Dahongliutan pegmatite field.

摘要: 新疆康西瓦-大红柳滩伟晶岩带是西昆仑造山带重要的 LCT 型稀有金属伟晶岩矿床密集区, 其中康西瓦绿柱石白云母伟晶岩和大红柳滩锂辉石伟晶岩分别为矿带内具代表性的伟晶岩型铍矿床和锂矿床。该矿带受自然条件所限, 研究程度不高。现有的对矿带中伟晶岩的研究主要针对大红柳滩岩体及大红柳滩锂矿床的地球化学及成岩成矿时代, 获得的成岩成矿年龄为 220~210 Ma, 而对于康西瓦铍矿的研究成果很少。笔者在野外地质调研的基础上, 总结了康西瓦铍矿床的地质特征, 利用锆石 LA-ICP-MS U-Pb 定年方法, 获得康西瓦绿柱石白云母伟晶岩结晶年龄为 (2094.4) Ma, 与大红柳滩锂辉石伟晶岩及大红柳滩岩体形成时代一致, 反映了三者为同一期岩浆活动产物。同时康西瓦伟晶岩中锆石还记录了 200 Ma 左右经历了一次热液活动和 160 Ma 左右的变质作用。前人利用白云母 ^{40}Ar - ^{39}Ar 法获得康西瓦伟晶岩的年龄为 185~156 Ma, 明显年轻于该地区岩体与伟晶岩中锆石、锡石及铌钽铁矿的 U-Pb 年龄, 可能为康西瓦伟晶岩遭受变质作用使白云母 ^{40}Ar - ^{39}Ar 同位素体系发生热扰动所致。

入藏号: CSCD:6446211

地址: Zhang Ze, School of Earth Science and Resources, Chang'an University; Laboratory of Mineralization and dynamics, Chang'an University, Xi'an, Shaanxi; Shaanxi 710054; 710054.

Liang Ting, School of Earth Science and Resources, Chang'an University; Laboratory of Mineralization and dynamics, Chang'an University, Xi'an, Shaanxi; Shaanxi 710054; 710054.

Feng Yonggang, School of Earth Science and Resources, Chang'an University; Laboratory of Mineralization and dynamics, Chang'an University, Xi'an, Shaanxi; Shaanxi 710054; 710054.

Yang Xiuqing, School of Earth Science and Resources, Chang'an University; Laboratory of Mineralization and dynamics, Chang'an University, Xi'an, Shaanxi; Shaanxi 710054; 710054.

Ding Kun, School of Earth Science and Resources, Chang'an University; Laboratory of Mineralization and dynamics, Chang'an University, Xi'an, Shaanxi; Shaanxi 710054; 710054.

Wang Yiqian, School of Earth Science and Resources, Chang'an University; Laboratory of Mineralization and dynamics, Chang'an University, Xi'an, Shaanxi; Shaanxi

710054;;710054.

Li Kan, Xi'an Geological Survey Center,China Geological Survey, Xi'an, Shaanxi 710054, China.

地址: 张泽, 长安大学地球科学与资源学院;;长安大学成矿作用及其动力学实验室, ;;, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

梁婷, 长安大学地球科学与资源学院;;长安大学成矿作用及其动力学实验室, ;;, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

凤永刚, 长安大学地球科学与资源学院;;长安大学成矿作用及其动力学实验室, ;;, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

杨秀清, 长安大学地球科学与资源学院;;长安大学成矿作用及其动力学实验室, ;;, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

丁坤, 长安大学地球科学与资源学院;;长安大学成矿作用及其动力学实验室, ;;, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

王艺茜, 长安大学地球科学与资源学院;;长安大学成矿作用及其动力学实验室, ;;, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

李侃, 中国地质调查局西安地质调查中心, 西安, 陕西 710054, 中国.

电子邮件地址: 478101169@qq.com

电子邮件地址: 478101169@qq.com

使用次数 (最近 180 天): 0

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作者: Lei Wuchao; Ye Leiming; Qu Weidong; Ma Guohua

作者: 雷武超; 叶雷明; 屈伟东; 马国华

标题: Geological Characteristics and Prospecting Potential of Lead-Zinc Polymetallic Deposits in Dawolong Area, East Kunlun

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作者关键词: East Kunlun; Dawolong; geological characteristics; prospecting prospects; hydrothermal type; structural control

作者关键词: 东昆仑; 大卧龙; 地质特征; 找矿前景; 热液型; 构造控制

摘要 : The Dawolong area is located in the Xiariha-Shiduolong Fe-Pb-Zn-Ag-Sn-Mo-wollastonite-dolomite metallogenic subzone, which is one of the main metallogenic belts of the iron polymetallic ore deposits in Qinghai Province. Less previous researches are focused on the genesis, ore-controlling factors and prospecting signs of these deposits. How to make breakthrough a new round of prospecting has become a key issue in current deposit research. Based on the discussion of the ore-forming geological structure background, the data of previous geological exploration has been systematically collected and studied, the geological characteristics of the mineral deposits (occurrences) have been studied, and the metallogenic regularity and ore-controlling geological factors and prospecting prospects of the mining area have been analyzed in this paper. It is considered that the prospecting conditions of the hydrothermal minerals in this mining area are favorable, and the structurally controlled (magma) hydrothermal deposits are the focus of future prospecting.

摘要: 大卧龙地区位于夏日哈-什多龙铁-铅-锌-银-锡-钼-硅灰石-白云岩成矿亚带, 是青海省铁多金属矿的主要成矿带之一。前人在矿床成因、控矿因素和找矿标志等方面研究较薄弱, 如何在新一轮找矿中突破已成为目前矿床研究的关键问题。笔者在讨论成矿地质构造背景基础上, 结合以往地质勘查成果资料, 对矿(床)点地质特征进行了研究, 分析成矿规律和控矿地质因素及矿区的找矿前景, 认为在矿区热液型矿产找矿条件有利, 受构造控制的(岩浆)热液型矿床为今后的找矿重点。

入藏号: CSCD:6446216

地址: Lei Wuchao, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710064, China.

Qu Weidong, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710064, China.

Ye Leiming, No.6 Team of Northwest Bureau of China Metallurgical Geology Bureau, Hanzhong, Shaanxi 723000.

Ma Guohua, No.6 Team of Northwest Bureau of China Metallurgical Geology Bureau, Hanzhong, Shaanxi 723000.

地址: 雷武超, 长安大学地球科学与资源学院, 西安, 陕西 710064, 中国.

屈伟东, 长安大学地球科学与资源学院, 西安, 陕西 710064, 中国.

叶雷明, 中国冶金地质总局西北局六队, 汉中, 陕西 723000, 中国.

马国华, 中国冶金地质总局西北局六队, 汉中, 陕西 723000, 中国.

电子邮件地址: lwuchao@126.com

电子邮件地址: lwuchao@126.com

使用次数 (最近 180 天): 0

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作者: Zhu Jinjin; Fu Chaofeng; Yang Hailong; Xin Jiang; Ma Dongsheng; Wang Tao; Qu Weidong

作者: 朱谨谨; 符超峰; 杨海龙; 辛江; 马东升; 王涛; 屈伟东

标题: Comprehensive Evaluation of Chang 6 Reservoir from Yanchang Formation in Ganguyi Oil Area, Ordos Basin

标题: 鄂尔多斯盆地甘谷驿油区延长组长 6 储层综合评价

来源出版物: 西北地质 卷: 52 期: 1 页: 166-175 出版年: 2019

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作者关键词: Ganguyi oil area; Yanchang Formation; reservoir feature; reservoir evaluation

作者关键词: 甘谷驿油区; 延长组; 储层特征; 储层评价

摘要: By using the advanced techniques of constant velocity mercury pressure and NMR fluid saturation testing, combined with conventional reservoir physical analysis, the characteristics of petrology, pore, porosity and permeability distribution of Yanchang Chang 6 sandstone reservoir in Ganguyi oil area, Ordos Basin have been systematically studied, and then the comprehensive classification and evaluation of Chang 6 reservoir in Ganguyi oil area have been made in this paper. The results show that the lithology of Chang 6 reservoir in Ganguyi oil area is dominated by fine feldspar sandstone. The reservoir space types mainly consist of residual intergranular pore and dissolution pore. The reservoir of Chang 6 reservoir in Ganguyi oil area is dominated by microlarynx, and the flow property of this reservoir is mainly controlled by the throat size. The saturation of movable fluid in the reservoir is on the low side. On the whole, the Chang 6 reservoir in Ganguyi oil area is characterized by low porosity and ultra-low permeability. The reservoir of Chang 6 reservoir in Ganguyi oil area has been evaluated by the geological parameters, such as storage coefficient, formation coefficient and flow zone index. It is considered that Chang 6 reservoir in Ganguyi oil area can be divided into 4 types, and the type III with poor reservoir is the main reservoir.

摘要: 运用先进的恒速压汞、核磁共振可动流体饱和度测试分析技术, 结合常规储层物性等分析, 系统的研究了鄂尔多斯盆地甘谷驿油区延长组长 6 油层组砂岩储层的岩石学特征、孔隙特征及孔渗分布特征等, 进而对甘谷驿油区长 6 储层进行综合分类评价。研究表明, 甘谷驿油区长 6 储层的岩性以细粒长石砂岩为主; 储集空间类型以残余粒间孔和溶蚀孔为主; 甘谷驿油区长 6 储层以微喉道为主, 且储层流通性质的好坏主要受喉道大小的控制; 储层内可动流体饱和度整体偏低。总体上, 甘谷驿油区长 6 储层显示为低孔-超低渗的储层特征。结合甘谷驿油区长 6 储层的存储系数、地层系数和流动带指数等地质参数对储层进行多因素综合评价, 认为甘谷驿油区长 6 储层最终可分为 4 类, 并以 III 类较差储层为主。

入藏号: CSCD:6446219

地址: Zhu Jinjin, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Fu Chaofeng, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Ma Dongsheng, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Tao, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Qu Weidong, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Yang Hailong, Yanchang Oil Field Co., Ltd. Pagoda oil production plant, Yan'an, Shaanxi 716000, China.

Xin Jiang, School of Earth Science and Resources, Chang'an University; Petro China CBM Institute of Engineering Technology, Xi'an, Shaanxi 710054; 710003.

地址: 朱谨谨, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

符超峰, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

马东升, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

王涛, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

屈伟东, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

杨海龙, 延长油田股份有限公司宝塔采油厂, 延安, 陕西 716000, 中国.

辛江, 长安大学地球科学与资源学院; 中石油煤层气有限责任公司工程技术研究院, 西安, 陕西; 陕西 710054; 710003, 中国.

电子邮件地址: 1572202050@qq.com

电子邮件地址: 1572202050@qq.com

使用次数 (最近 180 天): 0

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作者: Wang Yongwei; Li Rongxi; Wang Zhenliang; Qu Hongjun; Zhao Qianping; Gao Chao

作者: 王永炜; 李荣西; 王震亮; 屈红军; 赵谦平; 高潮

标题: Tight oil accumulation mechanism of Chang 7 interval in southern Ordos Basin

标题: 鄂尔多斯盆地南部延长组长 7 段致密油成藏条件与富集主控因素

来源出版物: 西北大学学报. 自然科学版 卷: 49 期: 1 页: 144-154 出版年: 2019

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文献类型: Article

作者关键词: Ordos Basin; tight oil; accumulation conditions; source rocks; reservoirs

作者关键词: 鄂尔多斯盆地; 致密油; 成藏条件; 烃源岩; 储层特征

摘要: The tight oil of Chang 7 interval was found at the south part of Ordos Basin, but the research

of accumulation geological conditions was seldom involved in study. In order to evaluate tight oil exploration prospect of Chang 7 interval, the analysis of geochemical test, field emission scanning electron microscopy (SEM) and balance depth research were used to study sedimentary microfacies, reservoir rock and hydrocarbon migration. Finally the control factors of tight oil accumulation conditions in study area were identified. The high quality source rocks of Chang 7 interval are widely developed in the study area, the sandstone near hydrocarbon source rocks. The geological conditions of forming tight oil reservoir is good. The tight oil accumulation period in Yanchang Formation is at early Cretaceous, tight oil accumulation occurred in late stage. Tight oil reservoir formation and enrichment are controlled by sedimentary microfacies and quality reservoirs. The Chang 7 interval is the main targets for exploration of tight oil in Yanchang Formation in study area. The main controlling factors of Chang 7 tight oil enrichment are as follows: good configuration of source rock and reservoir and constant charging are the key to the formation of the tight oil province, all kinds of pore development are the premise of tight oil enrichment, the top of the cap rocks and lateral block is necessary for dense oil saving.

摘要: 为评价鄂尔多斯盆地南部延长组长 7 段致密油的勘探前景, 以地化分析测试、场发射扫描电镜、平衡深度法等研究手段, 通过对烃源岩、储层、油气运移等方面的研究, 深入探究该区长 7 段致密油各项成藏条件并进行潜力评价。结果表明, 该区长 7 段优质烃源岩分布稳定, 生油能力强, 且上下邻近砂岩发育, 具有良好的源储配置条件; 该区致密油藏在早白垩世大规模形成, 属于晚期成藏; 在形成和聚集过程中主要受沉积微相和物性条件控制; 根据评价结果可知, 长 7 段油层组 I 类, II 类有利区发育较多。研究后认为, 长 7 段致密油藏富集的主控因素有: 源储配置是致密油形成的关键因素, 各类孔隙发育是致密油富集的重要前提, 顶部盖层和侧向遮挡是致密油保存的必要条件。

入藏号: CSCD:6430202

地址: Wang Yongwei, College of Earth Science and Resources, Chang'an University; Shaanxi Yanchang Petroleum (Group) Co. Ltd., Xi'an, Shaanxi 710054, China.

Li Rongxi, College of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Wang Zhenliang, Department of Geology, Northwest University, Xi'an, Shaanxi 710069, China.

Qu Hongjun, Department of Geology, Northwest University, Xi'an, Shaanxi 710069, China.

Zhao Qianping, Shaanxi Yanchang Petroleum (Group) Co. Ltd.; Shaanxi Key Laboratory of Lacustrine Shale Gas Accumulation and Exploitation, Xi'an, Shaanxi 710075, China.

Gao Chao, Shaanxi Yanchang Petroleum (Group) Co. Ltd.; Shaanxi Key Laboratory of Lacustrine Shale Gas Accumulation and Exploitation, Xi'an, Shaanxi 710075, China.

地址: 王永伟, 长安大学地球科学与资源学院; 陕西延长石油(集团)有限责任公司研究院, 西安, 陕西, 710054, 中国。

李荣西, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国。

王震亮, 西北大学地质系, 西安, 陕西 710069, 中国。

屈红军, 西北大学地质系, 西安, 陕西 710069, 中国。

赵谦平, 陕西延长石油(集团)有限责任公司研究院; 陕西省陆相页岩气成藏与开发重点实验室, 西安, 陕西, 710075, 中国。

高潮, 陕西延长石油(集团)有限责任公司研究院; 陕西省陆相页岩气成藏与开发重点实验

室, ;陕西省陆相页岩气成藏与开发重点实验室, 西安;;西安, 陕西;;陕西 710075;;710075, 中国.

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作者: Cao Di; Cao Jiannong; Zhu Qian

作者: 曹地; 曹建农; 朱倩

标题: 2-Dimension Multiscale Image Deconstruction Mode Based on Geometric Moment

标题: 一种基于图像几何矩的非降维连续尺度解构模式

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作者关键词: multiscale analysis; geometric moment; tower model; 2Dimage deconstruction; image segmentation

作者关键词: 多尺度分析; 几何矩; 塔式模型; 图像非降维解构; 图像分割

摘要: Dimensionality-reduction analyses are effective to deconstruct image completely, but also destructive for high-dimension information of image. Therefore, this study proposes a 2-dimension multiscale image deconstruction mode to solve this problem which is based on geometric moment. In this mode, 10 groups of 2-dimension multiscale deconstruction models are built. Models use single channel image as target, use different geometric moments as operators, use different scales of windows as operand, and use moment calculation to get eigenvalues. Based on eigenvalues, multiscale models are built. According to statistics analysis, 10 models are in two patterns, which are equilibrium pattern and growth pattern. Result shows that 2-dimension multiscale image deconstruction analysis could improve the accuracy of multiscale image segmentation, and growth pattern models are more effective than equilibrium pattern models.

摘要: 针对降维解构分析的多尺度图像处理容易造成高维信息的破碎与损失这一问题, 建立了一种基于图像几何矩的非降维连续尺度解构模式, 并在此模式下构建了 10 组非降维解构模型. 模型以单通道图像为应用对象, 以几何矩为算子, 以不同尺度窗口下矩运算产生的特征值为基础对原始信息进行非降维解构. 10 组解构结果呈现均衡模式和增长模式两种形态. 代入多尺度分割算法验证证明, 基于图像几何矩的非降维连续解构分析可以提升多尺度分割精度, 且增长模式下的解构信息对于图像分割更有利.

入藏号: CSCD:6449014

地址: Cao Di, School of Earth Science and Resources, Chang'an University, Xi'an, Shaanxi 710054, China.

Cao Jiannong, Key Laboratory of Degraded and Unused Land Consolidation Engineering, the Ministry of Land and Resources;; College of Geology Engineering and Geomatics, Chang'an University, Key Laboratory of Degraded and Unused Land Consolidation Engineering, the Ministry of Land and Resources;;, Xi'an;; Xi'an, ;; 710054;; 710054.

Zhu Qian, College of Geology Engineering and Geomatics, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 曹地, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

曹建农, 国土资源部退化及未利用土地整治工程重点实验室;; 长安大学地质工程与测绘学院, 国土资源部退化及未利用土地整治工程重点实验室;;, 西安;; 西安, ;; 710054;; 710054.

朱倩, 长安大学地质工程与测绘学院, 西安, 陕西 710054, 中国.

电子邮件地址: Renesmeeswan@126.com; caojiannong@163.com

电子邮件地址: Renesmeeswan@126.com; caojiannong@163.com

使用次数 (最近 180 天): 0

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作者: Mou Duoduo; Liu Lei

作者: 牟多铎; 刘磊

标题: Comparative Study of ELM and SVM in Hyperspectral Image Supervision Classification

标题: ELM 与 SVM 在高光谱遥感图像监督分类中的比较研究

来源出版物: 遥感技术与应用 卷: 34 期: 1 页: 115-124 出版年: 2019

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作者关键词: Hyperspectral remote sensing; Supervised classification; Extreme learning machine; Support vector machine; Classification time and accuracy

作者关键词: 高光谱遥感; 监督分类; 极限学习机; 支持向量机; 时间与精度

摘要: Combining the spatial features and spectral feature of hyperspectral remote sensing image in supervised classification can effectively improve the classification time and accuracy. In this study, the spatial information extraction method, named watershed transform, was combined with

the Extreme Learning Machine(ELM)and Support Vector Machine(SVM)methods.The classification results of the datasets with the spatial features and without the spatial features were synthetically evaluated and compared.Two hyperspectral datasets,the ROSIS data of Pavia university and the Hyperion data of Okavango Delta(Botswana),were selected to test the methods.After preprocessing,the training samples were selected from the images as the reference areas for each type,and the spectral features of each type were analyzed.The two classification methods were utilized to classify the hyperspectral datasets and relevant classification results were obtained.based on the validation samples selected from the images,the classification results were evaluated using the confusion matrix and the execution times.After that,the spectral features and spatial features were combined to classify the data.The results show that the Extreme Learning Machine(ELM)is superior to the Support Vector Machine(SVM)in the classification time and precision,and the spatial features are introduced in the classification process,which can effectively improve the classification accuracy.

摘要: 在高光谱遥感图像监督分类过程中加入空间特征信息,可有效提高分类的速度与精度。将空间信息提取方法分水岭法与极限学习机(ELM)和支持向量机(SVM)相结合,对两种分类方法加入空间特征信息前后的分类结果进行时间与精度的综合评价与比较分析。以意大利帕维亚大学(PaviaU)ROSIGIS 和博茨瓦纳(Botswana)奥卡瓦纳三角洲 Hyperion 高光谱遥感数据进行试验,首先对原始图像数据进行预处理,对不同地物类别选取适当的训练样本作为分类的参考区域,然后对各类别的光谱特征进行分析,并分别运用两种分类方法对数据集进行分类实验;之后将光谱特征与空间特征结合对数据进行分类试验。实验结果表明:在分类时间及精度方面,极限学习机(ELM)均优于支持向量机(SVM);在分类过程中引入空间特征信息,可有效提高分类精度。

入藏号: CSCD:6458063

地址: Mou Duoduo, School of Earth Science and Resources,Chang'an University, Xian, 710064.

Liu Lei, School of Earth Science and Resources,Chang'an University, Xian, 710064.

地址: 牟多铎, 长安大学地球科学与资源学院, 西安, 陕西 710064, 中国.

刘磊, 长安大学地球科学与资源学院, 西安, 陕西 710064, 中国.

电子邮件地址: 2488545866@qq.com; liul@chd.edu.cn

电子邮件地址: 2488545866@qq.com; liul@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Han Ke; An Le; Yang Xingke; Liu Shuwen

作者: 韩珂; 安乐; 杨兴科; 刘淑文

标题: Application of Mathematical Geological Methods in Huanglong Gold Deposit,Hanyin

Area, South Qinling

标题: 数学地质方法在南秦岭汉阴黄龙金矿中的应用

来源出版物: 黄金科学技术 卷: 27 期: 1 页: 1-14 出版年: 2019

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作者关键词: brittle-ductile shear zone; alteration; mathematical geology; cluster analysis; factor analysis; prospecting prognosis; Huanglong gold deposit; South Qinling

作者关键词: 脆韧性剪切带; 矿化蚀变; 数学地质; 聚类分析; 因子分析; 找矿预测; 黄龙金矿; 南秦岭

摘要: The South Qinling tectonic belt has formed a huge amount of mineral resources due to its complex tectonic evolution and magmatic activity. The gold ore field in the northern Shiquan-Hanyin area of Shaanxi Province is located in the South Qinling tectonic belt. So far, dozens of gold deposits or gold mineralization points have been discovered in the gold ore field, and the prospecting potential is huge. Huanglong gold deposit is located in the northern Hanyin area. The rocks in the mining area are subject to multi-stage structure deformation and metamorphism, and superimposed with slightly late magmatism. The type of gold mineralization is dominated by altered rock type, followed by quartz vein type. Mineralization is controlled by brittle-ductile shear zone and wall rock alteration. The main alteration types are biotite porphyroblasts crystallization and pyritization, carbonization, garnization, etc. In order to further ascertain the relationship between structure-alteration and mineralization, based on the large-scale (1/5 000~1/10 000) structure-alteration facies mapping in the mining area and the analysis of rock main elements and metallogenic elements, using SPSS17.0 software to carry out Q-type cluster analysis, R-type cluster analysis of main element and metallogenic elements, R-factor analysis for the relationship between ore and structure altered rock, altered rocks. The results show that the altered rock type gold mineralization is closely related to the faults in the brittle-ductile shear zone and biotite porphyroblasts crystallization alteration; the correlation coefficient between TFe_2O_3 and TiO_2, Al_2O_3, K_2O is large, in the field outcrop, it usually can be seen that biotite porphyroblasts crystallization is closely associated with pyritization, gold mineralization often occurs in the biotite porphyroblasts crystallization and pyritization superposition zone; biotite porphyroblasts crystallization, carbonization, pyritization, garnization alteration has high correlation, and its superimposed zone is a favorable part of altered rock type gold mineralization, which should be the product of late hydrothermal alteration stage of regional metamorphism; Au and Cu, Zn, Bi, V, Hg having weak positive correlation shows that gold mineralization may undergo multi-stage hydrothermal superposition and is related to magmatic hydrothermal fluid; three principal component factors F1, F2 and F3 represent the existence of tectonic-hydrothermal action and magmatic hydrothermal action, Au has a certain load on all three factors, which indicates that the formation of gold in the mining area may penetrate the whole process of brittle-ductile shear and magmatism in this area, and the gold mineralization may be superimposed over multiple periods. The next prospecting direction or exploration project layout should prioritize the periphery or the deep of the mining area where brittle-ductile shear zone, foliated rocks, the gold-related alteration zone or the alteration superposition well

develop,that is the strong structure-hydrothermal activity-water-rock reaction(WRR)concentration site.

摘要: 汉阴黄龙金矿大地构造位置处于南秦岭构造带内,矿区内岩石受多期构造变形变质作用,并叠加有稍晚期岩浆活动。金矿化类型以蚀变岩型为主,其次为石英脉型,矿化受脆韧性剪切带和围岩蚀变的控制,主要蚀变类型有黑云母变斑晶化、黄铁矿化、碳化和石榴石化。为查明构造蚀变与成矿之间的关系,通过主量元素聚类分析法和因子分析法进一步确认韧性剪切带中的脆性断层破碎带是矿区内主要的控矿构造,黑云母变斑晶化蚀变与金矿化关系最密切,并通常与黄铁矿化叠加出现,对成矿有利;蚀变岩型金矿石与硅化相关性不大。金相关成矿元素 Q 型聚类分析、R 型聚类分析和因子分析结果表明,金成矿作用可能贯穿于脆韧性剪切作用和岩浆活动的整个过程,受多期热液叠加和后期岩浆热液活动的影响。因此,黄龙金矿属于脆韧性剪切带型金矿,并可能受后期岩浆热液叠加再富集。

入藏号: CSCD:6445359

地址: Han Ke, School of Earth Sciences and Resources,Changan University, Xi'an, Shaanxi 710054, China.

An Le, School of Earth Sciences and Resources,Changan University, Xi'an, Shaanxi 710054, China.

Yang Xingke, School of Earth Sciences and Resources,Changan University;;Changan University, ;;Key Laboratory of Western Mineral Resources and Geological Engineering Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

Liu Shuwen, School of Earth Sciences and Resources,Changan University;;Changan University, ;;Key Laboratory of Western Mineral Resources and Geological Engineering Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710054;;710054.

地址: 韩珂, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

安乐, 长安大学地球科学与资源学院, 西安, 陕西 710054, 中国.

杨兴科, 长安大学地球科学与资源学院;;长安大学, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

刘淑文, 长安大学地球科学与资源学院;;长安大学, ;;西部矿产资源与地质工程教育部重点实验室, 西安;;西安, 陕西;;陕西 710054;;710054, 中国.

电子邮件地址: 877415765@qq.com; xky61@163.com

电子邮件地址: 877415765@qq.com; xky61@163.com

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建筑工程学院

第 1 条, 共 60 条

作者: Liu Boquan; Su Jizhi; Ma Yudong; Xi Kailing; Xing Guohua

作者: 刘伯权; 苏佶智; 马煜东; 奚凯麟; 邢国华

标题: Pseudo-static collapse experiment of multi-story multi-span reinforced concrete plane frames

标题: 多层多跨钢筋混凝土平面框架拟静力倒塌试验研究

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作者关键词: reinforced concrete frame structure; pseudo-static test; axial compression ratio; beam-to-column linear stiffness ratio

作者关键词: 钢筋混凝土框架结构; 拟静力试验; 轴压比; 梁柱线刚度比

摘要: The collapse of building structure is characterized with discrete and systematic features, indicating that the study of seismic collapse of buildings shall be conducted from multi-parameter and multi-level aspects. Three 1/3-scale models of three-story, three-bay reinforced concrete plane frames were fabricated and tested under low-cycle loading, based on the research of structural collapse and failure mode. The effects of axial compression ratio and beam-to-column linear stiffness ratio on the seismic performance of RC frame structures were discussed through the analyses on failure process, failure pattern, energy dissipation capacity and stiffness degradation of model frame, which provides references for further researches. Test results indicate that the ideal beam-hinge failure mechanism of RC frame structures can be easily attained by reducing vertical axial force and beam-to-column linear stiffness ratio, which shall be beneficial to the full development of plastic hinges at beam ends. The ultimate failure of test frames was caused by the sudden crushing of concrete owing to the full development of plastic hinges at column bottoms in the first floor, and the energy dissipation capacity of components in the first floor was fully utilized, while those of second floor and third floor were relatively less. The peak load, ultimate load and equivalent viscous damping coefficient of KJ-2 were about 9.9%, 8.7% and 16.5% larger than those of KJ-1 respectively, but the displacement ductility coefficient of KJ-2 was about 57.1% smaller than that of KJ-1, indicating that the bearing capacity and energy dissipation capacity of a structure can be increased by increasing its vertical load, but the ductility and deformation capacity may be decreased. Meanwhile, increasing the vertical load to some extent shall be beneficial to enhancing the initial lateral stiffness of structures and postponing the structural stiffness degradation, but the P-Delta effect appears to be prominent in the case of large inter-story drift angle. By increasing the linear stiffness ratio of RC frame structures, the energy dissipation capacity can be enhanced, but the bearing capacity, ductility and initial lateral stiffness of structure may be reduced. For the beam-hinge structure with small axial compression ratio and beam-to-column linear stiffness ratio, the inter-story drift angle of structure when approaching to collapse can reach 1/25, and the structures still possess a certain load-bearing capacity at this stage.

摘要: 建筑结构的破坏具有离散性和系统性的特点,该特性决定结构抗地震倒塌的研究需多参数、多层次考虑问题。文章结合结构地震倒塌破坏模式的研究,完成了三榀钢筋混凝土平面框架的低周反复荷载试验,通过对模型框架破坏过程、破坏形态、滞回耗能及刚度退化的分析,探讨轴压比和梁柱线刚度比对RC框架结构抗震性能的影响,以期为后续结构地震倒塌破坏机理的研究提供参考。分析结果表明:降低结构的竖向荷载和梁柱线刚度比,有利于梁端

塑性铰的充分发育,从而更易实现理想的梁铰破坏机制;试验框架的最终破坏是由底层柱下端塑性铰充分发育后、混凝土突然压溃所致,底层构件的耗能能力得到充分发挥,而中间层构件和顶层构件所耗散的能量较少;KJ-2的峰值荷载及极限荷载比KJ-1的峰值荷载及极限荷载分别大约9.9%和8.7%、等效黏滞阻尼系数比KJ-1大约16.5%,但位移延性系数比KJ-1小约57.1%,说明增大结构的竖向荷载可以提高其承载能力及耗能能力,但会降低延性及变形能力,同时,一定程度地增大竖向荷载,有利于强化结构的初始抗侧刚度,延缓刚度退化趋势,但在层间位移角较大情况下P-Delta效应的影响凸显;结构梁柱线刚度比的增大可以提高其耗能能力,但会降低结构的承载能力、延性及初始抗侧刚度;对于轴压比及梁柱线刚度比较小的梁铰结构,临近倒塌时的层间位移角可达1/25,此时结构仍具有一定的竖向承载能力。

入藏号: CSCD:6547527

地址: Liu Boquan, Changan University, Xian, 710000.

Su Jizhi, Changan University, Xian, 710000.

Ma Yudong, Changan University, Xian, 710000.

Xi Kailing, Changan University, Xian, 710000.

Xing Guohua, Changan University, Xian, 710000.

地址: 刘伯权, 长安大学, 西安, 陕西 710000, 中国.

苏佳智, 长安大学, 西安, 陕西 710000, 中国.

马煜东, 长安大学, 西安, 陕西 710000, 中国.

奚凯麟, 长安大学, 西安, 陕西 710000, 中国.

邢国华, 长安大学, 西安, 陕西 710000, 中国.

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作者: Yao Xia; Zhang Liping; Qian Lin; Peng Siqi; Zhang Chen; Li Weiyong

作者: 姚夏; 张莉平; 钱林; 彭思琪; 张琛; 李伟英

标题: Reuse and bio-stability of sludge water from sedimentation tank in water treatment plant

标题: 净水厂沉淀池排泥水回用及其生物稳定性

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plant

作者关键词: 废水回用; 沉淀池排泥水; 中试; 生物稳定性; 净水厂

摘要: Based on a pilot test of sludge water reuse in the sedimentation tank of the water treatment plant, the water quality safety and biological stability characteristics of the effluent from the sludge reuse process and the feasibility of the sludge water reuse in the water treatment plant were discussed. The results showed that the average concentrations of AOC and BDOC in sludge water were 98.16 mug/L and 1.92 mg/L, respectively. The concentration of AOC and BDOC was significantly correlated with water temperature. The total number of bacteria in effluent water was not detected, and the turbidity, ammonia nitrogen, COD_(Mn) and other indicators of water all conform to Sanitary Standard for Drinking Water Quality (GB 5749-2006) when the sludge return ratio (sludge:raw water) was 3%. The average concentrations of AOC and BDOC in the effluent were 88.67 mug/L and 0.21 mg/L, respectively, which guarantee the biostability of the water. Therefore, the recovery of sludge water under the condition of reasonable control of return ratio is not only implementable, but also realizes the sustainable development concept of energy saving and emission reduction of the water treatment plant.

摘要: 基于净水厂沉淀池排泥水回用的中试试验, 探析排泥水回用工艺出水水质安全和生物稳定特性, 探讨净水厂排泥水回用的可行性。试验表明: 排泥水的 AOC 和 BDOC 浓度均值分别为 98.16 mug/L 和 1.92 mg/L, 且 AOC 和 BDOC 浓度与水温呈显著线性相关特性; 污泥回流比 (泥水: 原水) 为 3% 时, 出水未检出细菌总数, 且出水浑浊度、氨氮、COD_(Mn) 等指标均满足《生活饮用水卫生标准》(GB5749-2006); 出水的 AOC 和 BDOC 浓度均值分别为 88.67 mug/L 和 0.21 mg/L, 保障了水质的生物稳定性。因此, 净水厂在合理控制回流比条件下, 排泥水回用不仅具有可实施性, 而且实现了净水厂节能减排的可持续发展理念。

入藏号: CSCD:6647995

地址: Yao Xia, College of Construction Engineering, Chang'an University, Xi'an, Shaanxi 710055, China.

Zhang Liping, College of Construction Engineering, Chang'an University, Xi'an, Shaanxi 710055, China.

Peng Siqi, College of Construction Engineering, Chang'an University, Xi'an, Shaanxi 710055, China.

Qian Lin, Shanghai Municipal Engineering Design Institute (Group) Co., Ltd., Shanghai 200092, China.

Zhang Chen, College of Environmental Science and Engineering, Tongji University; Tongji University, ; State Key Laboratory of Pollution Control & Resource Reuse, Ministry of Education, ;, Shanghai; Shanghai 200092; 200092.

Li Weiyang, College of Environmental Science and Engineering, Tongji University; Tongji University, ; State Key Laboratory of Pollution Control & Resource Reuse, Ministry of Education, ;, Shanghai; Shanghai 200092; 200092.

地址: 姚夏, 长安大学建筑工程学院, 西安, 陕西 710055, 中国.

张莉平, 长安大学建筑工程学院, 西安, 陕西 710055, 中国.

彭思琪, 长安大学建筑工程学院, 西安, 陕西 710055, 中国.

钱林, 上海市市政工程设计研究总院(集团)有限公司, 上海 200092, 中国.

张琛, 同济大学环境科学与工程学院; 同济大学, ; 长江水环境教育部重点实验室, ;, 上海; 上海 200092; 200092, 中国.

李伟英, 同济大学环境科学与工程学院; 同济大学, ; 长江水环境教育部重点实验室, ;, 上海;

上海 200092;;200092, 中国.

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作者: Liu Kuan; Ma Yudong; Huang Jiao; Liu Xiaoxiao; Su Jizhi

作者: 刘宽; 马煜东; 黄娇; 刘笑笑; 苏佶智

标题: Analysis of Seismic Performance of Q460 Steel Frame Columns under Low Cyclic Loading

标题: 低周反复荷载下 Q460 钢材框架柱抗震性能分析

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作者关键词: Q460 柱; ABAQUS 有限元; 参数分析; 抗震性能

摘要: In order to confirm the requirement of Q460 steel in seismic design better, the finite element software ABAQUS is used to simulate the seismic resistance of I-type and box-type bending members, with different axial compression ratios, flange width-to-thickness ratios, web height-to-thickness ratios and wall width-to-thickness ratio, under low cyclic repeated loading. The results showed that the difference in energy dissipation coefficient is not obvious for the members with different flange width-to-thickness ratio. The energy dissipation coefficient significantly reduces as the increase of the axial compression ratio, the web height-to-thickness ratio (I-type) and the wall width-to-thickness ratio (box-type). The ultimate bearing capacity of the specimens increases with the decrease of the axial compression ratio and the increase of width-thickness ratio of wall and flange. With the ratio of the web height-to-thickness approaches the standard limit, the downward trend of the bearing capacity exacerbates significantly. The ductility coefficient of Q235 steel column can reach 4, and that of Q460 steel column is only about 2. For the ultimate displacement angle of Q460 steel column, it is recommended to adopt 0.03 for the I-type column and 0.032 for the box-type column. In Chinese standard, the limit of the flange width-to-thickness ratio is conservative, and the value may be up to 9. The web height-to-thickness ratio should not be too large. The degree of stiffness degradation of Q460 steel column exacerbates with the increase

of the axial compression ratio. The initial stiffness of the column is larger and the stiffness degradation is more severe when the flange width-to-thickness ratio increases and the ratio of the web height to thickness reduces.

摘要: 为了进一步完善 Q460 钢材在抗震设计规范中相关限值的要求,本文利用有限元软件 ABAQUS,以轴压比、翼缘宽厚比、腹板高厚比和壁板宽厚比为变量,建立了共 48 根工字型框架柱和箱型框架柱,分析了其抗震性能。结果表明:翼缘宽厚比对框架柱的能量耗散系数影响较小;能量耗散系数随轴压比、腹板高厚比(工字型)和壁板宽厚比(箱型)增大而明显减小;框架柱的极限承载力随轴压比的减小及壁板宽厚比和翼缘宽厚比的增大而逐渐增大,当腹板高厚比接近规范限值时,承载力下降趋势明显增大。与采用 Q235 钢材的框架柱相比,Q460 钢材框架柱的延性较小,仅为 2 左右;当采用 Q460 钢材时,工字型框架柱的极限位移角限值建议取为 0.03,箱型框架柱的极限位移角限值建议取为 0.032。规范中对翼缘宽厚比限值的规定偏于保守,其值最大可取至 9。无论是工字型框架柱还是箱型框架柱,其腹板高厚比均不宜过大。Q460 钢材框架柱的刚度退化率随轴压比的增大而增强,且翼缘宽厚比越大,腹板高厚比越小,柱的初始刚度越大,刚度退化程度越明显。

入藏号: CSCD:6649554

地址: Liu Kuan, School of Civil Engineering of Chang'an University, Xi'an, Shaanxi 710061, China.

Ma Yudong, School of Civil Engineering of Chang'an University, Xi'an, Shaanxi 710061, China.

Huang Jiao, School of Civil Engineering of Chang'an University, Xi'an, Shaanxi 710061, China.

Liu Xiaoxiao, School of Civil Engineering of Chang'an University, Xi'an, Shaanxi 710061, China.

Su Jizhi, School of Civil Engineering of Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 刘宽, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

马煜东, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

黄娇, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

刘笑笑, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

苏佳智, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: liukuan93@163.com

电子邮件地址: liukuan93@163.com

使用次数 (最近 180 天): 0

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作者: Duan Liusheng; Zhou Tianhua; Su Mingzhou

作者: 段留省; 周天华; 苏明周

标题: Experiment on the static behavior of steel tubular column joint assembled by high strength steel core tube-bolts

标题: 高强钢芯筒-螺栓连接钢管柱节点静力性能试验

来源出版物: 哈尔滨工业大学学报 卷: 51 期: 12 页: 172-179 出版年: 2019

文献号: 0367-6234(2019)51:12<172:GQGXTL>2.0.TX;2-2

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出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: blind bolt; joint rotation capacity; bolt tension stress; failure modes; joint type

作者关键词: 单边螺栓; 节点转动能力; 螺栓拉力; 破坏模式; 节点类型

摘要: To solve the problems of steel tube column joints, such as insufficient anchorage strength and complex construction, steel tube column joints assembled by high strength steel core tube-bolt assemblies were proposed. The assemblies were composed of high strength steel core tubes embedded in steel tube columns and normal bolts. To study the static behavior of the new connections, six full scaled specimens of steel tubular column frame exterior joints were tested under monotonic loading. The research parameters included the types of the steel core tube, the thickness of the steel core tube plate, the bolt diameter, and the end-plate thickness. The stress distribution of the specimen key parts, the deformation capacity, the failure modes, the bolt tension stress, and the joint types were analyzed. Results show that the specimens were semi-rigid joints, and all joint failure modes belong to steel beam plastic hinge mechanisms. When the plate thickness of the enclosed type core tube was equal to the bolt diameter, the joint could satisfy the strength conditions of the rigid joint in the Chinese code. The deformation of the joint panel zone could be ignored, and the rotations of the core tubes were less than 10% of the total rotation. When the core tube plate thickness decreased, the width of the gap between the end-plate and the column would increase rapidly, and the bolt might be pulled out. The steel plate-bolt assembly tension force design value could be calculated as 70% of the tension bearing capacity of the threaded hole in high strength steel plates.

摘要: 为解决现有钢管柱节点单边螺栓锚固不足和操作复杂的问题,提出高强钢芯筒-螺栓连接副装配式节点,连接副由内置于钢管柱的高强钢芯筒和常规高强螺栓组成.为考察这种新型节点的静力性能,对6个1:1足尺钢管柱框架边节点进行单调加载试验,研究变量为钢芯筒类型、筒壁厚度、螺栓直径、钢梁端板厚度.重点分析节点关键部位的应力变化、变形能力、破坏模式、螺栓拉力和节点类型.结果表明:试件均为半刚性节点、梁端塑性铰破坏机制,封闭型芯筒厚度与螺栓直径相当时可以满足梁柱刚接的强度条件;节点域变形很小可以忽略,芯筒转动变形对节点转动影响不超过10%;钢梁端板与柱的间隙随着芯筒厚度减小而快速增长,螺栓有拔出趋势,连接副的抗拉设计值可按钢板螺纹抗拉承载力的70%取用.

入藏号: CSCD:6635892

地址: Duan Liusheng, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhou Tianhua, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Su Mingzhou, College of Civil Engineering, Xi'an University of Architecture and Technology, Xi'an, Shaanxi 710055, China.

地址: 段留省, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

周天华, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

苏明周, 西安建筑科技大学土木工程学院, 西安, 陕西 710055, 中国.

电子邮件地址: duanliusheng@126.com

电子邮件地址: duanliusheng@126.com

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Ren Xiang; Hu Zhiping; Wang Rui; Wei Xueni; Xia Xiangbo

作者: 任翔; 胡志平; 王瑞; 魏雪妮; 夏香波

标题: Nonlinear Analysis of Large-diameter Buried Pipelines Filled with Pressurized Fluid Crossing Active Faults

标题: 大口径有压埋地管道穿越活动断层的非线性分析

来源出版物: 地震工程学报 卷: 41 期: 5 页: 1299-1307 出版年: 2019

文献号: 1000-0844(2019)41:5<1299:DKJYYM>2.0.TX;2-U

来源出版物: China Earthquake Engineering Journal 卷: 41 期: 5 页: 1299-1307 出版年: 2019

文献号: 1000-0844(2019)41:5<1299:DKJYYM>2.0.TX;2-U

语言: Chinese

文献类型: Article

作者关键词: buried pressure pipeline; fault; seismic response; fluid-soil coupling

作者关键词: 有压埋地管道; 断层; 地震响应; 流固耦合

摘要: A three-dimensional finite-element model of a pipeline crossing a fault, the pressurized fluid, and the surrounding soil was established using the finite-element software ABAQUS. Pipelines in different faults (strike-slip fault, normal fault, and reverse fault) were simulated under static load and seismic load, and the conditions as regards whether the pipelines were filled with pressurized fluid were compared and analyzed. The deformation behaviors of pipelines with and without pressurized fluid under static load and seismic load were obtained. By comparing the behaviors, the influences of the mass and pressure of the fluid on the pipelines under static load and seismic load were obtained. The results show that the fluid in pipelines improves the deformation resistance of the pipeline under static load; thus, the pipelines are safer; however, under seismic load, the fluid triggers the deformation resistance of the pipeline, and thus, the pipelines are less safe.

摘要: 基于 ABAQUS 软件平台, 建立穿越断层的管道、有压液体及周围土体的三维有限元模型, 分别在静力荷载作用和地震作用下, 对不同运动形式断层(走滑断层、正断层、逆断层)中的管道进行模拟, 并对管道内有无有压液体进行对比分析。分别得到管道在静力荷载作用下和地震作用下空管道与有压管道的变形特征, 将其进行对比分析, 得到管道内液体的质量和压力在静力荷载作用及地震荷载作用下对管道的不同影响。结果表明: 在静力荷载作用下管道

内液体的质量和压力提高了管道的抗变形能力,使管道更安全;而在地震作用下管道内液体的质量和压力削弱了管道的抗变形能力,使管道更容易被破坏。

入藏号: CSCD:6636075

地址: Ren Xiang, School of Civil Engineering,Changan University, Xi'an, Shaanxi 710061, China.

Wang Rui, School of Civil Engineering,Changan University, Xi'an, Shaanxi 710061, China.

Wei Xueni, School of Civil Engineering,Changan University, Xi'an, Shaanxi 710061, China.

Xia Xiangbo, School of Civil Engineering,Changan University, Xi'an, Shaanxi 710061, China.

Hu Zhiping, School of Civil Engineering,Changan University;;Institute of Underground Structure and Engineering,Changan University, ;; Xi'an;;Xi'an, Shaanxi;;Shaanxi 710061;;710061.

地址: 任翔, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

王瑞, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

魏雪妮, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

夏香波, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

胡志平, 长安大学建筑工程学院;;长安大学地下结构与工程研究所, ;; 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

电子邮件地址: 14870260@qq.com; huzhping@chd.edu.cn

电子邮件地址: 14870260@qq.com; huzhping@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Lu Zhaolin; Li Xiaoling; Gou Wenjun; Zhang Liping

作者: 芦昭霖; 李晓玲; 苟文均; 张莉平

标题: EFFECT OF S/N ON PROCESS OF AUTOTROPHIC DISSIMILATORY NITRATE REDUCTION TO AMMONIUM

标题: S/N 对自养硝酸盐异化还原成铵过程的影响

来源出版物: 环境工程 卷: 37 期: 12 页: 17-21 出版年: 2019

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文献类型: Article

作者关键词: S/N; sulfur autotrophic denitrification; S/N; DNRA; ORP

作者关键词: 硫自养反硝化; 硝酸盐异化还原成铵; 氧化还原电位

摘要: In this study,SBBR reactor was used to investigate the effects of four influent S/N on the process of autotrophic dissimilatory nitrate reduction to ammonium by using nitrate and sodium

sulfide as the substrates. The results showed that when $n(S)/n(N) \leq 1.3$, the system mainly carried out the sulfur autotrophic denitrification process; when $n(S)/n(N) \geq 1.5$, there were both sulfur autotrophic denitrification process and nitrate dissimilation to ammonium process in the system, and the highest yield of ammonium was obtained when $n(S)/n(N) = 1.5 : 1$; ORP had a certain indication of the reaction process and type of reaction in the system. When a complete sulfur autotrophic denitrification process occurred, the ORP would have a nitrate knee and a nitrite knee. The knee points of nitrate and nitrite coincided when the process of sulfur autotrophic denitrification and dissimilatory nitrate reduction to ammonium existed simultaneously. The reason for the dissimilatory nitrate reduction to ammonium process might be due to an increase in sulfide concentration, which would inhibit denitrification and drive some electrons from $S^{(-2)}$ to NH_4^{+} .

摘要: 采用 SBBR 反应器,以硝酸盐和硫化钠为基质,探索了 4 种进水 S/N 对自养硝酸盐异化还原成铵过程的影响。结果表明:在 $n(S)/n(N) \leq 1.3$ 时,系统主要进行硫自养反硝化过程; $n(S)/n(N) \geq 1.5$ 时,系统内同时存在硫自养反硝化过程和硝酸盐异化还原成铵过程,在 $n(S)/n(N) = 1.5 : 1$ 时产铵最高;ORP 对系统内的反应进程和反应类型有一定的指示作用。当发生完整的硫自养反硝化过程时,ORP 会出现硝酸盐膝点和亚硝酸盐膝点。同时存在硫自养反硝化过程和硝酸盐异化还原成铵过程时,硝酸盐膝点和亚硝酸盐膝点重合。出现硝酸盐异化还原成铵过程的原因可能是硫化物浓度的增加,抑制反硝化作用,从而驱动部分电子从 $S^{(-2)}$ 到 NH_4^{+} 。

入藏号: CSCD:6636884

地址: Lu Zhaolin, School of Architecture and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Li Xiaoling, School of Architecture and Engineering, Chang'an University, Key Laboratory of Water Supply & Sewage Engineering, Ministry of Housing and Urban-Rural Development, Xi'an, Shaanxi 710054, China.

Zhang Liping, School of Architecture and Engineering, Chang'an University, Key Laboratory of Water Supply & Sewage Engineering, Ministry of Housing and Urban-Rural Development, Xi'an, Shaanxi 710054, China.

Gou Wenjun, Qinghai Agricultural Product Quality Safety Monitoring Center, Xining, Qinghai 810001, China.

地址: 芦昭霖, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

李晓玲, 长安大学建筑工程学院, 住建部给水排水重点实验室, 西安, 陕西 710054, 中国.

张莉平, 长安大学建筑工程学院, 住建部给水排水重点实验室, 西安, 陕西 710054, 中国.

苟文均, 青海省农产品质量安全监测中心, 西宁, 青海 810001, 中国.

电子邮件地址: 1793715336@qq.com; lixiaoling20030327@126.com

电子邮件地址: 1793715336@qq.com; lixiaoling20030327@126.com

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作者: Wei Jiewen; Han Liu; Zhao Xiaohong; Pan Ying; Yuan Chunbo

作者: 韦杰文; 韩柳; 赵晓红; 潘颖; 袁春博

标题: SEVERAL KEY ISSUES ON USING ALUM SLUDGE FROM WATERWORKS AS SUBSTRATE IN ROOF GREENING FACILITIES

标题: 给水厂铝污泥作为屋顶绿化基质应用的关键问题分析

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语言: Chinese

文献类型: Article

作者关键词: roof greening; alum sludge; plant substrate; bioretention facilities; sponge city

作者关键词: 屋顶绿化; 铝污泥; 基质; 生物滞留设施; 海绵城市

摘要: As one of the bioretention facilities in sponge city, roof greening is an effective measure for urban rainwater management and control. Alum sludge from waterworks reused as one of components of green roof substrate can relieve the pressure of sludge landfill and improve sludge reduction and utilization. Through the study of alum sludge as planting substrate for roof greening, this paper aimed to clarify the key issues in the application of such bioretention facilities: 1) whether leaching of aluminum and heavy metals took place in alum sludge; 2) whether alum sludge could be directly used as planting substrates; 3) whether alum sludge should be treated and mixed with other substrates to make light modified substrates; 4) the effect of roof greening facilities made of alum sludge on rainwater storage and purification. The results showed that the leaching amount of Al and heavy metals in alum sludge was very small in landscape application with soil pH of about 7, hardly posed a threat to the environment. The initial water content of alum sludge was 80%, and its character was unstable. Therefore, it was not suitable to be used directly as the planting substrates of roof greening facility, which needed to be dried with water content of 60% below. In order to meet the requirements of roof greening specifications, other light, water-retaining and fertilizer-conserving materials such as coconut bran, peat and humus soil, etc., should be added. The mixture with the formula (volume ratio) of alum sludge (40%), coconut chaff (35%) and perlite (25%) was selected as the substrate for ground cover plant. The results revealed that this substrate was efficient for the plant growth, with the rooting rate of 100% and a coverage rate of 75% above for long time. The stormwater retention rate of the roof greening facility reached 89.5% and 37.1% in the simulated moderate rain (20 mm/h) and heavy rain (45 mm/h) respectively. The facility had a certain removal capacity on various pollutants, especially enhanced the phosphorus removal, comparing with traditional bioretention facilities.

摘要: 屋顶绿化(roof greening)作为海绵城市生物滞留设施之一,是景观好、效果佳的城市雨水管控措施。使用给水厂铝污泥配制屋顶绿化基质,可缓解污泥填埋的用地压力,取得污泥资源化 and 减量化效果,进而阐明此类生物滞留设施应用中的主要关键问题: 1)铝污泥是否存在铝和重金属的浸出; 2)铝污泥是否能直接用作种植基质; 3)铝污泥应如何处理并搭配其他基材

制成轻型改良基质;4)以铝污泥改良基质制成的屋顶绿化设施对雨水的滞蓄净化效果。结果表明:在土壤 pH 约为 7 的景观应用上,铝污泥中铝和重金属的浸出量极少,对环境构成威胁甚微;铝污泥初期含水率为 80%,性状不稳定,不宜直接作为屋顶绿化设施的种植基质使用,需干燥至 60%以下;为满足屋顶绿化规范要求,还应搭配其他轻质、保水、保肥的基材(如椰糠、泥炭、腐殖土等)使用;在铝污泥(40%,体积分数,下同)、椰糠(35%)、珍珠岩(25%)的改良基质中栽种地被植物,植物生根率为 100%,覆盖率长期维持 75%以上,生长状况良好;在中雨标准(20 mm/h)和暴雨标准(45 mm/h)的降雨模拟中,设施雨水持蓄率分别达到 89.5%和 37.1%,对各类污染物有一定的去除效果,更弥补了传统生物滞留设施对磷去除效果较差的缺点。

入藏号: CSCD:6636887

地址: Wei Jiewen, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Han Liu, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Pan Ying, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Zhao Xiaohong, School of Civil Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Water Supply and Drainage, Ministry of Housing and Urban-Rural Development, Xi'an;; Xi'an, ;; 710054;; 710054.

Yuan Chunbo, School of Civil Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Water Supply and Drainage, Ministry of Housing and Urban-Rural Development, Xi'an;; Xi'an, ;; 710054;; 710054.

地址: 韦杰文, 长安大学建筑工程学院, 西安, 陕西 710054, 中国.

韩柳, 长安大学建筑工程学院, 西安, 陕西 710054, 中国.

潘颖, 长安大学建筑工程学院, 西安, 陕西 710054, 中国.

赵晓红, 长安大学建筑工程学院;; 长安大学, ;; 住房与城乡建设部给水排水重点实验室, 西安;; 西安, ;; 710054;; 710054.

袁春博, 长安大学建筑工程学院;; 长安大学, ;; 住房与城乡建设部给水排水重点实验室, 西安;; 西安, ;; 710054;; 710054.

电子邮件地址: 50597855@qq.com; xzhao@chd.edu.cn

电子邮件地址: 50597855@qq.com; xzhao@chd.edu.cn

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作者: Zhao Chuanliang; Yan Yi; Su Juntang; Li Huanyu; Wang Bowen; Zhong Yue; Hu Bo; Yang Liwei

作者: 赵传靓; 闫仪; 苏俊堂; 李环宇; 王博文; 钟玥; 胡博; 杨利伟

标题: RESEARCH PROGRESS ON THE HARM AND DETECTION TECHNOLOGIES OF

NANOPLASTICS IN AQUATIC ENVIRONMENT

标题: 水体环境中纳米塑料的危害与检测研究进展

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作者关键词: nanoplastic; aquatic environment; detection technology; environmental hazards; human health

作者关键词: 纳米塑料; 水体环境; 检测技术; 环境危害; 人体健康

摘要: In recent years, the fate and adverse effects of plastics in aquatic environment have attracted great attention. Recent studies have showed that plastic materials could break into nanoplastics and accumulated in the environment. Nanoplastics exhibit distinct physical and chemical properties from their bulk materials. Therefore, it is necessary to analyze and eliminate the risks and hazards that nanoplastics may cause to the environment. In this paper, the emerging topic of nanoplastics pollution in aquatic environment was summarized. The effects of nanoplastics on aquatic organisms and human health were mainly discussed, including the challenges in detecting nanoplastics from aquatic media. Finally, the future research trends were prospected, in order to provide useful recommendations for the future studies.

摘要: 近年来, 塑料在水环境中的迁移转化和不良影响引起了极大关注。最近研究表明, 塑料材料能够破碎成纳米塑料并在环境中积累。纳米塑料可以表现出与本体材料差异明显的物理和化学性质。因此, 需要分析和消除纳米塑料可能对环境造成的风险和危害。针对水体环境中纳米塑料新兴污染进行了综述, 重点论述纳米塑料对水生生物和人类健康的影响, 以及在水环境介质中检测纳米塑料所面临的挑战, 最后对未来研究趋势进行了展望, 为今后纳米塑料的相关研究提供参考。

入藏号: CSCD:6636892

地址: Zhao Chuanliang, School of Civil Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Water Supply & Sewage Engineering, Ministry of Housing and Urban-rural Development, Xi'an;; Xi'an, ;; 710061;; 710061.

Hu Bo, School of Civil Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Water Supply & Sewage Engineering, Ministry of Housing and Urban-rural Development, Xi'an;; Xi'an, ;; 710061;; 710061.

Yang Liwei, School of Civil Engineering, Chang'an University;; Chang'an University, ;; Key Laboratory of Water Supply & Sewage Engineering, Ministry of Housing and Urban-rural Development, Xi'an;; Xi'an, ;; 710061;; 710061.

Yan Yi, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Su Juntang, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Li Huanyu, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wang Bowen, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhong Yue, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 赵传靓, 长安大学建筑工程学院;; 长安大学, ;; 给水排水住房与城乡建设部重点实验室, 西安;; 西安, ;; 710061;; 710061.

胡博, 长安大学建筑工程学院;; 长安大学, ;; 给水排水住房与城乡建设部重点实验室, 西安;;

西安,;; 710061;;710061.

杨利伟, 长安大学建筑工程学院;;长安大学,;;给水排水住房与城乡建设部重点实验室, 西安;;西安,;; 710061;;710061.

闫仪, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

苏俊堂, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

李环宇, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

王博文, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

钟玥, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: zhaochuanliang90@sina.com; 408802216@qq.com

电子邮件地址: zhaochuanliang90@sina.com; 408802216@qq.com

使用次数 (最近 180 天): 0

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作者: Qiao Peng; Zhong Chengxing; Wang Zongyi; Wang A'yong

作者: 乔朋; 钟承星; 王宗义; 王阿勇

标题: Research Status and Development Trend on Vehicle-Bridge Coupling Vibration in China

标题: 我国车-桥耦合振动的研究现状及发展趋势

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作者关键词: bridge engineering; vehicle-bridge coupling vibration; seismic load; wind load; unevenness; resonance

作者关键词: 桥梁工程; 车-桥耦合振动; 地震荷载; 风荷载; 不平整度; 共振

摘要: Since entering the 21st century,China's highway and railway transportation have been greatly developed in terms of higher speed and heavier load. As more and more bridges have light weight and long spans,and the dynamic problem of vehicle-bridge structure is more and more prominent. Therefore,attentions have been focused on the research of vehiclebridge coupling vibration. Based on the review of the research on vehicle-bridge coupling in recent 20 years in China,the vehicle model,bridge model and numerical calculation method of vehicle-bridge

coupling vibration were summarized. And the research contents of vehicle-bridge coupling vibration in four aspects of earthquake load, wind load, unevenness and resonance were introduced systematically. Finally, some issues of vehicle-bridge coupling were suggested to be further studied, which could provide some reference for the future research of vehicle-bridge coupling.

摘要: 自进入21世纪,我国公路与铁路交通在高速化与重载化得到了巨大的发展,而桥梁也朝着轻质、大跨迈进,车-桥结构的动力问题越来越突出,车-桥耦合振动的研究因此获得了许多的关注。在回顾了近20年中国在车桥耦合问题研究的基础上,总结了车-桥耦合振动研究的车辆模型、桥梁模型及数值计算方法,并针对关于地震荷载、风荷载、不平整度和共振等4个方面的车-桥耦合振动研究内容做了系统介绍。并对车-桥耦合需要进一步研究的问题进行了探讨,可对今后车-桥耦合问题的研究提供一定的参考。

入藏号: CSCD:6634268

地址: Qiao Peng, School of Architecture Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhong Chengxing, School of Architecture Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Zongyi, School of Architecture Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang A'yong, School of Architecture Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 乔朋, 长安大学建筑工程学院, 西安, 陕西 710064, 中国.

钟承星, 长安大学建筑工程学院, 西安, 陕西 710064, 中国.

王宗义, 长安大学建筑工程学院, 西安, 陕西 710064, 中国.

王阿勇, 长安大学建筑工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: qiaopeng@chd.edu.cn; 1195928385@qq.com

电子邮件地址: qiaopeng@chd.edu.cn; 1195928385@qq.com

使用次数 (最近 180 天): 0

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作者: Lan Guanqi; Wang Yihong; Niu Dongdong; Quan Dengzhou

作者: 兰官奇; 王毅红; 牛东东; 权登州

标题: Experimental study on influence of loading modes on compressive properties of earth brick masonry

标题: 加载方式对生土基础体抗压性能影响试验研究

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作者关键词: earth material; masonry; compressive strength; loading mode; analytic hierarchy process

作者关键词: 生土材料; 砌体; 抗压强度; 加载方式; 层次分析法

摘要: The compressive test of masonry prism was conducted to investigate the influence of three different loading modes on the compressive performance of earth brick masonry. Based on the analytic hierarchy process, the optimum loading mode for measuring the compressive strength of earth brick masonry was determined. Research results show that loading with the European standards and improved Chinese standards would lead to the vertical crack penetration failure, and the local failure occurs mainly in the specimens loaded with American standards. The average compressive strength under the improved Chinese Standards is the lowest, which is 94% and 82% of those measured by the European standards and American standards, respectively. The improved Chinese standards show advantages in terms of integrity and stability of test data, and stress state of specimens, so it is suggested to use the improved Chinese standards to measure the compressive strength of earth brick masonry.

摘要: 通过砌体单轴抗压试验分析了三种不同加载方式对生土基础体抗压性能的影响, 基于层次分析法确定了生土基础体抗压强度测试的最优加载方式. 研究表明: 采用欧盟标准及改进国标进行加载, 试件多发生竖向裂缝贯穿破坏, 而美标加载方式下的试件多发生局部破坏; 在三种加载方式中, 改进国标加载方式下试件的抗压强度均值最小, 分别为欧标及美标所测抗压强度均值的 94% 和 82%; 改进后的国标加载方式在试件受力状态、数据稳定性及完整性方面均存在优势, 建议采用该加载方式测试生土基础体的抗压强度.

入藏号: CSCD:6627171

地址: Lan Guanqi, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wang Yihong, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Niu Dongdong, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Quan Dengzhou, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 兰官奇, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

王毅红, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

牛东东, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

权登州, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: wangyh@chd.edu.cn

电子邮件地址: wangyh@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Hu Zhiping; Zhang Dan; Zhang Yaguo; Wang Shaoqing; Li Fangtao

作者: 胡志平; 张丹; 张亚国; 王少卿; 李芳涛

标题: Test study on deformation and failure mechanisms of utility tunnels obliquely crossing ground fissures

标题: 地下综合管廊结构斜穿活动地裂缝的变形破坏机制室内模型试验研究

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作者关键词: tunneling engineering; underground utility tunnel; ground fissure; model test; deformation failure mode

作者关键词: 隧道工程; 地下综合管廊; 地裂缝; 模型试验; 变形破坏模式

摘要: Taking the ground fissure sites in Xi'an area as the research background, indoor physical model tests of an underground utility tunnel crossing ground fissures at an angle of 45° were performed with a geometrical reduction ratio of 1:15. The pressure of the peripheral soil and the surface strain, convergence displacement and macroscopic failure of the utility tunnel under the relative movement between the hanging and foot walls were analyzed, and the deformation and failure mode of the utility tunnel were introduced. The results indicate that the longitudinal contact pressure between the soil and the top face of the structure significantly increases in the hanging wall while decreases in the foot wall as the relative movement develops, and that the lateral contact pressure in the intersectant range between the ground fissure and the structural axis is relative larger. The longitudinal and ring cracks in the structure surface distribute respectively in the ranges of $2.9D$ - $5.1D$ ($D = 0.277$ m) and $0.9D$ in the foot wall. The deformation of the utility tunnel is asymmetric and the deformation in the hanging wall is higher than that in the foot wall. The structure is in a complex stress state of torsion, bend and shear, and hence, can be considered as a thin-walled member. The research can provide some references for the structural design and the formulation prevention of underground utility tunnels in Xi'an city.

摘要: 以西安地区地裂缝环境为研究背景, 通过几何缩尺比例为 1:15 的物理模型试验得到上、下盘相对错动情况下结构周边围岩土压力及结构应力、变形规律和宏观破坏现象, 论述地下综合管廊 45° 斜穿地裂缝时的变形破坏模式。结果表明: 随着错动量的不断增大, 上盘中管廊结构顶部纵向与土体的接触压力明显增加, 下盘中明显减小; 至于结构顶部横向与土体的接触压力, 地裂缝与结构轴线相交处土压力较大, 两边土压力较小; 混凝土表面纵向裂缝主要分布在下盘区 $2.9D$ ~ $5.1D$ ($D = 0.277$ m) 范围内, 环向裂缝主要分布于下盘区 $0.9D$ 范围内, 下盘结构变形程度高于上盘结构; 地下综合管廊在 45° 斜穿地裂缝时其变形不对称, 结构处于扭转、弯曲、剪切的复杂应力状态, 结构的受力形式属于薄壁杆件约束扭转。研究结果可为西安地下综合管廊斜穿地裂缝时的结构设计和防治措施的制定提供一定参考。

入藏号: CSCD:6620999

地址: Hu Zhiping, School of Civil Engineering, Chang'an University;; Institute of Underground Structure and Engineering, Chang'an University, ;; Xi'an;; Xi'an, Shaanxi;; Shaanxi 710061;; 710061.

Zhang Yaguo, School of Civil Engineering, Chang'an University;; Institute of Underground Structure and Engineering, Chang'an University, ;; Xi'an;; Xi'an, Shaanxi;; Shaanxi 710061;; 710061.

Zhang Dan, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wang Shaoqing, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Li Fangtao, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 胡志平, 长安大学建筑工程学院;; 长安大学地下结构与工程研究所, ;; 西安;; 西安, 陕西;; 陕西 710061;; 710061, 中国.

张亚国, 长安大学建筑工程学院;; 长安大学地下结构与工程研究所, ;; 西安;; 西安, 陕西;; 陕西 710061;; 710061, 中国.

张丹, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

王少卿, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

李芳涛, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: huzhping@chd.edu.cn; 15638207772@163.com

电子邮件地址: huzhping@chd.edu.cn; 15638207772@163.com

使用次数 (最近 180 天): 0

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第 12 条, 共 60 条

作者: Huang Shan; Yang Fan; Huang Qihua; Li Qiuwei; Gao Junfa; Qin Jinyi

作者: 黄山; 杨凡; 黄启华; 李秋玮; 高俊发; 秦晋一

标题: Study on Municipal Wastewater Treatment Effect by a New Type of Integrated Biological Reactor

标题: 一种新型一体化生物反应器对城市污水的处理效果研究

来源出版物: 水处理技术 卷: 45 期: 11 页: 107-111 出版年: 2019

文献号: 1000-3770(2019)45:11<107:YZXXYT>2.0.TX;2-C

来源出版物: Technology of Water Treatment 卷: 45 期: 11 页: 107-111 出版年: 2019

文献号: 1000-3770(2019)45:11<107:YZXXYT>2.0.TX;2-C

语言: Chinese

文献类型: Article

作者关键词: reactor; wastewater treatment; dissolved oxygen; removal rate

作者关键词: 反应器; 污水处理; 溶解氧; 去除率

摘要: A pilot-scale experiment was designed for investigate the contaminant removal effect of a new type of Integrated biological reactor on municipal wastewater under different dissolved oxygen (DO) and the hydraulic retention time (HRT).The study found that the average removal rate of COD,NH₄⁺-N,TP,SS and TN was respectively up to 94%,94.5%,80%,93% and 40% when the HRT was 6 h,the DO was controlled at 2.0 mg/L and the MLSS was 6 500 mg/L.The result showed that the reactor has a good treatment effect on municipal wastewater,and it has stable effluent during operation and good shock resistance capacity.

摘要: 设计中试实验研究了一种新型一体化生物反应器在不同溶解氧浓度及水力停留时间条件下对南方某水质净化厂城市污水的处理效果。研究发现,在控制反应器水力停留时间(HRT)为6 h,DO质量浓度为2.0 mg/L,污泥MLSS质量浓度为6 500 mg/L左右时,COD、NH₄⁺-N平均去除率分别达到94%、94.5%以上,TP平均去除率超过80%,SS去除率可达93%以上,TN去除效果不理想,平均去除率为40%左右。反应器对于城市污水具有较好的处理效果,且在运行期间出水稳定,具备较高的抗冲击负荷能力。

入藏号: CSCD:6611717

地址: Huang Shan, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Gao Junfa, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Qin Jinyi, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Yang Fan, Shenzhen Shenshui Water Resources Consulting Co.,Ltd, Shenzhen, Guangdong 518003, China.

Huang Qihua, Shenzhen Shenshui Water Resources Consulting Co.,Ltd, Shenzhen, Guangdong 518003, China.

Li Qiuwei, Shenzhen Shenshui Water Resources Consulting Co.,Ltd, Shenzhen, Guangdong 518003, China.

地址: 黄山, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

高俊发, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

秦晋一, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

杨凡, 深圳市深水水务咨询有限公司, 深圳, 广东 518003, 中国.

黄启华, 深圳市深水水务咨询有限公司, 深圳, 广东 518003, 中国.

李秋玮, 深圳市深水水务咨询有限公司, 深圳, 广东 518003, 中国.

电子邮件地址: 2574244188@qq.com; 239583562@qq.com

电子邮件地址: 2574244188@qq.com; 239583562@qq.com

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

引用的参考文献数: 11

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作者: Jing Yanlin; Wang Hao; Tao Chunliang; Yang Lina; Liu Jianwei; Wen Xin

作者: 井彦林; 王昊; 陶春亮; 杨丽娜; 刘建维; 温馨

标题: Experimental study on contact angle and pore characteristics of unsaturated loess

标题: 非饱和黄土的接触角与孔隙特征试验

来源出版物: 煤田地质与勘探 卷: 47 期: 5 页: 157-162 出版年: 2019

文献号: 1001-1986(2019)47:5<157:FBHHTD>2.0.TX;2-W

来源出版物: Coal Geology & Exploration 卷: 47 期: 5 页: 157-162 出版年: 2019

文献号: 1001-1986(2019)47:5<157:FBHHTD>2.0.TX;2-W

语言: Chinese

文献类型: Article

作者关键词: unsaturated loess; pore feature; contact angle; capillarity

作者关键词: 非饱和黄土; 孔隙特征; 接触角; 毛细作用

摘要: Contact angle and pore size are important factors affecting soil wettability, permeability and capillarity. In order to further understand the capillary characteristics and permeability of unsaturated loess, the contact angle test and mercury intrusion test of unsaturated loess were carried out. The relationship between pore size and contact angle was analyzed in details. Moreover, the variation of pore and contact angle with depth was discussed. It is found that the contact angle of loess in the dry state is higher than the contact angle of loess in the natural state; as the depth of the formation increases, the contact angle increases; the contact angle is negatively correlated with the large and medium pore volume, whereas is positively correlated with the micropore volume. Additionally, in the shallow part of the stratum, the contact angle is positively correlated with the small pore volume, while for the deep stratum, the contact angle is negatively correlated with the small pore volume. In unsaturated loess, the content of small pores and micropores is relatively large, while the content of large and medium pores is relatively small.

摘要: 接触角及孔径是影响土壤润湿性、渗透性及毛细作用的重要因素。为了进一步认识非饱和黄土的毛细特性及渗透性,进行了非饱和黄土的接触角测试及压汞试验,对黄土孔隙体积与接触角的关系进行了分析,探讨了孔隙、接触角随深度的变化规律。研究发现,干燥状态下黄土的接触角高于天然状态下黄土的接触角;随着地层深度的增加,接触角增大;接触角与大、中孔隙体积为负相关关系,与微孔隙体积为正相关关系。在地层浅部,接触角与小孔隙体积为正相关关系,而对于深部地层,接触角与小孔隙体积为负相关关系;非饱和黄土中小孔隙及微孔隙含量较大,大、中孔隙含量相对较少。

入藏号: CSCD:6607857

地址: Jing Yanlin, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wang Hao, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Tao Chunliang, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Liu Jianwei, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wen Xin, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Yang Lina, China JIKAN Research Institute of Engineering Investigations and Design Co. Ltd., Xi'an, Shaanxi 710043, China.

地址: 井彦林, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

王昊, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

陶春亮, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.
刘建维, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.
温馨, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.
杨丽娜, 机械工业勘察设计研究院有限公司, 西安, 陕西 710043, 中国.
电子邮件地址: yanlinjing86@163.com
电子邮件地址: yanlinjing86@163.com
使用次数 (最近 180 天): 0
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第 14 条, 共 60 条

作者: Liu Xi; Wu Tao; Liu Yibin

作者: 刘喜; 吴涛; 刘毅斌

标题: STUDY ON PROBABILISTIC SHEAR STRENGTH MODEL FOR DEEP FLEXURAL MEMBERS BASED ON BAYESIAN-MCMC

标题: 基于 Bayesian-MCMC 方法的深受弯构件受剪概率模型研究

来源出版物: 工程力学 卷: 36 期: 11 页: 130-138 出版年: 2019

文献号: 1000-4750(2019)36:11<130:JYBMFF>2.0.TX;2-W

来源出版物: Engineering Mechanics 卷: 36 期: 11 页: 130-138 出版年: 2019

文献号: 1000-4750(2019)36:11<130:JYBMFF>2.0.TX;2-W

语言: Chinese

文献类型: Article

作者关键词: deep flexural member; shear capacity; Bayesian theory; the Markov Chain Monte Carlo method; probabilistic model

作者关键词: 深受弯构件; 受剪承载力; 贝叶斯理论; MCMC 方法; 概率模型

摘要: A shear analytical model for deep beams was investigated considering the influences of objective and subjective uncertainties, and parameters in the probabilistic model of deep beams were simulated based on the R programming language, the process of which introduced Bayesian posteriori parameter estimation theory and the Markov Chain Monte Carlo (MCMC) method. As a result, the most optimal values and the reliability of model parameters were presented, simultaneously a probabilistic shear model for reinforced concrete deep beams was established and a comparison of before and after the model was conducted. Finally, the characteristic shear strengths of deep beams were achieved on the basis of different confidence levels. The research results show that the MCMC method assumed a credible reliability owing to the 50000 times of iterations by which the calculation was obtained, and it was presented that the posteriori probability model possessed a better agreement with test results than that of a prior probability model, while the posteriori model shows less discreteness.

摘要: 考虑主观、客观不确定性因素的影响,以深受弯构件受剪分析模型为研究对象,基于引入马尔科夫链-蒙特卡洛(MCMC)高效采样方法,通过 R 语言对深受弯构件概率模型参数进行 MCMC 随机模拟,给出参数的最优估计值及其对应的可信度,在先验模型基础上建立钢筋混凝土深受弯构件受剪承载力概率模型,完成模型前后的对比分析,并根据不同置信水平确定了深受弯构件受剪承载力的特征值。结果表明:基于 MCMC 方法得到的受剪承载力概率模型是在 50000 次迭代分析后产生的结果,能合理地解释影响参数的不确定性,可信度较高;后验概率模型计算结果与试验结果吻合良好,较先验模型更接近试验值,且离散性小。

入藏号: CSCD:6607484

地址: Liu Xi, School of Civil Engineering, Changan University, Xi'an, Shaanxi 710061, China.

Wu Tao, School of Civil Engineering, Changan University, Xi'an, Shaanxi 710061, China.

Liu Yibin, School of Civil Engineering, Changan University, Xi'an, Shaanxi 710061, China.

地址: 刘喜, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

吴涛, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

刘毅斌, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: lliuxii@163.com; wutao@chd.edu.cn; 471868217@qq.com

电子邮件地址: lliuxii@163.com; wutao@chd.edu.cn; 471868217@qq.com

使用次数 (最近 180 天): 0

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作者: Gao Ying; Li Peidong; Gao Junfa

作者: 高颖; 李沛东; 高俊发

标题: Study on inhibition of sulfide in sewer networks by free ammonia in urine

标题: 黄水中游离氨对污水管网硫化物的抑制研究

来源出版物: 应用化工 卷: 48 期: 10 页: 2525-2528 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: free ammonia; sulfide; sewer networks

作者关键词: 游离氨; 硫化物; 污水管网

摘要: The generation of sulfide in the sewage pipe network is an important cause of the fouling of pipe network corrosion. The current solution strategy is based on pharmaceutical dosage, which is costly and not environmentally friendly. At present, more advanced environmentally friendly

research is based on the preparation of free nitrous acid based on urine. Free ammonia is also used as a product of urine decomposition, and it is worth considering and verifying whether it inhibits sulfide. In this paper, by constructing a laboratory-scale reactor to simulate the biofilm of the pipe network, the inhibitory effect of free ammonia in the urine and diluted ten times of urine on the production of sulfide in the biofilm of the pipe network was studied. Batch experiments were performed before and after the soaking process to observe changes in other indicators. The results show that the continuous addition of ten times diluted urine can effectively inhibit the production of sulfide and methane in the pipe network.

摘要: 污水管网中硫化物的产生是造成管网腐蚀恶臭的重要原因, 现在的解决策略以药剂投加为主, 费用高昂且不够环保, 目前较为前沿且环境友好的研究有基于黄水中游离亚硝酸实现对管网硫化物的控制。游离氨同样作为黄水分解的产物, 是否也对硫化物有抑制作用值得思考和验证。通过构建实验室规模的反应器模拟管网生物膜情况, 分别研究了未经稀释和稀释 10 倍黄水中的游离氨投加对管网中生物膜产生硫化物的抑制效果, 并在投加前后和浸泡过程中做周期实验观测其他指标的变化。结果表明, 利用 10 倍稀释的黄水进行连续投加可有效抑制管网中硫化物和甲烷的产生。

入藏号: CSCD:6604906

地址: Gao Ying, College of Architectural Engineering, Changan University, Xian, 710016.

Li Peidong, College of Architectural Engineering, Changan University, Xian, 710016.

Gao Junfa, College of Architectural Engineering, Changan University, Xian, 710016.

地址: 高颖, 长安大学建筑工程学院, 西安, 陕西 710016, 中国.

李沛东, 长安大学建筑工程学院, 西安, 陕西 710016, 中国.

高俊发, 长安大学建筑工程学院, 西安, 陕西 710016, 中国.

电子邮件地址: 867161026@qq.com

电子邮件地址: 867161026@qq.com

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

引用的参考文献数: 10

在中国科学引文数据库中的被引频次: 0

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作者: Liu Xi; Wu Tao; Yang Xue; Wei Hui; Li Pengzhi

作者: 刘喜; 吴涛; 杨雪; 魏慧; 李鹏志

标题: Mechanical Properties and Microstructure of Fiber Reinforced High-Strength Lightweight Aggregate Concrete

标题: 纤维增韧高强轻骨料混凝土力学性能与微观结构

来源出版物: 建筑材料学报 卷: 22 期: 5 页: 700-706,713 出版年: 2019

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文献号: 1007-9629(2019)22:5<700:XWZRGQ>2.0.TX;2-S

语言: Chinese

文献类型: Article

作者关键词: high-strength lightweight aggregate concrete; fiber reinforcement; mechanical property; microstructure; brittleness

作者关键词: 高强轻骨料混凝土; 纤维增韧; 力学性能; 微观结构; 脆性

摘要: The crushed shale ceramist was used to prepare LC60 high-strength lightweight aggregate concrete(HLWAC) specimens containing various types of fibers and different fiber volume fractions. Their mechanical properties were studied and the fiber reinforcement mechanism was clarified from microscopic viewpoint. The experimental results show that bonding characteristic between aggregates and cement paste of HLWAC is much superior to that of normal weight concrete. The splitting tensile strength and flexural strength are enhanced while no obvious effect on compressive strength is found. The reinforcement of fibers in HLWAC can be attributed to its bridging mechanism which can impede the development of cracks. Furthermore, the improvement provided by carbon fibers proves to be better than that provided by steel fibers.

摘要: 采用碎石型高强页岩陶粒制备了不同纤维类型和体积分数的 LC60 级纤维增韧高强轻骨料混凝土,研究了其力学性能,并从微观尺度揭示了纤维增韧机理.结果表明:高强轻骨料混凝土界面的黏结性能优于普通混凝土;纤维能够有效阻止高强轻骨料混凝土裂缝的发展,还可适当提高其抗压强度,并明显提高其抗折强度和劈裂抗拉强度,起到增强增韧的作用;钢纤维与水泥浆体的黏结性能良好,碳纤维可在高强轻骨料混凝土中均匀分散且与水泥浆体的黏结性能良好;相同体积分数下,碳纤维的增韧作用优于钢纤维.

入藏号: CSCD:6604541

地址: Liu Xi, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Wu Tao, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Yang Xue, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Wei Hui, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Li Pengzhi, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 刘喜, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

吴涛, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

杨雪, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

魏慧, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

李鹏志, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: xliu1205@126.com; wutao@chd.edu.cn

电子邮件地址: xliu1205@126.com; wutao@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Yuan Chunyan; Zheng Gaokai; Lang Yujia; Wang Pengfei

作者: 袁春燕; 郑高凯; 郎雨佳; 王鹏飞

标题: Study on fire characteristics of ancient buildings with brick-wood structure under different fire scenes

标题: 考虑不同场景的砖木结构古建筑火灾特征研究

来源出版物: 中国安全生产科学技术 卷: 15 期: 10 页: 158-164 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: brick-wood structure; ancient building; fire simulation; fire parameters; visibility

作者关键词: 砖木结构; 古建筑; 火灾模拟; 火灾参数; 能见度

摘要: In order to study the characteristics of ancient buildings with brick-wood structure in the fire scene, the change of internal temperature, smoke concentration and other parameters in the building under different fire scenes was analyzed quantitatively. Taking the actual situation of Jia-ancestral shrine in Dangjia Village of Hancheng City as the research object, which was the typical courtyard house with the brick-wood structure system in north China, the change of temperature, CO concentration and visibility at different time points under different fire scenes was studied by using the PyroSim modeling and analysis. The results showed that the main wing room of Jia-ancestral shrine was relatively closed, and in the fire, the peak temperature around the fire source could reach 750 °C, the maximum molar concentration of CO was 0.005 mol/mol, the mass concentration was 0.003 kg/m³, the visibility was almost 0 m, the maximum wind speed was 10 m/s and extremely unstable. The space layout of the main wing room in the courtyard house was high, and the influence of these parameters in the fire would lead to the occurrence of serious flashover phenomenon, so the fire in this place was more likely to cause serious damage. The research on the development laws of important fire factors for the ancient buildings with brick-wood structure under different fire scenes could provide scientific reference and basis for the performance-based fire protection of ancient buildings.

摘要: 为探明砖木结构古建筑火场下的特征, 定量分析不同火灾场景下, 建筑内部温度、烟气浓度等参数的变化。选取中国北方典型的砖木结构体系的四合院韩城党家村贾祖祠为研究对象, 采用 PyroSim 建模分析, 研究不同火灾场景下不同时间点的温度、CO 浓度、能见度等变化。研究表明: 贾祖祠主厢房较封闭, 火灾中火源周围温度峰值可达 750 °C, CO 质量浓度达到 0.003 kg/m³, 能见度几乎为 0 m, 风速最高为 10 m/s 且极不稳定; 四合院中主厢房空间布局高, 火灾中这些参数的影响会导致严重的轰燃现象发生, 故此处发生火灾更易产生严重危害。对不同场景的砖木结构古建筑重要火灾因素发展规律的研究, 能为古建筑的性能化防火提供科学参考依据。

入藏号: CSCD:6601066

地址: Yuan Chunyan, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061,

China.

Zheng Gaokai, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Lang Yujia, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wang Pengfei, Zhengzhou YONGWei Real Estate Co.Ltd., Zhengzhou, Henan 450046, China.

地址: 袁春燕, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

郑高凯, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

郎雨佳, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

王鹏飞, 郑州市永威置业有限公司, 郑州, 河南 450046, 中国.

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作者: Dai Yan; Nie Shaofeng; Zhou Tianhua

作者: 戴岩; 聂少锋; 周天华

标题: Seismic Behavior of Circular Steel Tube-Confined H-Steel Reinforced Concrete Column-Steel Frame Ring Beam Joint

标题: 环梁式圆钢管约束 H 型钢混凝土柱-钢梁节点的抗震性能

来源出版物: 华南理工大学学报. 自然科学版 卷: 47 期: 5 页: 110-122 出版年: 2019

文献号: 1000-565X(2019)47:5<110:HLSYGG>2.0.TX;2-B

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文献号: 1000-565X(2019)47:5<110:HLSYGG>2.0.TX;2-B

语言: Chinese

文献类型: Article

作者关键词: ring beam; seismic behavior; circular steel tube-confined H-steel reinforced concrete column; axial compression; line stiffness ratio; variable parameter

作者关键词: 环梁; 抗震性能; 圆钢管约束 H 型钢混凝土柱; 轴压比; 线刚度比; 变参数

摘要: In this paper, a circular steel tube-confined H-steel reinforced concrete column-steel frame ring beam joint was designed, and a full-scale three-dimension finite element analysis model of the specimen was established. Then, the hysteretic curves, skeleton curves and failure modes of the specimens were calculated, and the results were compared with those obtained by experiments, with good accordance being found. Moreover, a finite-element variable parameter analysis was carried out to reveal the effects of axial compression ratio, concrete strength and line stiffness ratio on the seismic behavior of specimens. Finally, an improved node form of beam end-weakening flange was put forward. The results show that (1) with the increase of axial

compression ratio,the energy dissipation and ductility of the specimen decrease significantly;(2) the change of concrete strength has little effect on the hysteretic behavior of specimens;(3) the bearing capacity,ductility and seismic energy dissipation performance of the joints all increase significantly with the increase of beam-column linear stiffness ratio when the column section remains unchanged and only the steel beam size varies;(4) when the section of steel beam remains unchanged and the steel content in the column varies,the change of seismic behavior of the joint with the line stiffness ratio of beam to column is not obvious;and (5) the adoptin of beam end-weakening flange helps to move the plastic hinge far away from the joint area without remarkably reducing the bearing capacity and energy dissipation performance of the specimen,thus protecting the joint area more effectively.The above-mentioned relevant conclusions lay a theoretical foundation for the application of this new type of joint.

摘要: 设计了一种环梁式圆钢管约束 H 型钢混凝土柱-钢梁节点,并建立了该试件的全尺寸三维有限元分析模型,计算得到了此类节点试件的滞回曲线、骨架曲线及破坏模式,经与试验结果进行对比,两者吻合良好.在此基础上,对试件进行有限元变参数分析,考察了轴压比、混凝土强度、梁柱线刚度等对试件抗震受力性能的影响,同时提出了一种改进型梁端削弱翼缘的节点形式.结果表明:随轴压比增大,试件的耗能及延性性能明显下降;混凝土强度的变化对试件滞回性能影响不大;当保持柱截面不变,仅变换钢梁尺寸时,节点的承载力、延性及抗震耗能性能均随梁-柱线刚度比的增大而显著增大;而当保持钢梁截面不变,仅改变柱内型钢含钢率时,节点抗震受力性能随梁-柱线刚度比的变化并不明显;改进的梁端翼缘削弱形式的试件可在不明显降低其承载力及耗能性能的情况下,将塑性较外移至距节点区较远的地方,从而更好地保护节点区.上述研究结论可为此类新型节点的应用提供理论基础.

入藏号: CSCD:6596121

地址: Dai Yan, School of Civil Engineering,Chang'an University;;Xi'an Traffic Construction Quality Supervision Station, ;; Xi'an;;Xi'an, Shaanxi;;Shaanxi 710061;;710065.

Nie Shaofeng, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Zhou Tianhua, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 戴岩, 长安大学建筑工程学院;;西安交通基本建设工程质量监督站, ;; 西安;;西安, 陕西;;陕西 710061;;710065, 中国.

聂少锋, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

周天华, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: 783041867@qq.com

电子邮件地址: 783041867@qq.com

使用次数 (最近 180 天): 0

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作者: Sui Xuemin; Wang Huajiang; Jiang Chao

作者: 隋学敏; 王华江; 江超

标题: Study on Thermal Environment Response Characteristics of Intermittently Cooled Room by Tube-embedded Envelope

标题: 内嵌管式围护结构间歇供冷房间热环境响应特性研究

来源出版物: 流体机械 卷: 47 期: 9 页: 78-83 出版年: 2019

文献号: 1005-0329(2019)47:9<78:NKGSWH>2.0.TX;2-#

来源出版物: Fluid Machinery 卷: 47 期: 9 页: 78-83 出版年: 2019

文献号: 1005-0329(2019)47:9<78:NKGSWH>2.0.TX;2-#

语言: Chinese

文献类型: Article

作者关键词: tube-embedded building envelope; intermittent cooling; thermal environment; dynamic response

作者关键词: 内嵌管式围护结构; 间歇供冷; 热环境; 动态响应

摘要: TRNSYS software was used to simulate the dynamic response of thermal environment of intermittently cooled room with tubeembedded building envelope cooling system by selecting typical office building as the research object.The research results show that the tube-embedded building envelope has significant heat storage and release characteristics under intermittent cooling condition.The maximum value of the heat flux density of it appears about one hour after the stop of cooling;Intermittent operation will not cause indoor thermal environment parameters fluctuate significantly,and can keep indoor temperature basically stable;The internal wall also has heat storage and release characteristics under intermittent cooling condition,but its cooling capacity is very small and is negligible;Both indoor air temperature and the required cooling capacity of the system are not very different under the two conditions including night cooling and daytime cooling.Night cooling has no obvious energy saving advantage compared with daytime cooling.Night cooling can reduce chiller's installed capacity by about 25%. In addition,night cooling can use electricity with low valley price to save system operating costs,so it is recommended to adopt night cooling for economic reason.The results can provide theoretical guidance for the intermittent operation of tubes-embedded building envelope cooling system.

摘要: 采用 TRNSYS 软件,针对典型办公建筑,对内嵌管式围护结构间歇供冷下房间热环境动态响应特性进行了模拟研究。研究结果表明间歇供冷下内嵌管式围护结构供冷构件存在显著的蓄放热特性,供冷构件热流密度最大值出现在供冷停止后 1 h 左右;间歇运行不会引起室内热环境参数大幅度波动,可保持室内温度基本稳定;间歇供冷下内墙也存在蓄放热特性,但其释冷量很小,可忽略不计;夜间供冷和日间供冷下室内空气温度及系统所需供冷量均差异不大,夜间供冷无明显节能优势。夜间供冷可减小冷水机组装机容量 25%左右,且可利用低谷电价节省运行费用,从经济性角度建议采用夜间供冷。研究结果可为内嵌管式围护结构供冷系统的运行调控提供理论指导。

入藏号: CSCD:6593958

地址: Sui Xuemin, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Wang Huajiang, School of Civil Engineering,Chang'an University;;Beijing Zhongrui Electronic Systems Engineering Design Institute Co.,Ltd., ;; Xi' an;; ;;Beijing 710061;;100040.

Jiang Chao, School of Civil Engineering,Chang'an University, Xi' an, 710061.

地址: 隋学敏, 长安大学建工学院, 西安, 陕西 710061, 中国.

江超, 长安大学建工学院, 西安, 陕西 710061, 中国.

王华江, 长安大学建工学院;;北京中瑞电子系统设计院有限公司, ;;, 西安;;, ;;北京 710061;;100040.

电子邮件地址: suixuemin@163.com

电子邮件地址: suixuemin@163.com

使用次数 (最近 180 天): 0

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作者: Guan Yu; Zhou Xuhong; Shi Yu; Yao Xinmei

作者: 管宇; 周绪红; 石宇; 姚欣梅

标题: Study on Calculation Method for In-plane Stiffness and Bearing Capacity of Thin-walled Steel Composite Floor

标题: 轻钢组合楼盖面内刚度和承载力计算方法研究

来源出版物: 湖南大学学报. 自然科学版 卷: 46 期: 9 页: 31-43 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: cold-formed thin-walled steel; floors; stiffness and load-carrying capacity; calculation method; rigid floor

作者关键词: 冷弯薄壁型钢; 楼盖; 刚度和承载力; 计算方法; 刚性楼盖

摘要: In order to investigate the in-plane stiffness and bearing capacity of cold-formed thin-walled steel composite floor, a floor model was established through ABAQUS software and verified by the in-plane cyclic loading test results. Further, the effect of different parameters on the in-plane stiffness and bearing capacity of the floor model was studied. The results showed that the influence of the joist size, the opening area and spacing of joist web, flat strap and blocking layout on the in-plane stiffness and bearing capacity of composite floors was insignificant. The in-plane stiffness and bearing capacity of composite floors can be improved by decreasing the screw spacing and the length-to-width ratio of floor. The change of slab thickness in the range of 20~40 mm had a certain effect on the in-plane stiffness and bearing capacity of composite floors. Based on the failure modes and mechanical behavior of composite floors, the ultimate bearing capacity

of floor can be estimated by the load-carrying capacity of the single self-tapping screw and the number of self-tapping screws connected on both sides of floor. The calculation method for in-plane stiffness of composite floors was established based on the degenerate quadri-polyline model, which provided a theoretical basis for engineering design and application of thin-walled steel floors.

摘要: 为研究冷弯薄壁型钢组合楼盖的面内刚度和承载能力,采用 ABAQUS 软件建立楼盖有限元模型,通过轻钢楼盖面内滞回试验结果进行验证.研究不同参数对楼盖模型面内刚度和承载力的影响规律,结果表明:改变楼盖梁尺寸、楼盖梁腹板开孔面积和间距以及扁钢带和刚性支撑件的布置方式对楼盖面内刚度和承载力影响较小,减小自攻螺钉连接间距和组合楼盖的长宽比能提高组合楼盖的面内刚度和承载力,在 20~40mm 范围内改变楼板厚度对组合楼盖面内刚度和承载力存在一定影响.基于组合楼盖的破坏模式和受力机理,楼盖的面内极限承载力可通过单颗自攻螺钉连接的承载力和楼盖两侧自攻螺钉连接的数量进行估算.基于退化四折线模型,建立组合楼盖面内刚度的计算方法,为轻钢楼盖的工程设计与应用提供理论依据.

入藏号: CSCD:6588833

地址: Guan Yu, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Yao Xinmei, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhou Xuhong, School of Civil Engineering, Chang'an University;;School of Civil Engineering, Chongqing University, ;; Xi'an;;, ;Chongqing 710061;;400045.

Shi Yu, School of Civil Engineering, Chongqing University, Chongqing 400045.

地址: 管宇, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

姚欣梅, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

周绪红, 长安大学建筑工程学院;;重庆大学土木工程学院, ;, 西安;;, 陕西;;重庆 710061;;400045, 中国.

石宇, 重庆大学土木工程学院, 重庆 400045, 中国.

电子邮件地址: guanyu88927@163.com

电子邮件地址: guanyu88927@163.com

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作者: Wang Tianya; Wang Yihong; Wu Qinrong

作者: 王天涯; 王毅红; 吴琴容

标题: Experimental Study of Interlocking Compressed Earth Block Masonry under Shear-compression Composite Action

标题: 自嵌固生土砖砌体剪压复合受力试验研究

来源出版物: 湖南大学学报. 自然科学版 卷: 46 期: 9 页: 62-68 出版年: 2019

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语言: Chinese

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作者关键词: interlocking compressed earth block masonry; shear strength; failure mechanism; correlation of shear-compression; experimental study

作者关键词: 自嵌固生土砖砌体; 抗剪强度; 破坏机理; 剪压相关性; 试验研究

摘要: In order to study the bearing capacity of the occlusal part of interlocking compressed earth block (ICEB) masonry under shear-compression composite action, shear-compression composite test was performed on 18 ICEB masonry specimens under various vertical loads. The mechanical properties, failure mechanism and correlation between compression and shear stress were investigated. The results show that the interlocking of the brick can play a pinning effect, showing a better shear capacity. The main causes of the three types of failure mode of masonry were analyzed and summarized, and shear-compression strength formula was proposed compared with the formula by maximum tensile theory. It is found that the shear strength of the masonry calculated by the maximum tensile stress failure theory is safe and reliable, but conservative. The results of the study can provide the experimental results and theoretical basis for further research and design, as well as the application of the masonry mechanical properties.

摘要: 为了研究自嵌固生土砖砌体嵌固部位在剪压复合作用下的承载能力,在考虑其承受不同上部竖向荷载的情况下对18个自嵌固生土砖砌体试件进行了剪压复合受力试验,探究其受力性能、破坏机理及剪压相关性.试验表明砖体间咬合嵌固可起到销栓作用,表现出较好的抗剪能力.分析总结了砌体剪切、剪压和斜压三类破坏形态产生的主因,提出了自嵌固生土砖砌体剪压复合受力下砌体的抗剪强度计算公式,并与传统主拉应力破坏理论中砌体抗剪强度计算方法进行了对比,发现主拉应力破坏理论计算出的砌体抗剪承载力安全可靠,但较为保守.研究可为自嵌固生土砖砌体力学性能的进一步研究及设计应用提供试验成果及理论依据.

入藏号: CSCD:6588836

地址: Wang Tianya, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wang Yihong, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wu Qinrong, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 王天涯, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

王毅红, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

吴琴蓉, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: wangyh@chd.edu.cn

电子邮件地址: wangyh@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Gou Haigang; Xing Guohua; Wu Mingyang; Zhang Pengyao; Chang Zhaoqun; Yu Xiaoguang

作者: 苟海刚; 邢国华; 武名阳; 张蓬瑶; 常召群; 于晓光

标题: Experiment on the Flexural Behavior of Reinforced Concrete Beams Strengthened with NSM Aluminum Alloy/GFRP Bars

标题: 铝合金/GFRP 筋近表面嵌入式增强钢筋混凝土梁抗弯性能试验

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作者关键词: bridge engineering; aluminum alloy; hybrid strengthening; concrete beam; failure mode; ductility

作者关键词: 桥梁工程; 铝合金; 混合加固; 混凝土梁; 破坏模式; 延性

摘要: To study the flexural behavior of reinforced concrete beams strengthened with nearsurface mounted (NSM)aluminum alloy/glass fiber reinforced polymer (GFRP)bars,five concrete beam specimens with several main variables including strengthening manner,NSM reinforcement type,and NSM reinforcement ratio were designed for a monotonic static loading test.This study investigated the failure modes and failure characteristics of strengthened concrete beams.Test results show that reinforced concrete beams strengthened with NSM aluminum alloy or GFRP bars can increase the flexural strength.Compared with the reference beam,under same NSM reinforcement amount,the increases in the ultimate loads of beams strengthened with NSM GFRP,aluminum alloy/GFRP,and aluminum alloy bars are 105.8%,45.7%,and 17.5%, respectively.The ductility of NSM GFRP bars strengthened beams considerably decreases and brittle failure modes are observed,but the ductility of the beam specimens strengthened with NSM aluminum alloy and/or GFRP bars is equal to that of the reference beam.The specimens strengthened with NSM GFRP and aluminum alloy bars fail by concrete cover separating and concrete crushing after yielding of the tension reinforcement,respectively.However,the beam specimen strengthened with NSM aluminum alloy/GFRP bars initially exhibits debonding between GFRP bars and the concrete cover and is followed by concrete crushing with increasing the mid-span displacement,the process of failure is shown to have two safeguards.Based on the test results,the theoretical calculation model and engineering practical model for the flexural capacity of NSM strengthened beams are presented using the section analysis method.The calculation results show that the predicted values have good agreement with the test results for the ultimate bending moment of NSM strengthened beams,where the mean ratio of experimental results to theoretical predicted values and engineering practical predicted values is 1.081 and

1.063,respectively,with a variance of 0.003 and 0.005.

摘要: 为研究铝合金/玻璃纤维增强复合材料(GFRP)筋近表面嵌入式加固混凝土梁的抗弯性能,以加固方式、加固筋类型和加固量为变量,设计了 5 根钢筋混凝土梁试件进行单调静载试验,重点分析了混凝土加固梁的破坏模式和破坏特征。研究表明:采用铝合金筋或 GFRP 筋嵌入式加固后混凝土梁的受弯承载力均显著提高;加固量相同时,GFRP 筋加固梁、铝合金/GFRP 筋混合加固梁和铝合金筋加固梁的极限荷载比未加固梁分别提高了 105.8%、45.7%和 17.5%,但混凝土梁采用 GFRP 筋加固后延性降低、脆性突出,而采用铝合金/GFRP 筋混合加固或铝合金加固后混凝土梁的延性则与对比梁相当;GFRP 筋嵌入式加固梁和铝合金筋嵌入式加固梁分别发生了混凝土保护层剥落破坏和加固筋屈服后混凝土压溃破坏,而铝合金/GFRP 筋混合加固梁则先是 GFRP 筋与混凝土保护层发生剥离,之后随着作用跨中位移的持续增大,受压区混凝土发生压溃,破坏过程有两重防线。在试验研究基础上,采用截面分析法给出了嵌入式加固梁抗弯强度的理论计算模型与工程实用模型,计算结果表明:加固梁极限弯矩的试验值与理论预测值之比及与实用模型计算值之比的平均值分别为 1.081 和 1.063,方差分别为 0.003 和 0.005,吻合较好。

入藏号: CSCD:6567799

地址: Gou Haigang, School of Civil Engineering,Chang'an University;;Infrastructure Projects Office,Chang'an University, ;; Xi'an;;Xi'an, Shaanxi;;Shaanxi 710061;;710064.

Xing Guohua, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Wu Mingyang, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Pengyao, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Chang Zhaoqun, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Yu Xiaoguang, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 苟海刚, 长安大学建筑工程学院;;长安大学基建处, ;; 西安;;西安, 陕西;;陕西 710061;;710064, 中国.

邢国华, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

武名阳, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

张蓬瑶, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

常召群, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

于晓光, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: gouhg@chd.edu.cn; ghxing@chd.edu.cn

电子邮件地址: gouhg@chd.edu.cn; ghxing@chd.edu.cn

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作者: Liu Xing; Liu Wenli; Chen Xing; Jiang Xia; Guo Jifeng; Lu Ying; Huang Wei

作者: 刘星; 柳文莉; 陈星; 姜霞; 郭冀峰; 陆莹; 黄威

标题: Efficiency and mechanism of nutrient removal using modified sediments from a malodorous river

标题: 改性黑臭河道沉积物对营养盐去除的研究

来源出版物: 湖泊科学 卷: 31 期: 5 页: 1229-1238 出版年: 2019

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作者关键词: Malodorous river; modified; sediments; nutrient; adsorption

作者关键词: 黑臭河道; 改性; 沉积物; 营养盐; 吸附

摘要: In order to study the method of sediment resource utilization in the malodorous river, and to evaluate the nutrient removal efficiency using modified sediment and its removal mechanism, the sediment samples (S) from a seriously malodorous river in Beijing were collected in this study. The sediment was modified by oxidation and metal ion-loaded (MS). The nutrient removal efficiency for S and MS was evaluated. The removal mechanism of nutrient was studied through kinetics, equilibrium, and thermodynamic experiments. The results indicated that when the environmental temperature was 35°C, and solid to liquid ratio was 1 : 50 (g : ml), the nitrogen (initial concentration, 20 mg/L) and phosphorus (initial concentration, 10 mg/L) removal efficiency by using MS was up to 90% and 98%, respectively. The pseudo-second-order model could better describe the sorption kinetics ($R^2 > 0.93$), and the kinetic and isotherm study illustrated that data from the isotherm experiments were well described by Langmuir isotherm model. The sorption capacity reached 0.891 mg/g for nitrogen and 0.474 mg/g for phosphorus, respectively. The thermodynamic result suggested that enthalpy (ΔH^0) and entropy (ΔS^0) were positive, and Gibbs energy (ΔG^0) was negative during the adsorption experiments. The values of ΔG^0 decreased with the increase of temperature. The results showed that MS had the higher nutrient sorption capacity, and the exterior activated site had the main function of phosphorus and nitrogen sorption. The sorption process was a spontaneous or endothermic reaction, and high temperature was in favour of sorption. In addition, the results also indicated that desorption occurred more easily than sorption at the same temperature.

摘要: 为研究黑臭河道沉积物资源化利用方式, 评估沉积物资源化以后对营养盐去除效果和其去除机制, 以北京市某黑臭河道沉积物(S)为供试样品, 对其进行氧化并负载金属离子改性, 最终得到氧化载钠改性沉积物(MS)。选取 S 和 MS 两种材料, 评估其对氮和磷的去除效果, 通过采用动力学、热力学等手段, 进一步阐明改性材料对氮、磷去除机制。结果表明, 在环境温度为 35°C, 固液比 1 : 50(g : ml) 的条件下, 经氧化载钠联合改性材料对氮(初始浓度 20 mg/L) 的去除效果均达到 90% 以上, 其中对磷(初始浓度 10 mg/L) 的去除率最高可达 98%; 准二级动力学模型能更好地描述改性材料的吸附动力学行为($R^2 > 0.93$), 且动力学和吸附等温分析结果显示, Langmuir 模型可以更好地描述两种材料的吸附等温线, 改性材料对氮和磷的最大吸附量分别达到 0.891 和 0.474 mg/g; 热力学研究结果表明, 吸附过程中, 标准反应焓变 (ΔH^0)、标准反应熵变 (ΔS^0) 均为正值, 标准吉布斯自由能变 (ΔG^0) 为负值, 且随着温度的升高, ΔG^0 呈下降趋势。研究显示, MS 具有更高的吸附性能, 对氮、磷的吸附主要是材料表面活性吸附点位起主导作用, 并且吸附过程是个吸热、自发进行的过程, 更高的温度

更有利于吸附.在同一温度下,随着氮、磷初始浓度的增加,MS 对氮、磷的解吸比吸附过程更容易发生.

入藏号: CSCD:6568152

地址: Liu Xing, Chang'an University, School of Architecture and Engineering;;Chinese Research Academy of Environmental Sciences, Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas,Ministry of Education;;National Engineering Laboratory for Lake Pollution Control and Ecological Restoration, Xi'an;; ;Beijing 710054;;100012.

Liu Wenli, Chinese Research Academy of Environmental Sciences, National Engineering Laboratory for Lake Pollution Control and Ecological Restoration, Beijing 100012, China.

Chen Xing, Chinese Research Academy of Environmental Sciences, National Engineering Laboratory for Lake Pollution Control and Ecological Restoration, Beijing 100012, China.

Jiang Xia, Chinese Research Academy of Environmental Sciences, National Engineering Laboratory for Lake Pollution Control and Ecological Restoration, Beijing 100012, China.

Lu Ying, Chinese Research Academy of Environmental Sciences, National Engineering Laboratory for Lake Pollution Control and Ecological Restoration, Beijing 100012, China.

Guo Jifeng, Chang'an University, School of Architecture and Engineering, Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas,Ministry of Education, Xi'an, Shaanxi 710054, China.

Huang Wei, Chinese Research Academy of Environmental Sciences;;College of Environmental Science and Engineering,Donghua University, National Engineering Laboratory for Lake Pollution Control and Ecological Restoration;; ;, ;, ; Beijing;;Shanghai 100012;;201620.

地址: 刘星, 长安大学建筑工程学院;;中国环境科学研究院, 旱区地下水文与生态效应教育部重点实验室;;湖泊水污染治理与生态修复技术国家工程实验室, 西安;; ;北京 710054;;100012.

柳文莉, 中国环境科学研究院, 湖泊水污染治理与生态修复技术国家工程实验室, 北京 100012, 中国.

陈星, 中国环境科学研究院, 湖泊水污染治理与生态修复技术国家工程实验室, 北京 100012, 中国.

姜霞, 中国环境科学研究院, 湖泊水污染治理与生态修复技术国家工程实验室, 北京 100012, 中国.

陆莹, 中国环境科学研究院, 湖泊水污染治理与生态修复技术国家工程实验室, 北京 100012, 中国.

郭冀峰, 长安大学建筑工程学院, 旱区地下水文与生态效应教育部重点实验室, 西安, 陕西 710054, 中国.

黄威, 中国环境科学研究院;;东华大学环境科学与工程学院, 湖泊水污染治理与生态修复技术国家工程实验室;; ;, ;, ;北京;;上海 100012;;201620, 中国.

电子邮件地址: m17602924013@163.com; yixinghd6@163.com

电子邮件地址: m17602924013@163.com; yixinghd6@163.com

使用次数 (最近 180 天): 0

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作者: Zhang Changguang; Qi Hang; Cai Mingming; Gao Benxian

作者: 张常光; 祁航; 蔡明明; 高本贤

标题: Instability solution of translatory coal seam bumps based on the unified strength theory

标题: 基于统一强度理论的煤层平动冲击失稳解答

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作者关键词: coal bumps; translatory instability; unified strength theory; disturbance depth; width of plastic zone; intermediate principal stress

作者关键词: 冲击地压; 平动失稳; 统一强度理论; 扰动深度; 塑性区宽度; 中间主应力

摘要: The unified strength theory was adopted as a yield criterion to describe an improving effect of intermediate principal stress on the coal seam strength for the determination of plastic zone in coal seam. Then, instability solutions such as the coal seam stress, the disturbance depth and the width of plastic zone were derived for preceding translatory coal seam bumps. Furthermore, the comparability analysis and verification of the proposed solution were compared with existing results available in the literature. Finally, parametric studies were carried out to investigate the intermediate principal stress effect, the depth and thickness of coal seam, and the strength parameters of coal seam. It is found herein that the solutions proposed for the coal seam stress and the width of plastic zone are a set of orderly serialized results, so they have wide theoretical value and good engineering applications. Meanwhile, the validity of the proposed solution is demonstrated by comparing it with the results from Mohr-Coulomb criterion, Hoek-Brown criterion and Lippmann's theory. In addition, when the unified strength theory parameter b increases from 0 to 1, the damage range is decreased by 25.3%, and the expansion rate of plastic zone is decreased from 0.63 to 0.47. It means that the intermediate principal stress has a significant impact on the translatory coal seam bump. Therefore, the intermediate principal stress effect should be reasonably considered to achieve more potentials of coal seam. Moreover, when the support force increases from 0 to 1 MPa, the width of plastic zone is averagely decreased by 21.3%, which indicates that the support needs to firmly and effectively be constructed to reduce damage ranges. Besides, a deep coal seam has poor stability and its damage range is large, while a thin coal seam is more prone to display small-scale bumps and instability. It is profound to account for the changes of coal seam strength parameters including cohesion and internal friction angle as important strength indexes, due to that their influences are very significant in excavation designs, especially for the internal friction angle of coal seam.

摘要: 以统一强度理论作为煤层塑性区的屈服判据, 考虑中间主应力对煤层强度的提高作用,

建立了平动冲击失稳之前煤层的应力统一解、扰动深度解析式以及塑性区宽度统一解,对其进行可比性分析、文献已有解答的对比验证,探讨了中间主应力效应、煤层埋深与厚度、煤层强度参数对平动冲击失稳的影响特性。研究表明:本文所得应力统一解和塑性区宽度统一解均是一系列有序解答的集合,并得到文献 Mohr-Coulomb 准则解答、Hoek-Brown 准则解答以及 Lippmann 理论的验证,具有广泛的理论意义和良好的工程应用前景;当统一强度理论参数 b 从 0 增加到 1 时,煤层发生冲击失稳的破坏范围减小了 25.3%,冲击倾向性即塑性区扩展率由 0.63 减小到 0.47,这表明中间主应力对煤层平动冲击失稳的影响显著,应合理考虑中间主应力效应,以充分发挥煤层的承载潜力;支护力对煤层的塑性区宽度影响较大,当支护力从 0 增加到 1 MPa 时,塑性区宽度平均减小了 21.3%,需切实构筑有效支护以减小煤层平动冲击失稳的破坏范围;深埋煤层的稳定性较差、冲击失稳时破坏范围较大,另外厚煤层相比于薄煤层的稳定性较高,但发生冲击失稳的破坏范围更大;黏聚力和内摩擦角作为煤层的重要强度参数,对煤层平动冲击失稳的影响十分显著,开挖设计时应充分考虑煤层强度参数的变化,特别是内摩擦角。

入藏号: CSCD:6570615

地址: Zhang Changguang, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Qi Hang, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Cai Mingming, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Gao Benxian, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 张常光, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

祁航, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

蔡明明, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

高本贤, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: zcg1016@163.com

电子邮件地址: zcg1016@163.com

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作者: Lan Guanqi; Wang Yihong; Zhang Jianxiong; Dong Fei

作者: 兰官奇; 王毅红; 张建雄; 董飞

标题: Estimation of compressive strength of earth block masonry prisms based on artificial neural networks

标题: 基于人工神经网络的生土基础体抗压强度预测

来源出版物: 华中科技大学学报. 自然科学版 卷: 47 期: 8 页: 50-54 出版年:

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语言: Chinese

文献类型: Article

作者关键词: earth materials; masonry; compressive strength; artificial neural networks;
computational methods

作者关键词: 生土材料; 砌体; 抗压强度; 人工神经网络; 计算方法

摘要: This study used back propagation (BP) artificial neural networks to predict the compressive strength of masonry prisms formed by earth blocks and cement mortar or mud, by using three parameters: the height-to-thickness ratio of prisms and the compressive strength of the mortar and that of the blocks. A simplified formula for calculating the compressive strength of the earth masonry prism was proposed. The predicted results were compared with the experimental values and the calculated values of the existing formulas. The results show that the BP neural network model with 10 hidden layer neurons has a good predictive performance for the compressive strength of earth masonry. The accuracy and stability of the simplified formula are superior with the mean value of the ratio between the calculated value and the experimental value is 0.92, and the standard deviation is 0.28, which can be used to determine the compressive strength of earth masonry prisms.

摘要: 采用 BP 人工神经网络模型, 以砌体高厚比、块材强度及粘结剂强度作为输入变量, 以砌体抗压强度作为输出变量, 建立网络模型模拟输入变量和输出变量间的非线性关系, 提出了用于生土基础体抗压强度计算的简化公式, 并将模型预测结果与试验值、计算值进行了对比分析。结果表明: 在样本空间内, 本研究所建立的 10 隐含层神经元 BP 神经网络模型对生土基础体抗压强度具有较好的预测性能, 且简化公式的计算精度及稳定性均较好, 计算值与试验值的比值均值为 0.92, 方差为 0.28, 可用于对生土基础体单轴抗压强度的计算。

入藏号: CSCD:6564419

地址: Lan Guanqi, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wang Yihong, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Jianxiong, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Dong Fei, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 兰官奇, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

王毅红, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

张建雄, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

董飞, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: wangyh@chd.edu.cn

电子邮件地址: wangyh@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Bu Yonghong; Zhang Dongfang; Yan Liuxue; Niu Dongdong

作者: 卜永红; 张冬芳; 闫刘学; 牛东东

标题: Experimental study on seismic behavior of outer end-plate reinforced connection

标题: 外端板加强式节点抗震性能试验研究

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语言: Chinese

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作者关键词: concrete-filled square steel tubular column; steel beam; outer end-plate reinforced connection; experimental study; seismic behavior

作者关键词: 方钢管混凝土柱; 钢梁; 外端板加强式节点; 试验研究; 抗震性能

摘要: Due to the bolts loosening and even brittle fracture of the core-bolt and stiffened end-plate connection between concrete-filled square steel tubular column and steel beam under earthquake action, the welded connection and bolted-welded connection reinforced by outer end-plates were presented. Six concrete-filled steel tubular column and steel beam joints were tested under low-cyclic loading. The failure process and characteristics of the welded joints and bolted-welded joints reinforced by outer end-plates were analyzed and compared with the core-bolt and stiffened end-plate joint in different construction details and beam-to-column stiffness ratio, and the hysteretic loops, bearing capacity, ductility and energy dissipation, strength and stiffness degradation of the joints were also studied. The test results indicate that when the beam-to-column stiffness ratio is smaller, the failure modes of the two kinds of new joints are plastic hinge failure at the end of beams, which is same as the core-bolt and stiffened end-plate joint. However, when the beam-to-column stiffness ratio is larger, the weld crack failure occurs in the core zone of the welded connection reinforced by outer end-plates and the bending failure occurs in the column end of the bolted-welded connection reinforced by outer end-plates. Compared with the core-bolt and stiffened end-plate connection, the two types of new joints have higher bearing capacity and better safety reserve, full hysteretic loops, good seismic performance indicators, and meet the seismic design requirements of strong joint and weak component.

摘要: 提出外端板加强式焊接节点与栓焊混合节点构造形式. 通过 6 个钢管混凝土柱-钢梁节点的低周反复荷载试验, 分析并比较了外端板加强式焊接节点、栓焊混合节点与穿芯螺栓-加劲端板节点在不同构造、不同梁柱刚度比下的破坏过程及特征, 对节点的滞回曲线、承载能力、延性和耗能能力、强度与刚度退化等抗震性能进行了研究. 试验结果表明: 当梁柱刚度比

较小时,两种新型节点与穿芯螺栓-加劲端板节点均表现为梁端出现塑性铰破坏;当梁柱刚度比较大时,外端板加强式焊接节点发生核心区焊缝开裂破坏,外端板加强式栓焊混合节点发生柱端弯折破坏;与穿芯螺栓-加劲端板节点相比,两类新型节点具有更高的承载力和更好的安全储备,且滞回曲线饱满,各抗震性能指标较好,满足强节点弱构件的抗震设计要求.

入藏号: CSCD:6564422

地址: Bu Yonghong, School of Construction Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Dongfang, School of Construction Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Yan Liuxue, School of Construction Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Niu Dongdong, School of Construction Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 卜永红, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

张冬芳, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

闫刘学, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

牛东东, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: byh956@126.com

电子邮件地址: byh956@126.com

使用次数 (最近 180 天): 0

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作者: Liu Yunxiao; Li Xiaoguang; Zhang Chunmiao; Lu Boning

作者: 刘云霄; 李晓光; 张春苗; 吕泊宁

标题: Properties of Iron Tailing Sand Cement Based Grouting Material

标题: 铁尾矿砂水泥基灌浆料性能研究

来源出版物: 建筑材料学报 卷: 22 期: 4 页: 538-544 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: iron tailing sand; grouting material; rheology; interfacial transition zone

作者关键词: 铁尾矿砂; 灌浆料; 流变; 界面过渡区

摘要：Iron tailing sand was used as aggregate to prepare cement based grouting material. Compared with quartz sand grouting material(QG), the properties of iron tailing sand grouting material(ITG) were comprehensively analyzed. The results show that the rheological parameters of ITG are slightly different from QG, e.g. ITG has got slightly higher yield stress, almost the same plastic viscosity and slightly higher thixotropy, so the workability of ITG is slightly lower than that of QG. After hardening, the strength of ITG is slightly lower than that of QG. The porosity of ITG is lower than that of QG, and there are more harmless pores and less harmful pores in ITG. The hardness of iron tailing sand is lower than that of quartz sand, but in ITG, the interfacial transition zone is denser and the microhardness of the interface is slightly higher. It has little effect on the properties of grouting material that iron tailing sand instead of quartz sand as grouting aggregate, and has good technical feasibility.

摘要：分别用铁尾矿砂和石英砂为骨料来制备水泥基灌浆料，系统分析了不同骨料对水泥基灌浆料性能的影响。结果表明：用铁尾矿砂与石英砂配制的灌浆料在浆体富余系数为最佳值时，其流变学参数几乎一致，即适当的配合比设计能够保证铁尾矿砂灌浆料与石英砂灌浆料具有同等的施工性能；硬化后，铁尾矿砂灌浆料较石英砂灌浆料孔隙率更低，无害孔更多、少害孔及有害孔更少；铁尾矿砂自身硬度较石英砂低，但铁尾矿砂灌浆料界面过渡区更为密实，界面显微硬度略高。以铁尾矿砂替代石英砂作为灌浆料骨料，对灌浆料性能影响不大，具有良好的技术可行性。

入藏号: CSCD:6559391

地址: Liu Yunxiao, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Li Xiaoguang, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Chunmiao, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Lu Boning, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 刘云霄, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

李晓光, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

张春苗, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

吕泊宁, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: liuyunxiao87@163.com

电子邮件地址: liuyunxiao87@163.com

使用次数 (最近 180 天): 0

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作者: Li Liya; Lin Chenhao; Yuan Weining

作者: 李利亚; 林晨豪; 袁卫宁

标题: Research on local stability behavior of axially compressed stub columns with hot-rolled steel square and rectangular hollow sections considering the plate interaction

标题: 考虑板件间相关作用的热轧方矩钢管短柱轴压局部稳定性能研究

来源出版物: 建筑结构 卷: 49 期: 16 页: 85-90,96 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: local stability; hot-rolled steel SHS/RHS; axial compression member; plate interaction; direct strength method

作者关键词: 局部稳定; 热轧方矩钢管截面; 轴心受压构件; 板件相关作用; 直接强度法

摘要: An investigation into the local stability behavior and the design method of hot-rolled steel square and rectangular hollow sections (SHS/RHS) stub columns under axial compression was presented. The finite element models considering both different local imperfections and residual stresses patterns were established using ABAQUS and the reliability of the finite element models was verified by collected test data. Based on that, parameter analysis on different cross-section aspect ratio, web height to thickness ratio and regularized width to thickness ratio were performed. The results show that for slender cross-sections, the element interaction influences the ultimate capacity of members under axial compression significantly, which should be considered in the design formula. The results of parameter analysis were compared with the local stability design curves of SHS/RHS in the European, American and Chinese steel structure design codes and the direct strength method, and a modified direct strength method considering the element interaction was proposed. The results show that the modified direct strength method design formula agrees well with the finite element calculation results, and the calculation results appear more reasonable.

摘要: 对轴心受压作用下热轧方矩钢管短柱的局部稳定受力性能和设计方法进行研究。采用 ABAQUS 建立有限元分析模型, 考虑了构件不同初始缺陷以及残余应力分布的影响, 并用收集到的试验数据验证有限元模型的可靠性。在此基础上, 对不同高宽比, 腹板高厚比以及正则化宽厚比的截面进行参数分析。结果表明, 对于较薄柔的截面, 板件相关作用对构件的轴压极限承载力的影响很大, 设计公式应当予以考虑。将参数分析结果与欧洲、美国、中国钢结构设计规范以及直接强度法中方矩管截面局部稳定设计曲线进行对比, 并提出了考虑板件相关作用的修正直接强度设计方法。结果表明修正后的直接强度法设计公式与有限元计算结果吻合很好, 计算结果更为合理。

入藏号: CSCD:6560749

地址: Li Liya, College of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Lin Chenhao, College of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Yuan Weining, College of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 李利亚, 长安大学建筑工程学院, 西安, 陕西 710064, 中国.

林晨豪, 长安大学建筑工程学院, 西安, 陕西 710064, 中国.

袁卫宁, 长安大学建筑工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: liya_chd@sina.com

电子邮件地址: liya_chd@sina.com

使用次数 (最近 180 天): 0
使用次数 (2013 年至今): 0
引用的参考文献数: 19
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作者: Meng Qinglong; Zhang Zhibo; Xiong Cheng

作者: 孟庆龙; 张志博; 熊成

标题: Simulation Research on Operation Effect of VAV Air-conditioning System with Variable Water Temperature Strategy

标题: 变风量空调系统变水温策略运行效果仿真研究

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文献类型: Article

作者关键词: TRNSYS; chilled water; VAV system; variable water temperature; TRNSYS; energy consumption

作者关键词: 冷冻水; 变风量系统; 变水温; 能耗

摘要: Aiming at the problem of coordinated operation between VAV (variable air volume) and variable water temperature in central air conditioning system, a TRNSYS dynamic simulation model of air conditioning system with adjustable air supply and water supply temperature is established, and the accuracy of the model is proved by experiments. By controlling the terminal air volume to simulate the effect of variable water temperature operation on the air conditioning system under different load rates, the optimal water supply temperature of the air conditioning system under different load rates is obtained, and the variable water temperature operation strategy of the VAV air-conditioning system at different time periods is formulated, and compared with the constant water temperature operation conditions. The results show: compared with the constant water temperature mode, the variable water temperature mode of the VAV air-conditioning system can ensure the comfort of the room during the working period, and the overall energy consumption of the system can be saved by 5.88% in the whole simulation cycle.

摘要: 针对中央空调系统的变风量与变水温协调运行的问题,建立了可同时进行变风量和变水温调节的空调系统的 TRNSYS 动态仿真模型,并利用实验证明了模型的准确性。通过控制末端风量模拟不同负荷率下变水温运行对空调系统的影响,得出该空调系统在不同负荷率下的最佳供水温度,制定了变风量空调系统随时间变水温运行策略,并与定水温工况进行对比。结果表明:在工作时段该变风量空调系统变水温模式运行能保证房间舒适性,且相对定水温运行模式,在整个模拟周期内系统总体能耗节省 5.88%。

入藏号: CSCD:6547702

地址: Meng Qinglong, School of Civil Engineering,Changan University;;School of Environmental Science and Engineering,Changan University, ;;, Xian;;Xian, ;; 710061;;710054.

Zhang Zhibo, School of Environmental Science and Engineering,Changan University, Xian, 710054.

Xiong Cheng, School of Environmental Science and Engineering,Changan University;;School of Civil Engineering,Xinyu University, ;;, Xian;;Xinyu, ;; 710054;;338000.

地址: 孟庆龙, 长安大学建筑工程学院;;长安大学环境科学与工程学院, ;;, 西安;;西安, 陕西;;陕西 710061;;710054, 中国.

张志博, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

熊成, 长安大学环境科学与工程学院;;新余学院建筑工程学院, ;;, 西安;;新余, 陕西;;江西 710054;;338000, 中国.

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作者: Wang Rui; Wang Lei; Hu Zhiping; Zhao Zhenrong; Li Xiaole; Wang Qiang

作者: 王瑞; 王雷; 胡志平; 赵振荣; 李小乐; 王强

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作者关键词: compacted loess; static deviatoric stress; dynamic modulus; creep behavior

作者关键词: 压实黄土; 静偏应力; 动模量; 蠕变

摘要: Different from the seismic load,the static deviatoric stress induced by traffic loading has remarkable effects on the dynamic properties of foundation soil.The influence of static deviatoric stress on dynamic stress-strain relationship of compacted loess was investigated through indoor dynamic triaxial test to study the variation of dynamic modulus versus cyclic vibration number.The results indicate that the static deviatoric stress could increase the dynamic modulus of the soil at the same dynamic strain level.With the increase of the static deviatoric stress,the

dynamic stress-strain relationship of soil shows linear relationship within a certain range of initial dynamic strain. The dynamic modulus of soil would be reduced with the increase of cyclic vibration number when the static deviatoric stress is not taken into account. On the contrary, the dynamic modulus of soil would be increased when the static deviatoric stress is considered. In addition, the hysteretic characteristics of soil were corrected by dividing the soil cyclic accumulative strain into dynamic creep strain and visco-elastic strain. The enhancing effect of static deviatoric stress on the dynamic modulus of soil is more obvious after correction. The correction method in this paper can provide more distinct research approach and well-defined mechanics parameters for dynamic response and long-term deformation of soil foundation subjected to traffic loading.

摘要: 区别于地震荷载,交通荷载作用下的静偏应力对土体动力特性的影响显著。通过室内动三轴试验研究静偏应力对压实黄土动应力-应变关系的影响规律,分析动模量随加载振次的变化规律。结果表明:静偏应力可以显著提高同等动应变幅值下土体的动模量;随着静偏应力的增加,土体的动应力-应变关系在一定的起始动应变幅值范围内呈线性关系。当不考虑静偏应力时,土体的动模量随着振次的增加逐渐衰减;当考虑静偏应力时,土体的动模量随着振次的增加逐渐增大。此外,通过将动力荷载作用下土体的循环累积应变分解为动力蠕变和弹性应变,对土体的滞回特性进行了修正,修正之后静偏应力对土体动模量的强化作用更加明显。修正方法可为交通荷载作用下路基的动力响应和长期变形分析提供更为清晰的研究思路和意义明确的力学参数。

入藏号: CSCD:6549907

地址: Wang Rui, School of Civil Engineering, Changan University, Xian, 710061.

Li Xiaole, School of Civil Engineering, Changan University, Xian, 710061.

Wang Qiang, School of Civil Engineering, Changan University, Xian, 710061.

Wang Lei, Xian Railway Survey and Design Institute Co., Ltd., Xian, 710054.

Zhao Zhenrong, Xian Railway Survey and Design Institute Co., Ltd., Xian, 710054.

Hu Zhiping, School of Civil Engineering, Changan University; Institute of Underground Structure and Engineering, Changan University, Xian, 710061; Institute of Underground Structure and Engineering, Changan University, Xian, 710061.

地址: 王瑞, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

李小乐, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

王强, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

王雷, 中铁西安勘察设计研究院有限责任公司, 西安, 陕西 710054, 中国.

赵振荣, 中铁西安勘察设计研究院有限责任公司, 西安, 陕西 710054, 中国.

胡志平, 长安大学建筑工程学院; 长安大学地下结构与工程研究所, 西安, 陕西; 西安, 陕西; 陕西 710061; 710061, 中国.

电子邮件地址: E-mail: wr2801100103@163.com; E-mail: huzhping@chd.edu.cn

电子邮件地址: E-mail: wr2801100103@163.com; E-mail: huzhping@chd.edu.cn

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作者: Su Jizhi; Liu Boquan; Xing Guohua; Song Meng; Ma Yudong

作者: 苏佳智; 刘伯权; 邢国华; 宋猛; 马煜东

标题: Study on damage indicator of frame-shear wall structure under strong earthquake

标题: 强震下框架-剪力墙结构损伤破坏量化指标研究

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语言: Chinese

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作者关键词: seismic performance; damage indicator; time-history analysis; inter-storey drift angle; hysteretic energy

作者关键词: 抗震性能; 损伤指标; 时程分析; 层间位移角; 滞回耗能

摘要: In order to explore a damage indicator to fully evaluate the seismic performance of reinforced concrete structures,numerous nonlinear dynamic time-history analyses are carried out based on a 10-storey frame-shear wall structure via finite element software ABAQUS. The distribution of maximum inter-storey drift angle and hysteretic energy is analyzed,and the failure mechanism of structure is studied from the perspective of energy dissipation. The results show that the maximum inter-storey drift angle does not always occurs at the most serious damaged location or the weakest storey of structure. The dispersion is greater if the inter-storey drift angle is used as the evaluation indicator,which is susceptible to the selection and quantity of seismic waves. On the contrary,the distribution of structural hysteretic energy is less affected by the randomness of the selected seismic waves. The bottom storey dissipates the maximum energy,about 60% of total energy,while any of the other storeys. dissipates merely 1% - 8%. The energy dissipation of the overall structure is mainly consumed by frame columns,accounting for about 80%,and in part by frame beams,only 18% - 22%. The calculation results are in agreement with the actual failure phenomena that the structural collapse is arised from the full development of column hinges.

摘要: 为了探究能够全面评估钢筋混凝土结构抗震性能的量化指标,借助有限元软件 ABAQUS 对一拟建的 10 层框架-剪力墙结构进行了大量的非线性动力时程数值计算,对比分析了不同地震作用下最大层间位移角与滞回耗能的分布情况,从结构滞回耗能的角度揭示了破坏机制,得到主要结论如下:结构层间位移角最大的位置不一定是损伤破坏最严重或者薄弱的部位,以层间位移角作为整体结构抗震性能的判别指标离散性较大,计算结果易受所选地震波的方法及数量影响;结构滞回耗能沿楼层的分布受地震波选取方法和数量的随机性影响较小,结构底层耗能对结构整体耗能贡献最大,约占结构总耗能的 60%,其余各楼层滞回耗能约占结构总滞回耗能的 1%~ 8%;梁和柱滞回耗能主要集中于结构底部 1 层,总的框架梁滞回耗能仅占结构总滞回耗能的 18%~ 22%,绝大部分地震输入能由框架柱吸收,总的框架柱滞回耗能占结构总滞回耗能的 80%左右,该计算结果与实际震害中结构主要形成柱铰破坏机制的现象较为一致。

入藏号: CSCD:6538569

地址: Su Jizhi, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Liu Boquan, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Xing Guohua, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Song Meng, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Ma Yudong, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 苏侏智, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

刘伯权, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

邢国华, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

宋猛, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

马煜东, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: sujizhi1989@163.com; ghxing@chd.edu.cn

电子邮件地址: sujizhi1989@163.com; ghxing@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Xiong Ergang; Xi Yanghong; Song Liangying; Liang Xingwen

作者: 熊二刚; 惠阳虹; 宋良英; 梁兴文

标题: Method for calculating peak displacement of reinforced concrete shear wall

标题: 钢筋混凝土剪力墙峰值位移计算方法

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作者关键词: reinforced concrete; shear wall; peak displacement; vertical cantilever beam; truss theory; plastic hinge; plastic deformation; elastic deformation

作者关键词: 钢筋混凝土; 剪力墙; 峰值位移; 竖向悬臂梁; 桁架模型; 塑性铰; 塑性变形; 弹性变形

摘要: To study the peak displacement of reinforced concrete shear walls (the displacement corresponding to the peak load), we established a calculation model and formula for the peak displacement of medium-and high-rise I-section shear walls with boundary columns walls based on a truss model for the longitudinal elongation of the vertical cantilever beam. Then, using this

formula,we determined the peak displacements of 34 I-shaped shear walls with boundary columns.The results show that the calculated and experimental results basically agree.The proposed formula enables the estimation of the peak displacement for reinforced concrete shear walls,which can be directly obtained by solving the vertical elongation strain of the shear wall using the calculation model introduced in this paper.

摘要: 为了研究钢筋混凝土剪力墙的峰值位移(峰值荷载对应的位移),根据竖向悬臂梁纵向伸长量计算的桁架模型,建立了中高墙、高墙带端柱 I 形截面剪力墙的峰值位移计算模型和计算公式,并采用该公式对收集的 34 片带端柱的 I 形剪力墙的峰值位移进行了计算。研究结果表明:计算结果与试验结果基本吻合,采用所提出的计算公式基本可以预测钢筋混凝土剪力墙的峰值位移;同时,采用本文的计算模型可以通过求解剪力墙的竖向伸长应变,直接得到剪力墙的峰值位移。

入藏号: CSCD:6546546

地址: Xiong Ergang, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Xi Yanghong, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Song Liangying, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Liang Xingwen, School of Civil Engineering,Xi'an University of Architecture & Technology, Xi'an, Shaanxi 710055, China.

地址: 熊二刚, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

惠阳虹, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

宋良英, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

梁兴文, 西安建筑科技大学土木工程学院, 西安, 陕西 710055, 中国.

电子邮件地址: xerg@chd.edu.cn

电子邮件地址: xerg@chd.edu.cn

使用次数 (最近 180 天): 1

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作者: Xing Guohua; Yang Chengyu; Chang Zhaoqun; Qin Yongjun; Zhang Guangtai

作者: 邢国华; 杨成雨; 常召群; 秦拥军; 张广泰

标题: STUDY ON MODIFIED AXIAL-SHEAR-FLEXURE INTERACTION MODEL FOR CORRODED REINFORCED CONCRETE COLUMNS

标题: 锈蚀钢筋混凝土柱的修正压-剪-弯分析模型研究

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作者关键词: bond; corrosion; ultimate strength; axial-shear-flexure interaction; reinforced concrete columns

作者关键词: 粘结; 锈蚀; 极限强度; 压-剪-弯交互作用; 钢筋混凝土柱

摘要: With the increasing of their service life, the steel reinforcements in concrete structures are prone to corrosion, which causes the bearing capacity degradation of a concrete structure. Therefore, the corrosion of reinforcing bars greatly affects the use of concrete structures. Based on analyzing the effect of corroded steel reinforcement on buckling, the confinement effect of corroded stirrup and degradation of mechanical properties of concrete and steel, the constitutive models of these materials including steel and concrete along with the bond behaviour between the steel bars and concrete were proposed in many literatures. By selecting the corroded reinforced concrete columns as the research object, an analytical model of peak lateral load capacity of corroded reinforced concrete columns under axial-shear-flexure loading was put forward by modifying the analysis model of reinforced concrete columns subjected to cyclic loading. The proposed model was verified through 21 corroded columns tests. It is believed that a good agreement between test results and prediction results for lateral load capacity is achieved with an average ratio of test results to predicted results of 1.021 and a variance of 0.014 between test results and predicted results. The suggested model can be served as a theoretical method to analyse the load bearing capacity of corroded reinforced concrete columns under cyclic loading.

摘要: 随着服役时间的增加,混凝土结构中钢筋易发生锈蚀,引起混凝土结构承载性能下降,严重影响工程结构的继续使用。该文在分析纵筋锈蚀后的屈曲效应、箍筋锈蚀后的约束效应、混凝土和钢筋材料性能劣化的基础上,建议了考虑锈蚀影响的钢筋、混凝土及锈蚀钢筋与混凝土界面粘结性能的本构模型,以锈蚀钢筋混凝土柱为研究对象,对反复荷载作用下钢筋混凝土柱的分析模型进行修正,建立了锈蚀钢筋混凝土柱压-剪-弯交互作用下极限承载力计算模型,并通过 21 根锈蚀混凝土柱的试验结果对建议分析模型进行了验证。研究表明:锈蚀钢筋混凝土柱极限承载力试验值与计算值之比平均值为 1.021,方差为 0.014,建议模型极限承载力预测值与试验结果吻合较好,可用于低周反复荷载作用下锈蚀钢筋混凝土柱的承载力分析。

入藏号: CSCD:6541245

地址: Xing Guohua, School of Civil Engineering, Chang'an University;;School of Civil Engineering, Xinjiang University, ;; Xi'an;;Urumqi, ;; 710061;;830046.

Yang Chengyu, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Chang Zhaoqun, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Qin Yongjun, School of Civil Engineering, Xinjiang University, Urumqi, Xinjiang 830046, China.

Zhang Guangtai, School of Civil Engineering, Xinjiang University, Urumqi, Xinjiang 830046, China.

地址: 邢国华, 长安大学建筑工程学院;;新疆大学建筑工程学院, ;; 西安;;乌鲁木齐, ;; 710061;;830046.

杨成雨, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

常召群, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

秦拥军, 新疆大学建筑工程学院, 乌鲁木齐, 新疆 830046, 中国.

张广泰, 新疆大学建筑工程学院, 乌鲁木齐, 新疆 830046, 中国.

电子邮件地址: ghxing@chd.edu.cn; chengyu_777@126.com; czq199212@163.com; 13999257880@163.com; zgtlxh@126.com

电子邮件地址: ghxing@chd.edu.cn; chengyu_777@126.com; czq199212@163.com; 13999257880@163.com; zgtlxh@126.com

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作者: Nie Shaofeng; Zhang Yang; Wang Jiqin; Liao Fangfang; Wang Zhen

作者: 聂少锋; 张洋; 王继琴; 廖芳芳; 王振

标题: A Study on the Compression Behavior of Duplex High-Strength Cold-Formed Steel Sigma-shaped Built-Up Column

标题: 双肢弓形高强冷弯薄壁型钢拼合柱受压性能研究

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作者关键词: high-strength cold-formed steel; duplex -shaped built-up column; compression behavior; failure mode; finite element analysis

作者关键词: 高强冷弯薄壁型钢; 双肢弓形拼合柱; 受压性能; 破坏模式; 有限元分析

摘要: In order to study the compression behavior of high-strength cold-formed steel duplex -shaped built-up column, the influence of slenderness ratio, screw spacing, equivalent height-thickness ratio, eccentric direction and eccentricity on maximum bearing capacity of column are analyzed by Abaqus software. The results show that the failure modes of specimens under axial compression and eccentric compression around weak axis are overall buckling. The failure modes of specimens under eccentric compression around strong axis are local buckling or flexural-torsional buckling. The maximum bearing capacity and stiffness of specimens are decreased with the increasing of slenderness ratio, eccentricity and equivalent height-thickness ratio. If the screw spacing varies between 100~300 mm, the maximum bearing capacities of specimens vary within 5.88%. The calculated values P_G of the maximum bearing capacity of specimen are calculated by Technical Code of Cold-Formed Thin-Wall Steel Structures (GB 50018-2002), and compared with the finite element results P_A . The results show that the

calculated results of bearing capacity of columns are conservative. For the specimens under axial compression, the difference between P_G and P_A decreases with the increasing of the slenderness ratio. The difference between P_G and P_A of the specimen under eccentric compression around strong axis is larger than that of the specimen under eccentric compression around weak axis with the same slenderness ratio and eccentricity.

摘要: 采用有限元软件 Abaqus 对双肢弓形高强冷弯薄壁型钢拼合柱的受压性能进行了研究, 分析了试件破坏模式以及长细比、自攻螺钉间距、腹板等效高厚比、偏心方向和偏心距对试件最大承载力的影响。结果表明: 轴向受压试件和绕弱轴偏心受压试件, 发生绕弱轴整体弯曲屈曲破坏; 绕强轴偏心受压试件为局部屈曲或弯扭屈曲破坏; 试件最大承载力和刚度随长细比、偏心距和腹板有效高厚比的增加而减小; 当螺钉间距在 100~300 mm 之间变化时, 试件的最大承载力变化幅度在 5.88% 以内。依据《冷弯薄壁型钢结构技术规范》(GB 50018-2002), 计算得到最大承载力 P_G 并与有限元值 P_A 进行对比, 结果表明: 规范计算结果均较保守。对于轴压试件, P_G 与 P_A 的差距随长细比的增大而减少。对于偏压试件, 在相同长细比和偏心距的情况下, 绕强轴偏压试件的 P_G 与 P_A 的差距比绕弱轴偏压试件更大。

入藏号: CSCD:6546981

地址: Nie Shaofeng, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Yang, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wang Jiqin, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Liao Fangfang, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wang Zhen, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 聂少锋, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

张洋, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

王继琴, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

廖芳芳, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

王振, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: niesf126@126.com

电子邮件地址: niesf126@126.com

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作者: Su Jizhi; Liu Boquan; Ma Yudong; Huang Jiao; Xing Guohua

作者: 苏佳智; 刘伯权; 马煜东; 黄娇; 邢国华

标题: Influence of design parameters on seismic collapse resistant performance of RC frame

structures

标题: 设计参数对 RC 框架结构抗倒塌性能的影响分析

来源出版物: 地震工程与工程振动 卷: 39 期: 3 页: 84-98 出版年: 2019

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语言: Chinese

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作者关键词: RC frame structure; maximum interlayer displacement angle; performance level; seismic fragility; collapse resistance performance

作者关键词: RC 框架结构; 最大层间位移角; 性能水平; 地震易损性; 抗倒塌性能

摘要: The strong randomness of the seismic response output of structures is not only affected by the non-stationary random excitation of ground motion, but also affected by uncertainties such as structural strength, component size and combination. Therefore, the seismic performance analysis and dynamic elastoplastic time history analysis of proposed nineteen finite element models are carried out based on the low-cycle repeated loading test of the RC plane frame, and the axial compression ratio, beam-to-column stiffness ratio, concrete strength and steel strength are variables. The variation range of the maximum interlayer displacement angle of structures under different performance levels is given. The effects of axial compression ratio and beam-to-column stiffness ratio on the collapse resistance of RC frame structures are studied. The main conclusions are as follows: The increase of axial compression ratio is beneficial to improve the bearing capacity and energy dissipation capacity of structures, but the ductility deformation capacity will be significantly reduced. Reducing the beam-to-column stiffness ratio is beneficial to improving the seismic performance of the structure. The points that the maximum interlayer displacement angle of the RC frame structure reaches $1/620$, $1/340$, $1/120$, and $1/30$ can be used as the limit of four performance level of Operational (OP), Immediate Occupancy (IO), Life Safety (LS) and Collapse Prevention (CP). The increase of axial compression ratio and beam-to-column stiffness ratio will reduce the collapse resistance performance of RC frame structures and increase the collapse failure probability.

摘要: 结构地震响应输出的强随机性除了主要受地震动非平稳随机激励影响以外, 结构自身材料强度、构件尺寸及组合方式等不确定因素的影响同样不容忽视。因此, 本文基于课题组完成的 RC 平面框架低周反复加载试验, 以轴压比、梁柱线刚度比、混凝土强度及钢筋强度为变量, 对拟建的 16 榀有限元数值模型进行了抗震性能分析和动力弹塑性时程分析, 给出了不同性能水平下结构最大层间位移角的变化范围, 研究了轴压比、梁柱线刚度比变化对 RC 框架结构抗倒塌能力的影响, 得到主要结论如下: 轴压比增大有利于提高结构的承载力及耗能能力, 但延性变形能力会明显下降; 降低梁柱线刚度比有利于提高结构的抗震性能; RC 框架结构最大层间位移角达到 $1/620$ 、 $1/340$ 、 $1/120$ 、 $1/30$ 时, 可分别作为基本完好(OP)、立即使用(IO)、生命安全(LS)、防止倒塌(CP)四个性能水平点的限值; 轴压比和梁柱线刚度比的增大会降低 RC 框架结构的抗倒塌能力、增加结构发生倒塌失效破坏的概率。

入藏号: CSCD:6535910

地址: Su Jizhi, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Liu Boquan, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Ma Yudong, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Huang Jiao, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.
Xing Guohua, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.
地址: 苏侏智, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.
刘伯权, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.
马煜东, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.
黄娇, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.
邢国华, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.
电子邮件地址: sujizhi1989@163.com; bqliu@chd.edu.cn
电子邮件地址: sujizhi1989@163.com; bqliu@chd.edu.cn
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作者: Wang Bu; Bi Tiechuan; Sun Zhenyue; Zhu Huirong; Zhang Nuoya

作者: 王步; 毕铁川; 孙振月; 朱慧荣; 张诺亚

标题: RESEARCH ON RESIDUAL BEARING CAPACITY COMPRESSION STRENGTHS OF CFRP CONFINED RC COLUMNS UNDER LOW-VELOCITY IMPACT

标题: 碳纤维增强复材环向围束加固柱受低速冲击剩余承载力研究

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文献类型: Article

作者关键词: carbon fiber-reinforced polymer(CFRP); columns; low-velocity impact; confinement; finite element method

作者关键词: 碳纤维增强复合材料; 柱; 低速冲击; 约束; 有限元方法

摘要: Externally bonded carbon fiber reinforced polymer (CFRP) wraps, which are used to increase the axial compression strengths of reinforced concrete columns by providing confinement, are susceptible to the low-velocity impacts and may suffer severe damages. Based on the impact damages of column specimens under various scenarios, obtained from the explicit finite element (FE) analysis, an implicit nonlinear FE analysis model was used to investigate the axial compressive behavior of the impacted CFRP confined columns with an explicit to implicit sequential solution procedure. The roles of different influencing factors, such as initial kinetic energy, the thickness of CFRP, and the shape of impactor, were analyzed quantitatively.

摘要: 外贴纤维增强复合材料(CFRP)环向围束钢筋混凝土柱受低速撞击时,因各向异性材性

而易发生冲击损伤。基于显式有限元分析获得的不同低速冲击工况下 CFRP 环向围束加固柱的损伤结果,通过显式-隐式连续求解,建立了具有低速冲击损伤特征的 CFRP 环向围束加固柱的非线性隐式有限元分析模型,对包括冲击初始动能、CFRP 厚度和撞击物形状在内的多种因素对加固柱的剩余承压承载力的影响效果进行了系统性的量化分析。

入藏号: CSCD:6529775

地址: Wang Bu, School of Civil Engineering, Chang'an University;;Research Institute of Testing and Retrofitting Engineering Structures, Chang'an University, ;; Xi'an;;Xi'an, ;; 710061;;710061.

Bi Tiechuan, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Sun Zhenyue, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Nuoya, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhu Huirong, Alliance Innovation Design Consultant (Wuhan) Co., Ltd., Wuhan, Hubei 100071, China.

地址: 王步, 长安大学建筑工程学院;;长安大学工程结构诊断与改造研究所, ;; 西安;;西安, ;; 710061;;710061.

毕铁川, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

孙振月, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

张诺亚, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

朱慧荣, 联创新锐设计顾问(武汉)有限公司, 武汉, 湖北 100071, 中国.

电子邮件地址: kingstep74@163.com

电子邮件地址: kingstep74@163.com

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作者: Wei Hui; Wu Tao; Yang Xue; Liu Xi

作者: 魏慧; 吴涛; 杨雪; 刘喜

标题: EXPERIMENTAL STUDY ON STRESS-STRAIN RELATIONSHIP OF FIBER REINFORCED LIGHTWEIGHT AGGREGATE CONCRETE

标题: 纤维增韧轻骨料混凝土单轴受压应力-应变全曲线试验研究

来源出版物: 工程力学 卷: 36 期: 7 页: 126-135,173 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: lightweight aggregate concrete; fiber reinforced; peak stress; elastic modulus;

stress-strain curve model

作者关键词: 轻骨料混凝土; 纤维增韧; 峰值应力; 弹性模量; 应力-应变曲线模型

摘要: An experimental study of nine-group prism specimens with different concrete strength, fiber type and fiber dosage has been carried out to understand the stress-strain relationship of fiber reinforced lightweight aggregate concrete (LWAC) under axial compression load. Failure process and failure characteristics of the specimens were analyzed, and the effect of test variables on the peak stress, peak strain and elastic modulus were studied. Combining with the existing research, calculation formulas of the feature points on test curves were derived. Simultaneously, a segment-based stress-strain model was proposed considering the characteristics of fiber reinforced LWAC. Test results indicate that the failure characteristics of LWAC are significantly different from that of the normal weight concrete. Incorporating fibers into LWAC can effectively restrict the formation of internal micro-cracks, resulting in a prominent crack-resisting and enhancing toughness effect. But these benefits varied slightly with the test variables such as concrete strength, fiber type and fiber dosage. Combining fibers with LWAC can also effectively flatten the decreasing slope of stress-strain curves and improve the brittleness of LWAC. Simulation results obtained from the proposed stress-strain model agree well with the test results, which indicates that this proposed model can accurately describe the axial compressive behavior of fiber reinforced LWAC.

摘要: 为探究纤维增韧后轻骨料混凝土应力-应变全曲线,完成了不同混凝土强度等级、纤维种类及掺量下的9组棱柱体单轴受压试验,分析了破坏过程和破坏特征,系统研究了各因素对峰值应力、峰值应变和弹性模量的影响,并结合已有研究给出了各曲线特征点计算模型,考虑纤维轻骨料混凝土自身特征,建立了分段式纤维轻骨料混凝土应力-应变全曲线模型。研究表明:轻骨料混凝土破坏特征与普通混凝土显著不同,掺入纤维有效抑制了其内部微裂缝的开展,起到阻裂、增韧的效果,且随混凝土强度等级、纤维种类及掺量变化差异明显;纤维增韧后试件的应力-应变曲线下降段坡度趋于平缓,脆性得到有效改善;建议的应力-应变全曲线模型与试验结果吻合良好,能够准确描述纤维增韧轻骨料混凝土在单轴受压作用下的受力变形特征。

入藏号: CSCD:6523212

地址: Wei Hui, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wu Tao, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Yang Xue, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Liu Xi, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 魏慧, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

吴涛, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

杨雪, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

刘喜, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电 子 邮 件 地 址 : weihuichd@163.com; wutao@chd.edu.cn; ms_yangxue@163.com; lliuxii@163.com

电 子 邮 件 地 址 : weihuichd@163.com; wutao@chd.edu.cn; ms_yangxue@163.com; lliuxii@163.com

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作者: Hu Zhiping; Peng Jianbing; Zhang Fei; Wang Rui; Chen Nannan

作者: 胡志平; 彭建兵; 张飞; 王瑞; 陈南南

标题: The critical issues and creative concepts in the development of urban underground space

标题: 浅谈城市地下空间开发中的关键科学问题与创新思路

来源出版物: 地学前缘 卷: 26 期: 3 页: 76-84 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: urban underground space; geological structure; underground structure; multi-field coupling; disaster evolution

作者关键词: 城市地下空间; 地质结构; 地下建筑结构; 多场耦合; 灾变演化

摘要: One of the important approaches to promote sustainable development of cities is the development of urban underground space. This approach has several significant benefits, including increasing urban land utilization ratio, expanding urban volume ratio, enhancing urban carrying capacity and alleviating urban diseases such as traffic congestion, environmental pollution, flood disaster and so on. Here, we summarized the main problems and hazards in the urban underground space development process. We also analyzed the current critical issues related to underground and geological structures such as the multi-field coupling mechanism between geological structural elements, the dynamic mechanism of geological structural system, the interaction mechanism between geological and underground structures, the catastrophe and dynamic evolution mechanisms of underground structures, and the disaster prediction and dynamic regulation mechanism of underground space engineering. These critical issues are being examined and need further exploration in the future. Finally, based on the above analyses, we suggested the corresponding creative concepts, which include research on multi-field coupling mechanism, decryption of triggering and evolutionary mechanisms, and establishment of theory of early warning system. This study presents a wide range of research possibilities for future underground space development.

摘要: 城市地下空间开发是提高城市土地利用效率, 扩大城市容积率, 增强城市综合承载能力, 缓解交通拥堵, 解决环境污染及洪涝灾害等城市病, 促进城市可持续发展的重要途径。概述了目前我国城市地下空间开发中存在的问题及危害, 分析了城市地下空间开发中涉及地下建筑结构与地质结构系统的关键科学问题: 地质结构要素间的多场耦合作用机理不清; 地质结构系统动态平衡的动力学机制不明; 地质结构与地下建筑结构的互馈机理仍需深入探索; 地下建筑结构的灾变机理及其演化的动力学机制不清; 地下空间工程的灾害预测与动态调控机制有

待深入研究。最后提出了相应的创新思路:研究施工扰动下地质结构的多场耦合作用机制与边界效应以及地质结构与地下建筑结构在多场耦合作用下的互馈机制和综合系统的动力学过程,概化其力学模型;厘清内外动力作用对地下建筑结构的边界效应及材料性能劣化机制,破解复杂地质结构环境下地下建筑结构灾变机理及演化过程,建立地下建筑结构与地质结构综合系统的灾变理论;建立城市地下空间工程灾害超前判识、预警预报与风险控制理论及安全防护理论体系,形成地下空间工程的防灾减灾机制。

入藏号: CSCD:6520116

地址: Hu Zhiping, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Fei, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wang Rui, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Chen Nannan, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Peng Jianbing, Chang'an University, Key Laboratory of Western China's Mineral Resources and Geological Engineering (Ministry of Education), Xi'an, Shaanxi 710054, China.

地址: 胡志平, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

张飞, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

王瑞, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

陈南南, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

彭建兵, 长安大学, 西部矿产资源与地质工程教育部重点实验室, 西安, 陕西 710054, 中国.

电子邮件地址: huzhping@chd.edu.cn; dicexy_1@chd.edu.cn

电子邮件地址: huzhping@chd.edu.cn; dicexy_1@chd.edu.cn

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作者: Nie Shaofeng; Zhou Tianhua; Zhou Xuhong; Zuo Xiaoyu; Ye Mengna

作者: 聂少锋; 周天华; 周绪红; 左小雨; 叶梦娜

标题: Experimental study and numerical analysis on compressive behavior of three-limb built-up cold-formed steel columns with double box section

标题: 三肢冷弯薄壁型钢拼合双腔箱形柱受压性能试验研究与数值分析

来源出版物: 东南大学学报. 自然科学版 卷: 49 期: 1 页: 25-33 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: cold-formed thin-walled steel; three-limb built-up column with double boxes section; parameter analysis; maximum bearing capacity

作者关键词: 冷弯薄壁型钢; 三肢拼合双腔箱形柱; 参数分析; 最大承载力

摘要: Experimental study and numerical simulation on 12 three-limb built-up columns with double boxes section were carried out to study the compressive behavior under axial and eccentric loading. The load-displacement curves, the load-strain curves and the maximum bearing capacity of the specimens were obtained through the experimental study. The buckling modes and the failure characteristics were analyzed. The finite element software ABAQUS was used to analyze the influence of the slenderness ratio of the columns, the web height to thickness ratio of the section, the eccentricity and the direction of the loading on the compressive behavior of the built-up cold-formed steel columns with double box section. The results show that the final failure mode of the LT-A(long length columns) and MT-A(middle length columns) group specimens are overall flexural buckling damage. Most of the damage locations are in the mid-height of columns, except for the individual specimens of MT-A group. The maximum bearing capacity of the specimens decreases with the increase of the slenderness ratio of the columns. The maximum bearing capacity of the specimens increases with the decrease of the height thickness ratio of the web. The maximum bearing capacity of the specimens under eccentric compression decreases with the increase of the eccentricity.

摘要: 对 12 根三肢冷弯薄壁型钢拼合双腔箱形柱分别进行了轴压、偏压试验和数值模拟分析.通过试验研究,得到了各试件的荷载-位移、荷载-应变曲线以及最大承载力,并分析了屈曲模式和破坏特征.采用有限元软件 ABAQUS 分析了双腔箱形柱的长细比变化、截面腹板的高厚比变化、荷载偏心方向和偏心距参数对拼合双腔箱形柱受压性能的影响.结果表明,LT-A(长柱)和 MT-A(中长柱)组试件的最终破坏模式为整体弯曲屈曲破坏,个别 MT-A 组试件破坏位置发生在柱端,其余均在柱中.试件的轴压最大承载力均随试件长细比的增大而逐渐减小.试件轴压最大承载力随截面腹板高厚比的减小而增大;偏压试件的最大承载力随着偏心距的增加而降低.

入藏号: CSCD:6513699

地址: Nie Shaofeng, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhou Tianhua, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zuo Xiaoyu, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Ye Mengna, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhou Xuhong, School of Civil Engineering, Chongqing University, Chongqing 400044.

地址: 聂少锋, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

周天华, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

左小雨, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

叶梦娜, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

周绪红, 重庆大学土木工程学院, 重庆 400044, 中国.

电子邮件地址: niesf126@126.com

电子邮件地址: niesf126@126.com

使用次数 (最近 180 天): 0

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作者: Yang Liwei; Long Pengcheng; Li Deyi; Hu Bo; Guo Fei; Zhao Chuanliang

作者: 杨利伟; 龙朋成; 李德溢; 胡博; 郭飞; 赵传靓

标题: Electricity Generation Performance and Treatment of Swine Wastewater by Chlorella Biocathode Microbial Fuel Cell

标题: 小球藻生物阴极 MFC 处理养猪废水及产电性能

来源出版物: 中国给水排水 卷: 35 期: 11 页: 1-8 出版年: 2019

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来源出版物: China Water & Wastewater 卷: 35 期: 11 页: 1-8 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: Chlorella biocathode; microbial fuel cell; swine wastewater; electricity generation performance; pollutant degradation

作者关键词: 小球藻生物阴极; 微生物燃料电池; 养猪场废水; 产电性能; 污染物降解

摘要: Based on the characteristics of large-scale swine wastewater and the problems existing in current treatment technologies, a Chlorella biocathode microbial fuel cell (MFC) was constructed to explore the feasibility of simultaneous treatment of swine wastewater and electric energy recovery. When the COD concentration of the anode substrate increased from 510 mg/L to 4 250 mg/L, the maximum output voltage and power density of MFC increased from 279. 16 mV and 271. 15 mW/m³ to 501. 16 mV and 907. 52 mW/m³ respectively, and the internal resistance of MFC decreased from 795. 93 Omega to 256. 7 Omega. With the increasing of COD concentration in anode, the removal efficiency of COD gradually increased and reached the maximum when the COD was 4 250 mg/L, which was 98. 29% . However, the Coulombic efficiency of MFC decreased from 5.97% to 2. 86%. The removal efficiency of NH₄⁺ - N and TP also showed a downward trend. Based on comprehensive evaluation of electricity generation performance, pollutant degradation ability and Coulombic efficiency, the Chlorella biocathode MFC had the best performance when the initial concentration of COD, NH₄⁺ - N and TP was about 950 mg/L, 55 mg/L and 10 mg/L in anode chamber. These results demonstrate that the Chlorella biocathode MFC can degrade COD in swine wastewater and produce electricity by using pollutants.

摘要: 针对规模化养猪场废水特点和目前处理技术存在的问题,构建了小球藻生物阴极微生物燃料电池(MFC),探索利用 MFC 同步处理养猪场废水及回收电能的可行性.当阳极底物 COD 由 510 mg/L 增加至 4 250 mg/L 时,电池的最大输出电压由 279. 16 mV 提高到 501. 16 mV,最大功率密度从 271. 15 mW/m³ 提高到 907.52 mW/m³,对应的内阻由 795. 93 Omega 降至

256.7 Omega;随着阳极底物 COD 浓度的增加,MFC 阳极中 COD 去除率逐渐提高,并在 COD 为 4 250 mg/L 时达到最大,为 98. 29%.然而,电池库仑效率却由 5. 97%降至 2. 86%,且 NH₄⁺-N 和 TP 的去除率也呈下降趋势.结合产电性能、污染物降解能力以及库仑效率等方面进行分析评价,在阳极底物 COD 为 950 mg/L、NH₄⁺-N 约为 55 mg/L、TP 约为 10 mg/L 时,MFC 的产电和有机物降解综合性能表现最佳.可见,小球藻生物阴极 MFC 可降解养猪场废水中的 COD 并利用污染物质产电.

入藏号: CSCD:6513360

地址: Yang Liwei, College of Civil Engineering and Architecture, Changan University, Xi'an, Shaanxi 710061, China.

Hu Bo, College of Civil Engineering and Architecture, Changan University, Xi'an, Shaanxi 710061, China.

Zhao Chuanliang, College of Civil Engineering and Architecture, Changan University, Xi'an, Shaanxi 710061, China.

Long Pengcheng, College of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Li Deyi, China Railway Construction Investment Group Co. Ltd., Beijing 100855, China.

Guo Fei, College of Architecture and Civil Engineering, Xihua University, Chengdu, Sichuan 610039, China.

地址: 杨利伟, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

胡博, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

赵传靓, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

龙朋成, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

李德溢, 中国铁建投资集团有限公司, 北京 100855, 中国.

郭飞, 西华大学建筑与土木工程学院, 成都, 四川 610039, 中国.

电子邮件地址: 408802216@qq.com

电子邮件地址: 408802216@qq.com

使用次数 (最近 180 天): 0

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作者: Chai Shaobo; Li Jianchun; Zhao Junhai; Chen Xin

作者: 柴少波; 李建春; 赵均海; 陈昕

标题: Study on stress P-wave propagation across intersecting rock joints with nonlinear deformation

标题: P 波在非线性交叉节理岩体中的传播特性研究

来源出版物: 岩石力学与工程学报 卷: 38 期: 6 页: 1149-1157 出版年: 2019

文献号: 1000-6915(2019)38:6<1149:PBZFX>2.0.TX;2-1

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文献类型: Article

作者关键词: rock mechanics; intersecting joints; wave propagation; time-domain recursive analysis method; jointed rock mass; transmission and reflection coefficients

作者关键词: 岩石力学; 交叉节理; 波传播; 时域递归分析法; 节理岩体; 透反射系数

摘要: The intersecting distribution of joints in rock mass makes the stress wave propagation complicated. In this paper, the propagation characteristics of stress P-waves across nonlinearly intersecting rock joints were studied by using theoretical analysis and numerical simulation. The propagation process of multiple reflected waves between two intersecting joints was analyzed using the time-domain recursive analysis method (TDRM) and the propagation equation was established combining the principle of superposition. The wave propagation process in two intersecting joints was simulated by UDEC. The comparison between the theoretical and numerical results shows that they are very close to each other. A numerical model was proposed for calculating the propagation of stress P-wave cross two sets of intersecting rock joints, and parameters studies were carried out. It is shown that the wave propagation is influenced by joint stiffness, joint distribution and incident wave frequency and that the transmission and reflection coefficients are different at different monitoring positions of intersecting joints. The theoretical method proposed in this paper, providing a new way for analyzing the propagation of stress waves in intersecting joints, still has some limitations. For complex conditions, the numerical simulation method can be adopted to study wave propagation across jointed rock mass.

摘要: 岩体中的节理常会呈现交叉分布,使得应力波的传播极其复杂。通过理论和数值模拟方法对平面 P 波在具有非线性特性的交叉节理中的传播特性进行了研究。首先,采用时域递归分析法分析 2 条交叉节理之间多重反射波的传播过程,结合叠加原理建立了平面 P 波在 2 条交叉节理中的传播方程。其次,采用 UDEC 程序对 2 条交叉节理中的波传播进行了数值模拟,对比发现,理论结果与数值计算结果非常接近。然后,采用数值方法建立了平面 P 波在 2 组交叉节理中传播的计算模型。最后,对影响波传播的一些参数进行了分析。结果表明,节理刚度、节理分布以及入射波频率等都影响波的传播过程;交叉节理不同监测点处的透反射系数也不尽相同。提出的理论方法为分析应力波在交叉节理中的传播提供了新的思路,但该方法仍有很多局限,对于复杂工况,可以采用数值模拟方法。

入藏号: CSCD:6508864

地址: Chai Shaobo, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Junhai, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Jianchun, School of Civil Engineering, Southeast University, Nanjing, Jiangsu 210096, China.

Chen Xin, Department of Civil Engineering, University of Science and Technology Beijing, Beijing 100083, China.

地址: 柴少波, 长安大学建筑工程学院, 西安, 陕西 710064, 中国.

赵均海, 长安大学建筑工程学院, 西安, 陕西 710064, 中国.

李建春, 东南大学土木工程学院, 南京, 江苏 210096, 中国.

陈昕, 北京科技大学土木工程系, 北京 100083, 中国.

电子邮件地址: shbchai@chd.edu.cn; jcli@seu.edu.cn

电子邮件地址: shbchai@chd.edu.cn; jcli@seu.edu.cn

使用次数 (最近 180 天): 2

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作者: Zheng Hong; Jiang Lu; Liu Zhichao; Chen Peng

作者: 郑宏; 蒋璐; 刘智超; 陈鹏

标题: Hysteretic behavior analysis of spatial joints of new type assembled square concrete filled steel tubular column and H-typed beam

标题: 新型装配式方钢管混凝土柱-H 型梁空间节点滞回性能分析

来源出版物: 建筑结构 卷: 49 期: 11 页: 67-76 出版年: 2019

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作者关键词: concrete filled steel tube; new type of assembled joint; spatial joint; finite element analysis; hysteretic behavior

作者关键词: 钢管混凝土; 新型装配式节点; 空间节点; 有限元分析; 滞回性能

摘要: A new type of spatial joint with assembled concrete filled square steel tubular column and H-typed beam was proposed. Two series of joint specimens were designed. The finite element software ABAQUS was used to simulate and analyze the specimens under low cyclic repeated loading, and results were compared with experimental results. The results show that the failure modes and hysteretic curves of the joint obtained by finite element analysis are in good agreement with the experimental results. On this basis, a new type of mid-story spatial joint was selected to study the hysteretic behavior of this new type of spatial joints. The results show that the failure mode of plane joints is the same as that of spatial joints, and all of them are plastic hinge failure at beam ends. The hysteretic behavior of corner-column joints is weaker than that of plane joints, and the hysteretic behavior of side-column and mid-column joints is similar to that of plane joints.

摘要: 提出了一种新型装配式方钢管混凝土柱-H 型梁空间连接节点, 设计了 2 个系列的节点试件, 利用有限元软件 ABAQUS 对低周反复荷载作用下的试件进行模拟分析并与试验结果对比, 结果表明有限元分析得到的节点破坏形态、滞回曲线与试验结果吻合较好。在此基础上, 选取新型中层空间连接节点来研究此类新型空间节点的滞回性能, 研究结果表明: 平面节点与空间节点的破坏模式一致, 均为梁端塑性铰破坏; 角柱节点的滞回性能弱于平面节点, 边

柱与中柱节点的滞回性能与平面节点相似。

入藏号: CSCD:6507440

地址: Zheng Hong, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Jiang Lu, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Liu Zhichao, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Chen Peng, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 郑宏, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

蒋璐, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

刘智超, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

陈鹏, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: cezheng@chd.edu.cn

电子邮件地址: cezheng@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Yan Weiheng; Zhang Yujie; Zhang Wen; Ji Minghui; Wang Tuo

作者: 颜卫亨; 张玉杰; 张雯; 姬明辉; 王妥

标题: Study on optimization of folded reticulated shell house based on wind-resistant design

标题: 基于抗风设计的折叠网壳房屋外形优化研究

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作者关键词: folded reticulated shell house; computational fluid dynamics; numerical simulation; wind load coefficient; shape optimization

作者关键词: 折叠网壳房屋; 计算流体动力学; 数值模拟; 风荷载体型系数; 外形优化

摘要: In order to improve the wind resistance of complex folded reticulated shell house and make it have a reasonable under the action of wind load, numerical simulations were performed using the fluid dynamics calculation software FLUENT based on the basic theory of computational fluid dynamics (CFD). Comparing with wind tunnel test data, reasonable numerical wind tunnel were discussed and analyzed, including boundary conditions, calculation domain size, mesh division, discrete format, solving algorithm, turbulence model and etc. These basic parameters and technology were determined. In accordance with Technical specifications of the spatial grid

structure (JGJ 72010) and the functional requirements for use in the camping houses, 28 kinds of building optimization schemes were designed with the parameters of the rise span ratio, the angle and height of the end door. Using wind direction angles of $0^\circ, 30^\circ, 45^\circ, 60^\circ, 90^\circ$ as analysis parameters, the numerical simulations of 140 working conditions were carried out to obtain the wind pressure distribution characteristics and wind load coefficients of light-folded reticulated shell house with different optimization schemes. On this basis, with the objective of the most uniform wind pressure distribution and minimum standard deviation of wind load coefficients, the light-folded reticulated shell house was subjected to an optimization analysis which was based on wind-resistant design, and a reasonable one with good wind resistance was obtained. Results show that the optimized one can effectively solve the adverse wind pressure distribution on the surface of the house and greatly improve the wind resistance of the folded reticulated shell.

摘要: 为改善复杂体型折叠网壳房屋的抗风性能,使其在风荷载作用下具有合理外形,基于计算流体动力学(CFD)的基本理论,运用 FLUENT 软件进行数值模拟,与风洞试验数据对比验证,探讨与分析轻型折叠网壳房屋的合理数值风洞,包括边界条件、计算域尺寸、网格划分方式、离散格式、求解算法、湍流模型等基本参数和技术的确定。按照《空间网格结构技术规程》(JGJ 72010)与野营房屋使用功能要求,以矢跨比、端门倾角、端门高为尺寸参数,设计出 28 种建筑体型,以 $0^\circ, 30^\circ, 45^\circ, 60^\circ, 90^\circ$ 风向角为分析参数进行 140 种工况的数值模拟,得出轻型折叠网壳房屋不同体型表面风压分布特性与风荷载体型系数。在此基础上以风压分布最均匀与体型系数标准差最小为优化目标,对轻型折叠网壳房屋进行基于抗风设计的体型优化分析,得到抗风性能良好的合理外形。结果表明,经优化的外形可有效化解房屋表面的不利风压分布,极大提高折叠网壳的抗风性能。

入藏号: CSCD:6507450

地址: Yan Weiheng, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Yujie, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Wen, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Ji Minghui, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wang Tuo, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 颜卫亨, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

张玉杰, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

张雯, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

姬明辉, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

王妥, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: yanwh@chd.edu.cn

电子邮件地址: yanwh@chd.edu.cn

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作者: Wang Bo; Zhao Junhai; Zhang Dongfang; Ma Kangkai

作者: 王博; 赵均海; 张冬芳; 马康凯

标题: Axial compressive bearing capacity of composite L-shaped steel tubular columns filled with steel-reinforced concrete

标题: 钢管组合 L 形钢管混凝土柱的轴压承载力

来源出版物: 土木与环境工程学报 (中英文) 卷: 41 期: 2 页: 70-78 出版年: 2019

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作者关键词: unified strength theory; concrete-filled steel tube column; special shaped column; steelreinforced concrete; axial compressive bearing capacity

作者关键词: 统一强度理论; 钢管混凝土柱; 异形柱; 钢管混凝土; 轴压承载力

摘要: Based on the unified strength theory, the axial ultimate bearing capacities of composite L-shaped steel tube short columns filled with steel-reinforced concrete (CLSC-SRC) under three-dimensional stress were analyzed in this paper. According to characteristic of section shape, the column was firstly divided into one rectangle and one square steel tubular columns filled with steel-reinforced concrete. Then, considering the influence of width to thickness ratio on steel tube and a concrete strength reduction factor was introduced with scale effect. Because nonuniform constraint of the long and short edge of the steel tube was equivalent to the uniform constraint of the circumferential direction, a formula for calculation of axial compressive bearing capacity of CLSC-SRC can be developed. Finally, the formula for calculating the compression bearing capacity of the steel bone L-shaped concrete-filled steel tubular long columns was proposed referring to the code for design of steel structure. The proposed formula was validated by comparing the calculation results with the corresponding test data. Results show that the proposed formulations are correct and reasonable. The effects of the parameters and Pull pressure ratio of Material and Osseous rate were obtained in the theoretical analysis. More importantly, the proposed formula has good applicability and extensive applications, offering a useful supplement to existing formulas obtained from experiments.

摘要: 采用统一强度理论对轴心受压钢管组合 L 形钢管混凝土短柱的核心混凝土、型钢钢管在三向受压应力状态下的轴向极限承载力进行分析; 根据截面形状组成特点, 将 L 形钢管分为一个矩形和一个方形, 通过考虑宽厚比对钢管的影响和引入考虑尺寸效应影响的混凝土强度折减系数, 将钢管长短边非均匀约束等效为环向均匀约束, 推导并建立了轴压短柱的承载力公式; 在此基础上, 参照钢结构设计规范, 建立了中长柱轴压承载力公式. 计算结果与试验结果吻合较好, 验证了理论公式的正确性, 并进行了短柱轴压承载力参数分析, 得到了参数 k 及材料拉压比 α 、含骨率 ρ 对承载力的影响. 结果表明: 该计算式具有良好的适用性和广泛的应用性, 对试验所提出的公式进行了理论上的补充。

入藏号: CSCD:6502525

地址: Wang Bo, School of Civil Engineering,Changan University, Xian, 710061.

Zhao Junhai, School of Civil Engineering,Changan University, Xian, 710061.

Zhang Dongfang, School of Civil Engineering,Changan University, Xian, 710061.

Ma Kangkai, School of Civil Engineering,Changan University, Xian, 710061.

地址: 王博, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

赵均海, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

张冬芳, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

马康凯, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: 398585730@qq.com; zhaojh@chd.edu.cn

电子邮件地址: 398585730@qq.com; zhaojh@chd.edu.cn

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作者: Wang Bu; Zhang Nuoya; Huang Xiaoxia; Xue Weihua; Zhu Huirong

作者: 王步; 张诺亚; 黄小霞; 薛炜铎; 朱慧荣

标题: INVESTIGATION ON IMPACT DAMAGES OF CFRP-RETROFITTED RC COLUMNS UNDER LOW-VELOCITY IMPACTS

标题: 碳纤维增强复材环向围束加固柱受低速冲击损伤的研究

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语言: Chinese

文献类型: Article

作者关键词: carbon fiber-reinforced polymer(CFRP); columns; low-velocity impact; finite element method

作者关键词: 碳纤维增强复合材料; 柱; 低速冲击; 有限元方法

摘要: Under the low-velocity impacts far below those considered by current design codes,the externally bonded carbon fiber-reinforced polymer (CFRP) systems for reinforced concrete (RC) structures would suffer severe damages, which might result in obviously decreases or even a totally lost in strengthening effect. However, there is no quantitative understanding about this potential safety hazard. In the study,the explicit finite element models were established for the CFRP-retrofitted column-impactor systems considering contact nonlinearity and material

nonlinearity. The effects of different influencing factors (i. e.,the initial kinetic energy of impactor,the thickness of CFRP,and the shape of impactor) on the impact damages of CFRP-retrofitted RC columns were studied systematically.

摘要: 在钢筋混凝土结构常规设计中可忽略的低速冲击作用下,外贴加固钢筋混凝土构件的碳纤维增强复合材料(CFRP)片材就可能发生严重损伤,导致加固作用的降低乃至丧失。目前,对这一安全隐患仍缺乏量化认识。针对易受撞击且失效后果严重的 CFRP 环向围束受压加固柱,建立了可考虑接触非线性和材料非线性的加固柱-撞锤系统的显式有限元分析模型,对包括冲击初始动能、CFRP 厚度和撞击物形状在内的多种因素对加固柱冲击损伤的影响效果进行了系统性的量化研究。

入藏号: CSCD:6504747

地址: Wang Bu, School of Civil Engineering,Chang'an University;;Research Institute of Testing and Retrofitting Engineering Structures,Chang'an University, ;; Xi'an;;Xi'an, ;; 710061;;710061.

Zhang Nuoya, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Huang Xiaoxia, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Xue Weihua, School of Civil Engineering,Chang'an University;;Anar Group, ;; Xi'an;;, ;;Beijing 710061;;100071.

Zhu Huirong, United Design Group Co.,Ltd.,Wuhan, Wuhan, Hubei 430032, China.

地址: 王步, 长安大学建筑工程学院;;长安大学工程结构诊断与改造研究所, ;; 西安;;西安, ;; 710061;;710061.

张诺亚, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

黄小霞, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

薛炜铎, 长安大学建筑工程学院;;石榴集团, ;; 西安;;, ;;北京 710061;;100071.

朱慧荣, 联创新锐设计顾问(武汉)有限公司, 武汉, 湖北 430032, 中国.

电子邮件地址: kingstep74@163.com

电子邮件地址: kingstep74@163.com

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作者: Lu Linfeng; Zhang Tingqiang; Lyu Pin

作者: 卢林枫; 张廷强; 吕品

标题: Influence Factors Analysis on the Seismic Behavior of Weak-Axis Tubular Web Reduced Beam Section Connection

标题: 钢管腹板削弱型梁柱弱轴连接的抗震性能影响因素分析

来源出版物: 建筑钢结构进展 卷: 21 期: 3 页: 77-86 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: tubular web; weak-axis beam-column connection with reduced beam section; stiffness degradation; ductility coefficient; plastic rotational capacity; seismic behavior

作者关键词: 钢管腹板; 削弱型梁柱弱轴连接; 刚度退化; 延性系数; 塑性转动能力; 抗震性能

摘要: Base on the basic forms of box-strengthened joint region connection for the weak-axis of I-section column and tubular web reduced beam section(TW-RBS),a new weak axis tubular web reduced beam section(WA-TW-RBS)connection with the boxstrengthen joint region is proposed for the I-section column and H-shaped beam in the seismic frame.In order to investigate the mechanical and seismic behavior of WA-TW-RBS connection,three series of 14 WA-TW-RBS connection specimens are analyzed using FEM software Abaqus.The diameter and thickness of steel tube and the distance from steel tube center to the surface of end plate are changed in the FE analysis.The influences of these parameters on the hysteretic behavior,stiffness degradation,ductility,and plastic rotational capacity are studied.The FEM analysis results show that all the ductility coefficients of the WA-TW-RBS connections are greater than 3.0,and all the plastic rotation angles of the specimens are not less than 0.03rad,and all the connections are beneficial to form the beam plastic hinge and offset them from the panel zone.In the analysis,the steel column and the panel zone of all the specimens are still in the elastic stage,which indicates the seismic design concepts ofstrong column and weak beamandstrong joint and weak memberare satisfied.

摘要: 在节点域箱形加强式工字形梁柱弱轴连接和钢管腹板削弱型(tubular web reduced beam section,TW-RBS)连接的基本形式上,提出了一种工字形柱与 H 形梁的钢管腹板削弱型弱轴(weak axis tubular web reduced beam section,WA-TW-RBS)连接。设计了 3 个系列共 14 个 WA-TW-RBS 弱轴连接节点的对比分析模型,采用有限元软件 Abaqus 对钢管的直径、厚度以及钢管中心距蒙皮板外边缘的距离进行了变参数分析,研究这些参数的变化对节点滞回性能、刚度退化、节点延性和塑性转动能力的影响。研究表明:在上述参数合理的取值范围内,WA-TW-RBS 连接节点的延性系数能达到 3.0 以上,节点的塑性转动能力不小于 0.03rad,并且能有效地实现塑性较外移,是一种非常理想的钢框架抗震节点形式。所有模型在分析时,钢柱和节点域都处于弹性阶段,满足强柱弱梁和强节点弱构件的抗震设计理念。

入藏号: CSCD:6506434

地址: Lu Linfeng, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Tingqiang, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Lyu Pin, School of Civil Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 卢林枫, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

张廷强, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

吕品, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: lulinfeng@chd.edu.cn

电子邮件地址: lulinfeng@chd.edu.cn

使用次数 (最近 180 天): 0
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作者: Lu Linfeng; Liu Yan; Li Kangsheng

作者: 卢林枫; 刘岩; 李康生

标题: Finite Element Analysis on the Seismic Behavior of DRBS Weak-Axis Connection with Box-shaped Region

标题: 箱形节点域 DRBS 型弱轴连接抗震性能有限元分析

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作者关键词: DRBS connection; box-shaped region; weak-axis connection; seismic behavior; finite element analysis

作者关键词: 翼缘双削弱型节点; 箱形节点域; 弱轴连接; 抗震性能; 有限元分析

摘要: A new double reduced beam section(DRBS)connection based on box-shaped region connection for weak-axis I-shaped column is introduced and the seismic behavior of the connection is studied using software ABAQUS.A parametric study is conducted to evaluate the behavior of connections.The results show that,following the limitations and guidelines stated in this research,when the length of the second reduced zone equals to the length of the first reduced zone and the depth of the second reduced section is slightly larger than the upper limitation recommended by FEMA-350,the DRBS connection exhibits outstanding seismic behavior.Comparing with RBS joint,the bearing capacity of the DRBS joint is not significantly reduced,but the maximum equivalent plastic strain is significantly reduced,and the ductility and plastic rotation capacity are increased.Moreover,the DRBS joint slows the occurrence of local buckling of beam webs and flanges and then increases the accumulated energy absorption before local buckling occurs.

摘要: 为了研究箱形节点域翼缘双削弱(double reduced beam section,DRBS)工字形柱弱轴连接节点的抗震性能,设计了两个系列模型。应用有限元软件 Abaqus 对第 2 个削弱区段的长度和深度的取值进行了研究,分析了节点的破坏形式、等效塑性应变、承载力、延性、塑性转动能力及耗能系数等,并与箱形节点域翼缘削弱(reduced beam section,RBS)型弱轴连接节点进行了对比分析。结果表明:在循环荷载作用下,在第 2 个削弱区段的削弱长度等于第 1 个削

弱区段长度且第 2 个削弱区段的削弱深度取值宜略大于美国 FEMA-350 规范推荐的上限值时,箱形节点域 DRBS 型节点具有良好的抗震性能。与 RBS 型节点相比,DRBS 型节点的承载力降低不明显,但是显著降低了最大等效塑性应变,提高了节点的延性和塑性转动能力。此外,DRBS 型节点减缓了梁腹板和翼缘的局部屈曲的发生,从而提高了节点的累积耗能能力。

入藏号: CSCD:6506435

地址: Lu Linfeng, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Liu Yan, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Li Kangsheng, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 卢林枫, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

刘岩, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

李康生, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: lulinfeng@chd.edu.cn

电子邮件地址: lulinfeng@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Yang Liwei; Zhang Shuang; Yang Zhou; Dou Yan; Hu Bo; Zhao Chuanliang

作者: 杨利伟; 张爽; 杨周; 窦妍; 胡博; 赵传靓

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标题: 径流中氮和磷在生物滞留池中的迁移及去除机理

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文献类型: Article

作者关键词: bioretention tank; surface runoff; nitrogen; phosphorus; CXTFIT software; retardation coefficient; removal mechanism

作者关键词: 生物滞留池; 地表径流; 氮; 磷; CXTFIT 软件; 阻滞系数; 去除机理

摘要: Bioretention tank is a measure to control surface runoff pollutant discharge from the source. The removal effect of NH₄⁺-N, NO₃⁻-N and TP of surface runoff was investigated in a bioretention tank, which was filled with sand and soil mixture with a volume ratio of 4 : 6. Moreover, the CXTFIT 2.0 software was adopted to simulate the experimental results. The

removal mechanism of TP, NH₄⁺-N and NO₃⁻-N in the bioretention tank was analyzed by adsorption experiments. The results showed that the removal process of NH₄⁺-N, NO₃⁻-N and TP in the bioretention tank could be simulated by CXTFIT 2.0 software. The larger the retardation coefficient (R_d) fitted by penetration process of NH₄⁺-N, NO₃⁻-N and TP, the better the removal effect of NH₄⁺-N, NO₃⁻-N and TP could be obtained in the bioretention tank. Among them, the removal effect of NH₄⁺-N was the best ($R_d = 8$), and the removal effect of TP was better when R_d was equal to 7, while the removal effect of NO₃⁻-N was extremely limited when the optimal R_d was 0.8. The removal of NH₄⁺-N and TP in the bioretention tank were both effective adsorption, which were mainly uneven adsorption.

摘要: 生物滞留池是一种可以在源头控制地表径流污染物排放的措施。采用砂、土混合物(体积比为4:6)作为填料,研究了生物滞留池对地表径流中氨氮、硝态氮和总磷的去除效果,并采用CXTFIT2.0软件对试验结果进行模拟。另外,利用吸附试验对氨氮、硝态氮和总磷在生物滞留池中的去除机理进行了解析。结果表明,生物滞留池对氨氮、硝态氮和总磷的去除过程可以采用CXTFIT 2.0软件进行模拟;氨氮、硝态氮和总磷穿透过程拟合出的阻滞系数(R_d)越大,生物滞留池对其去除效果越好,其中,对氨氮的去除效果最好($R_d=8$),对总磷的去除效果较好($R_d=7$),对硝态氮的去除效果极其有限($R_d=0.8$);生物滞留池对氨氮和总磷的去除都是有利的,且以不均匀的吸附方式为主。

入藏号: CSCD:6500010

地址: Yang Liwei, School of Architectural Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Hu Bo, School of Architectural Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhao Chuanliang, School of Architectural Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Shuang, School of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Dou Yan, School of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Yang Zhou, China Central South Municipal Design Institute Co. Ltd., Wuhan, Hubei 430000, China.

地址: 杨利伟, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

胡博, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

赵传靓, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

张爽, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

窦妍, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

杨周, 中国市政工程中南设计研究总院有限公司, 武汉, 湖北 430000, 中国.

电子邮件地址: 408802216@qq.com

电子邮件地址: 408802216@qq.com

使用次数 (最近 180 天): 0

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作者: Su Jizhi; Liu Boquan; Xing Guohua; Ma Yudong; Song Meng

作者: 苏佳智; 刘伯权; 邢国华; 马煜东; 宋猛

标题: Damage evolution process of RC frame under earthquake excitation

标题: 地震作用下 RC 框架结构损伤演化过程分析

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作者关键词: structural engineering; damage index model; RC frame structure; weighted coefficient; energy dissipation and storage capability

作者关键词: 结构工程; 损伤指数模型; 钢筋混凝土框架结构; 权重系数; 能量耗储能力

摘要: In order to clarify theseismic collapse mechanism of RC frame structures and control their failure path,the damage degree of component, storey, and structure was quantitatively studied based on a 1/3-scale model of three-storey and three-bay frame, was carried out under low reversed cyclic loading. The influence of component damage was analyzed and the relationship between different levels was discussed on the seismic behavior of structure. The results show that the damage degree of the bottom members is generally greater than that of the top ones when the structure collapses. The average damage indexes of columns in different stories are 0.97, 0.62, 0.15, and those of beams are 0.95, 0.86, 0.74, respectively. The cumulative damage of the structure develops from the bottom to the top. As the energy dissipation member, the frame beams are damaged before the columns, with more serious degree and uniform distribution along the floor. The damage distribution of columns along the floor is relatively concentrated. When the structure collapses, the damage indexes in the first story are larger than those of the upper ones, about 8.89%, 21.06% of beams and 26.56%, 62.93% of columns.When the load displacement is small, the structure relies on horizontal components to consume seismic energy, however, it gradually relies on vertical components as the displacement amplitude and cycle number increase. The damage development curves of beams and columns show a convex and concave tendency, respectively. The damage model proposed from the perspective of structural energy dissipation is more consistent with the nature of structural seismic resistance, with fewer unknown parameters, and the calculation results can accurately reflect the damage state of the structure at different performance levels.

摘要: 为明确 RC 框架结构的抗地震倒塌破坏机理,控制其失效路径,基于课题组完成的 1 榀 1/3 比例的 3 层三跨 RC 平面框架低周循环加载试验,通过量化构件、楼层及结构 3 个层次的损伤破坏程度,研究了不同层次损伤破坏之间的相互联系以及不同类型构件损伤程度对结构整体抗震性能的影响。研究结果表明:结构发生倒塌破坏时,底层构件损伤程度普遍大于上部构件,第 1~3 层梁、柱端的损伤指数平均值分别为 0.95、0.86、0.74 和 0.97、0.62、0.15,地震

作用下结构的累积损伤是自下而上发展的;框架梁作为耗能构件,一般先于框架柱出现损伤,且损伤程度较大,沿楼层分布比较均匀,结构最终倒塌时第1层框架梁的损伤指数分别比第2、3层增加约8.89%和21.06%,框架柱的损伤破坏沿楼层分布相对集中,主要分布于结构底层,最终倒塌时第1层框架柱的损伤指数分别比第2、3层提高约26.56%和62.93%;结构在加载位移幅值较小时,主要依靠水平耗能构件消耗地震能量,随着位移幅值及循环次数的增加,竖向承力构件逐渐取代水平构件的耗能作用,框架梁、柱的整体损伤发展曲线分别呈上凸和上凹趋势;从结构能量耗储能力角度提出的整体损伤模型更符合结构抗震的本质,未知参数少,且计算结果能够较为准确地反映结构在不同性能水平下的损伤状态。

入藏号: CSCD:6501817

地址: Su Jizhi, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Liu Boquan, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Xing Guohua, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Ma Yudong, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Song Meng, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 苏佶智, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

刘伯权, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

邢国华, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

马煜东, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

宋猛, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: sujizhi1989@163.com; bqliu@chd.edu.cn

电子邮件地址: sujizhi1989@163.com; bqliu@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Zhao Junhai; Dong Jing; Zhang Dongfang

作者: 赵均海; 董婧; 张冬芳

标题: Research status of dynamic responses of RC structure confined with FRP under blast loading

标题: 爆炸荷载下 FRP 约束钢筋混凝土结构动力响应研究现状

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作者关键词: blast loading; fiber reinforced polymer; reinforced concrete structure; dynamic response; research status

作者关键词: 爆炸荷载; 纤维增强复合材料; 钢筋混凝土结构; 动力响应; 研究现状

摘要: Fiber reinforced polymer (FRP) has been widely used in civil engineering with the advantages, such as high strength to weight ratios, corrosion resistance, fatigue resistance, low thermal conductivity and so on. This study focuses on the blast resistance of the reinforced concrete (RC) structure confined with FRP. By reviewing the research on the dynamic responses of the reinforced structure confined with FRP under blast loads, it is found that the blast resistance of RC structure has been significantly strengthened by the confinement of FRP. Additionally, primary results are introduced from the three aspects, such as the theoretical research, experimental research and numerical analysis. Based on the existing achievements, both valuable research issues and suggestions are presented, which could provide a certain reference for the future research.

摘要: 纤维增强复合材料(Fiber Reinforced Polymer,简称 FRP)具有轻质高强、耐腐蚀、耐疲劳和低导热系数等优点,现已广泛应用于土木工程各领域。针对 FRP 约束钢筋混凝土结构的抗爆性能,通过综述近年来国内外爆炸荷载下 FRP 约束钢筋混凝土结构动力响应的研究现状及进展,表明 FRP 材料的约束对钢筋混凝土结构的抗爆性能有显著的提高作用。此外,从相关理论研究、试验研究和数值模拟 3 个方面介绍了主要成果。针对现有成果,对爆炸荷载下 FRP 约束钢筋混凝土结构动力响应研究提出了需要进一步研究和解决的问题,可为后续研究提供一定的参考。

入藏号: CSCD:6486076

地址: Zhao Junhai, School of Civil Engineering, Chang' an University, Xi'an, Shaanxi 710061, China.

Dong Jing, School of Civil Engineering, Chang' an University, Xi'an, Shaanxi 710061, China.

Zhang Dongfang, School of Civil Engineering, Chang' an University, Xi'an, Shaanxi 710061, China.

地址: 赵均海, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

董婧, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

张冬芳, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: zhaojh@chd.edu.cn; kimikobe@163.com

电子邮件地址: zhaojh@chd.edu.cn; kimikobe@163.com

作者识别号:

作者 Web of Science ResearcherIDORCID 号

Zhang, Dongfang 0000-0003-0929-7958

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 1

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作者: Wei Hui; Wu Tao; Liu Yang; Liu Xi

作者: 魏慧; 吴涛; 刘洋; 刘喜

标题: A SHEAR DESIGN MODEL FOR RC DEEP FLEXURAL MEMBERS CONSIDERING THE SIZE EFFECT

标题: 考虑尺寸效应的深受弯构件受剪模型分析

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作者关键词: reinforced concrete; deep flexural members; shear bearing capacity; Tan-Cheng model; size effect

作者关键词: 钢筋混凝土; 深受弯构件; 受剪承载力; Tan-Cheng 模型; 尺寸效应

摘要: There is a lack of accurate and reasonable shear design models for reinforced concrete deep flexural members such as typical D-region shear components with complicated force mechanism and significant size effect. In combination with the advantages of the Tan-Cheng model that fully considers the softening effect of concrete and the size effect of struts, and on the basis of the deep understanding of the effect of diagonal strut angle α and composite tensile stress f_t on the shear strength of deep flexural members, the relationship between the top node height l_c and α was simplified and a modified Tan-Cheng model was proposed by reconsidering the effective action region of web reinforcement. The predictions of 308 deep flexural members from either foreign or domestic source indicate that the proposed model has a comparable accuracy with the Tan-Cheng model, and it can accurately consider the size effect of concrete struts through a concise calculation process. The comparison between the proposed model and current code provisions shows that the predictions by the proposed model has a better agreement with the test results. It further indicates that the proposed model can reasonably predict the shear strength of deep flexural members.

摘要: 深受弯构件斜截面受剪机理复杂且受尺寸效应影响显著,缺乏准确、合理的受剪计算模型。结合 Tan-Cheng 模型中对混凝土软化作用和深受弯构件尺寸效应的全面考虑优势,在深入研究混凝土斜压杆倾角 α 和构件复合抗拉强度 f_t 对深受弯构件受剪承载力影响的基础上,简化压杆顶部节点区高度 l_c 与 α 的关系,考虑腹筋有效作用区域修正复合抗拉强度 f_t 计算模型,提出了不影响精度前提下的修正 Tan-Cheng 模型。研究表明:基于国内外 308 组深受弯构件受剪试验数据计算结果,建议模型计算精度等同 Tan-Cheng 模型,并能够准确考虑尺寸效应影响,但计算过程较为简洁;通过与现有典型各国规范建议模型对比分析表明,计算结果较规范计算值更接近试验值,能够更准确地对深受弯构件的受剪承载力进行预测。

入藏号: CSCD:6483848

地址: Wei Hui, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wu Tao, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Liu Yang, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Liu Xi, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 魏慧, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

吴涛, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

刘洋, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

刘喜, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电 子 邮 件 地 址 : weihuichd@163.com; wutao@chd.edu.cn; 13891705608@163.com;
lliuxii@163.com

电 子 邮 件 地 址 : weihuichd@163.com; wutao@chd.edu.cn; 13891705608@163.com;
lliuxii@163.com

使用次数 (最近 180 天): 0

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作者: Yang Liwei; Jiang Wang; Li Deyi; Hu Bo; Li Yanpeng; Zhao Qing

作者: 杨利伟; 江旺; 李德溢; 胡博; 李彦鹏; 赵庆

标 题 : Effect of pH on the Source Separating Swine Wastewater Treatment byMFCs with
Microalgae

标题: pH 对微藻型 MFCs 处理养猪源分离废水影响研究

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作者关键词: pH; microbial fuel cells (MFCs); microalgae type; pH; the source separating swine
wastewater

作者关键词: 微生物燃料电池(MFCs); 微藻型; 养猪源分离废水

摘 要 : A two-compartment microbial fuel cells (MFCs) with microalgae as cathode was constructed, and the source separating swine wastewater as anode substrate was used to investigate the effect of anode pH on electricity generation performance and the source separating swine wastewater treatment efficiency of MFCs with microalgae on the basis of stable operation. The results showed that, the anode liquid in MFCs with microalgae was conducive to improving the system performance in the alkaline environment. When the pH increased from 6 to 10, the electric production performance of MFCs with microalgae increased accordingly; When pH=10, the electric production performance of the system reached the best, with a power density of 534.8 mW/m², which was 2.12 times of the maximum power density when pH was 6. pH had little influence on COD removal rate, which was above 90%. NH₄⁺-N removal rate increased with

the increase of pH. When pH was 10, NH₄⁺-N removal rate reached 93.54%.

摘要: 实验构建了以微藻为阴极的双室微生物燃料电池(MFCs),以养猪源分离废水为阳极底物,考察在稳定运行的基础上,阳极初始 pH 对微藻型 MFCs 的产电性能和养猪源分离废水处理效果的影响。结果表明,微藻型 MFCs 中阳极液在碱性环境中有利于提高系统的性能,当 pH 从 6 增加到 10 时,微藻型 MFCs 的产电性能随之提高。当 pH=10 时,系统的产电性能达到最佳,功率密度为 534.8 mW/m³,是 pH=6 时的 2.12 倍。pH 对 COD 的去除率影响不大,均在 90% 以上;NH₄⁺-N 的去除率随着 pH 的升高而提高,当 pH=10 时,NH₄⁺-N 去除率达 93.54%。

入藏号: CSCD:6474230

地址: Yang Liwei, College of Architecture and Engineering, Chang'an University;; ;Department of Housing and Urban-Rural Development Water Supply and Drainage Key Laboratory, Xi'an;;Xi'an, ; 710061;;710061.

Hu Bo, College of Architecture and Engineering, Chang'an University;; ;Department of Housing and Urban-Rural Development Water Supply and Drainage Key Laboratory, Xi'an;;Xi'an, ; 710061;;710061.

Zhao Qing, College of Architecture and Engineering, Chang'an University;; ;Department of Housing and Urban-Rural Development Water Supply and Drainage Key Laboratory, Xi'an;;Xi'an, ; 710061;;710061.

Jiang Wang, College of Architecture and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Li Deyi, China Railway Construction Investment Group Co. LTD, Beijing 100855, China.

Li Yanpeng, College of Environmental Science and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 杨利伟, 长安大学建筑工程学院;;长安大学, ;;住房与城乡建设部给水排水教育部重点实验室, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

胡博, 长安大学建筑工程学院;;长安大学, ;;住房与城乡建设部给水排水教育部重点实验室, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

赵庆, 长安大学建筑工程学院;;长安大学, ;;住房与城乡建设部给水排水教育部重点实验室, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

江旺, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

李德溢, 中国铁建投资集团有限公司, 北京 100855, 中国.

李彦鹏, 长安大学环境科学与工程学院, 西安, 陕西 710054, 中国.

电子邮件地址: 408802216@qq.com

电子邮件地址: 408802216@qq.com

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Li Peidong; Gao Ying; Wu Rongchu; Gao Junfa

作者: 李沛东; 高颖; 吴荣础; 高俊发

标题: Research progress of degradation of organic pollutants in wastewater by heterogeneous Fenton reaction

标题: 异相芬顿反应降解废水中有机污染物的研究进展

来源出版物: 应用化工 卷: 48 期: 3 页: 717-720,727 出版年: 2019

文献号: 1671-3206(2019)48:3<717:YXFDFY>2.0.TX;2-U

来源出版物: Applied Chemical Industry 卷: 48 期: 3 页: 717-720,727 出版年: 2019

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语言: Chinese

文献类型: Review

作者关键词: heterogeneous Fenton; catalyst; broad pH range

作者关键词: 异相芬顿; 催化剂; 扩宽 pH 范围

摘要: The mechanism of the Fenton reaction and the limitations of the traditional Fenton reaction are briefly described. The recent progress in the degradation of organic pollutants in wastewater by heterogeneous Fenton, photo-heterogeneous Fenton and electro-heterogeneous Fenton is reviewed. It is outlined that the novel Fenton catalyst has a good effect in both the broad pH range and the reuse rate. The focus of future Fenton reaction is discussed.

摘要: 简述了芬顿反应的机理以及传统芬顿反应的局限性。综述了异相芬顿、光-异相芬顿和电-异相芬顿降解废水中有机污染物的最新研究进展。概述了新型芬顿催化剂在宽泛的 pH 范围内具有良好效果, 以及重复利用率。探讨了未来芬顿反应的研究重点。

入藏号: CSCD:6470781

地址: Li Peidong, School of Architecture Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Gao Ying, School of Architecture Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Wu Rongchu, School of Architecture Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Gao Junfa, School of Architecture Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 李沛东, 长安大学建筑工程学院, 西安, 陕西 710054, 中国.

高颖, 长安大学建筑工程学院, 西安, 陕西 710054, 中国.

吴荣础, 长安大学建筑工程学院, 西安, 陕西 710054, 中国.

高俊发, 长安大学建筑工程学院, 西安, 陕西 710054, 中国.

电子邮件地址: 635679269@qq.com

电子邮件地址: 635679269@qq.com

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第 54 条, 共 60 条

作者: Zhang Changguang; Qi Hang; Zhao Junhai; Cai Mingming

作者: 张常光; 祁航; 赵均海; 蔡明明

标题: Unified solutions to remained width for inclined strip coal pillars

标题: 倾斜煤层条带煤柱留设宽度统一解

来源出版物: 采矿与安全工程学报 卷: 36 期: 2 页: 248-255 出版年: 2019

文献号: 1673-3363(2019)36:2<248:QXMCTD>2.0.TX;2-P

来源出版物: Journal of Mining & Safety Engineering 卷: 36 期: 2 页: 248-255 出版年: 2019

文献号: 1673-3363(2019)36:2<248:QXMCTD>2.0.TX;2-P

语言: Chinese

文献类型: Article

作者关键词: inclined coal seam; strip coal pillar; unified strength theory; caving gangue; remained width

作者关键词: 倾斜煤层; 条带煤柱; 统一强度理论; 垮落矸石; 留设宽度

摘要: Recoverable reserves of inclined coal seams account for a large proportion in China, but there are few calculation methods for inclined strip coal pillars. Based on the unified strength theory, the unified solution to remained width for strip coal pillars in an inclined coal seam is established taking the intermediate principal stress, gangue support as well as the dip angle of coal seam into consideration. Then the comparability analysis and comparison verification are carried out to discuss the support effect of gangue and the impact of each parameter. It is found that the obtained unified solution of remained width is a set of ordered theoretical results which can be degraded into multiple strength criterion solutions and verified by the empirical formula of the literature. And it has a wide theoretical significance and engineering application prospects. The support of gangue has a great influence on shallow coal seams and the coal seam with large mining width, which can be utilized to improve the recovery rate of coal seams. Moreover, the remained width decreases with the increase of the dip angle of the coal seam, and especially when the dip angle is more than 10° , the design of horizontal coal seams will be conservative; the intermediate principal stress effect and the change of interface strength parameters should be considered reasonably.

摘要: 我国倾斜煤层可采储量占比较大,但至今鲜有针对倾斜煤层条带煤柱的计算方法。基于统一强度理论,考虑中间主应力、矸石支撑作用和煤层倾角的影响,建立倾斜煤层条带煤柱留设宽度的统一解,对其进行可比性分析与对比验证,探讨矸石的支撑作用和各参数的影响特性。研究表明:本文所得留设宽度统一解是一系列有序理论解答的集合,可退化为多种强度准则解答,并得到文献经验公式的验证,具有广泛的理论意义和工程应用前景;矸石支撑作用对浅埋煤层、煤层开采宽度较大时的影响较大,加以利用可提高煤层的采出率;留设宽度随煤层倾角的增加而减小,特别是煤层倾角大于 10° 时,当作水平煤层的设计将偏于保守;应合理考虑煤柱强度的中间主应力效应和煤层界面强度参数的变化。

入藏号: CSCD:6471183

地址: Zhang Changguang, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Qi Hang, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhao Junhai, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Cai Mingming, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 张常光, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

祁航, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

赵均海, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

蔡明明, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: zcg1016@163.com

电子邮件地址: zcg1016@163.com

使用次数 (最近 180 天): 0

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作者: Zhang Xun; Huang Maosong; Hu Zhiping

作者: 张勋; 黄茂松; 胡志平

标题: Model tests on cumulative deformation characteristics of a single pile subjected to lateral cyclic loading in sand

标题: 砂土中单桩水平循环累积变形特性模型试验

来源出版物: 岩土力学 卷: 40 期: 3 页: 933-941 出版年: 2019

文献号: 1000-7598(2019)40:3<933:STZSZS>2.0.TX;2-6

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文献号: 1000-7598(2019)40:3<933:STZSZS>2.0.TX;2-6

语言: Chinese

文献类型: Article

作者关键词: single pile; sand; lateral cyclic loading; cumulative displacement; prediction model

作者关键词: 单桩; 砂土; 水平循环加载; 累积位移; 预测模型

摘要: Large-diameter single pile foundation is a typical foundation type for offshore wind turbines. Model tests of large-diameter single pile are conducted using a simple mechanical load rig designed in-house in sand. The cumulative deformation response of a single pile under long-term lateral cyclic loading is discussed. The test results indicate that the cumulative displacement of the pile head presents two phase characteristics with number of cycles, and the short-term effect for lateral cyclic loading is greater than the long-term effect. Sand density and cyclic loading paths greatly influence the displacement characteristics of the pile head. The lateral secant stiffness of

the pile head increases with cycling under different initial conditions. The change of horizontal static bearing capacity of single pile after cyclic loading in sands of different densities is not completely consistent with hard-soft mechanism for loose-dense sand subjected to shear. The prediction model parameters for lateral cyclic cumulative displacement of single pile are obtained by use of the empirical formula method. Comparison between the calculation results and the test results show that this model can effectively predict the cumulative displacement of single pile under different cyclic paths.

摘要: 针对典型的浅海风机大直径单桩基础,采用自主设计的水平循环加载装置,在砂土地基中完成了单桩模型试验,揭示了长期水平循环加载下单桩累积变形响应特征。试验结果表明,桩顶水平累积位移随循环次数的变化呈两阶段特征,循环加载短期效应大于长期效应;砂土密实度及循环加载路径对桩顶累积位移特征影响较大;不同初始条件下,单桩水平循环刚度随着循环次数的增大而不断增大;不同密实砂土中循环后单桩水平静承载力的变化与松密砂剪切硬化机制不完全一致。基于经验公式法,对单桩水平循环累积位移预测模型进行了参数分析。与试验结果对比分析表明,该模型能较好地预测不同循环加载路径下单桩累积位移。

入藏号: CSCD:6462253

地址: Zhang Xun, School of Civil Engineering, Changan University;;Department of Geotechnical Engineering, Tongji University, ;; Xi'an;;, Shaanxi;;Shanghai 710061;;200092.

Huang Maosong, Department of Geotechnical Engineering, Tongji University, Shanghai 200092, China.

Hu Zhiping, School of Civil Engineering, Changan University, Xi'an, Shaanxi 710061, China.

地址: 张勋, 长安大学建筑工程学院;;同济大学地下建筑与工程系, ;;, 西安;;, 陕西;;上海 710061;;200092, 中国.

黄茂松, 同济大学地下建筑与工程系, 上海 200092, 中国.

胡志平, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: zhangxunok@126.com

电子邮件地址: zhangxunok@126.com

作者识别号:

作者 Web of Science ResearcherIDORCID 号

Huang, Maosong D-7595-2017

使用次数 (最近 180 天): 1

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作者: Zhang Changguang; Cai Mingming; Qi Hang; Shan Yepeng

作者: 张常光; 蔡明明; 祁航; 单冶鹏

标题: A unified solution for calculating mine backfills considering the backfilling order and the

back wall cohesion

标题: 考虑充填顺序与后壁黏结力的采场充填计算统一解

来源出版物: 岩石力学与工程学报 卷: 38 期: 2 页: 226-236 出版年: 2019

文献号: 1000-6915(2019)38:2<226:KLCTSX>2.0.TX;2-5

来源出版物: Chinese Journal of Rock Mechanics and Engineering 卷: 38 期: 2 页: 226-236 出版年: 2019

文献号: 1000-6915(2019)38:2<226:KLCTSX>2.0.TX;2-5

语言: Chinese

文献类型: Article

作者关键词: mining engineering; mine backfill; unified strength theory; backfilling order; back wall cohesion; intermediate principal stress

作者关键词: 采矿工程; 采场充填; 统一强度理论; 充填顺序; 后壁黏结力; 中间主应力

摘要: On the basis of the shear strength formulation arising from unified strength theory under plane strain conditions, unified solutions of the required cohesion and the safety factor of the backfill were derived for mine backfills with a high height-to-width ratio. Influencing factors such as the intermediate principal stress effect, the backfilling order and the back wall cohesion as well as the top surcharge were comprehensively considered in the unified solution. The solutions were simplified combining with an engineering case and applied to a specific example. Comparability analysis of the proposed solution was conducted, and parametric studies were also carried out. It was found that the proposed solution contains many conventional and new results and hence, has extensively theoretical value and good comparability. It was also shown that calculation formulas of mine backfills for two different objectives are both easy to use and choose in engineering practice. The influence of the intermediate principal stress effect, the backfilling order and the back wall cohesion on the calculation of mine backfills is significant, and effective usages of these three factors can generate an important economic benefit. Existing results available in the literature are conservative in comparison to the proposed result. The influence of the top surcharge cannot be neglected and should be evaluated for obtaining an optimal calculation of mine backfills.

摘要: 以统一强度理论的平面应变抗剪强度公式为基础,合理考虑中间主应力效应、充填顺序、后壁黏结力和顶部超载等综合影响,推导大深宽比采场充填计算时充填料的所需黏聚力统一解和充填体的安全系数统一解,并结合工程算例给出简化公式以及示范计算,继而分析其可比性,最后探讨各因素的影响特性。研究结果表明:本文统一解涵盖了众多的已有解答与新准则解答,具有广泛的理论意义和很好的可比性;2种不同用途的充填计算公式都十分简单,便于实际工程选择及使用;中间主应力效应、充填顺序和后壁黏结力对采场充填计算的影响均很显著,指出现有文献的结果偏于保守,对这3种因素的有效利用可产生重要的经济效益;顶部超载的影响亦不容忽视,应慎重估计顶部超载以实现充填优化计算。

入藏号: CSCD:6413925

地址: Zhang Changguang, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Cai Mingming, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Qi Hang, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Shan Yepeng, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 张常光, 长安大学 建筑工程学院, 西安, 陕西 710061, 中国.

蔡明明, 长安大学 建筑工程学院, 西安, 陕西 710061, 中国.

祁航, 长安大学 建筑工程学院, 西安, 陕西 710061, 中国.

单冶鹏, 长安大学 建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: zcg1016@163.com

电子邮件地址: zcg1016@163.com

使用次数 (最近 180 天): 0

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作者: Chang Zhaoqun; Xing Guohua; Yang Chengyu; Zhou Cheng; Liu Boquan

作者: 常召群; 邢国华; 杨成雨; 周成; 刘伯权

标题: RESEARCH ON FLEXURAL BEHAVIOR OF CORRODED REINFORCED CONCRETE
SIMPLY SUPPORTED ONE-WAY SLABS

标题: 锈蚀钢筋混凝土简支单向板抗弯性能研究

来源出版物: 工业建筑 卷: 49 期: 2 页: 55-59,102 出版年: 2019

文献号: 1000-8993(2019)49:2<55:XSGJHN>2.0.TX;2-4

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文献号: 1000-8993(2019)49:2<55:XSGJHN>2.0.TX;2-4

语言: Chinese

文献类型: Article

作者关键词: corrosion; one-way slab; bearing capacity; flexural stiffness; bond

作者关键词: 锈蚀; 单向板; 承载性能; 抗弯刚度; 黏结

摘要: The steel reinforcement in the concrete slab would be easily corroded under the erosion condition due to the small concrete cover depth, which resulted in the deterioration of the flexural behavior of the reinforced concrete slab. By considering the effect of bond strength degradation of steel reinforcement, a calculated model of bond strength between corroded steel and concrete was put forward. The criteria for judging the failure mode of corroded reinforced concrete slab was proposed. Based on different failure modes, the theoretical model of flexural bearing capacity of corroded slab was established. A calculated method of mid-span deflection of corroded slab was given by considering the effect of flexural stiffness reduction due to the bond strength degradation. Then analytical models were verified by using previous experimental data. A good agreement between tested results and predicted values of corroded reinforced concrete slab was achieved with average ratios of test results to predicted values which were 0.986 and 1.054, the variances which were 0.022 and 0.014 for the flexural bearing capacity and mid-span deflection, respectively.

摘要: 侵蚀环境下钢筋混凝土板由于保护层厚度较小, 板中钢筋极易发生锈蚀, 致使钢筋混凝土板的受力性能显著退化。考虑锈蚀板中钢筋黏结性能退化的影响, 提出锈蚀钢筋与混凝土

的黏结强度计算模型,并推导出锈蚀钢筋与混凝土的基本锚固长度计算式,建立锈蚀钢筋混凝土板破坏模式的判别准则;基于不同的破坏模式建立了相应的锈蚀混凝土板受弯承载力计算模型。并考虑黏结性能退化对锈蚀板抗弯刚度的影响,给出了锈蚀钢筋混凝土板跨中挠度的计算方法。通过已有试验数据对建议锈蚀板承载力和挠度计算模型进行了对比验证,受弯承载力试验值与计算值之比平均值为 0.986,方差为 0.022,跨中挠度试验值与计算值之比平均值为 1.054,方差为 0.014。

入藏号: CSCD:6449476

地址: Chang Zhaoqun, School of Civil Engineering, Changan University, Xian, 710061.

Xing Guohua, School of Civil Engineering, Changan University, Xian, 710061.

Yang Chengyu, School of Civil Engineering, Changan University, Xian, 710061.

Zhou Cheng, School of Civil Engineering, Changan University, Xian, 710061.

Liu Boquan, School of Civil Engineering, Changan University, Xian, 710061.

地址: 常召群, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

邢国华, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

杨成雨, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

周成, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

刘伯权, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: czq199212@163.com

电子邮件地址: czq199212@163.com

使用次数 (最近 180 天): 0

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作者: Ye Yanxia; Zhang Zhiyin; Liu Yue; Zhang Chunmiao

作者: 叶艳霞; 张志银; 刘月; 张春苗

标题: A STRENGTH CRITERION FOR LIGHTWEIGHT AGGREGATE CONCRETE BASED ON WARHEAD YIELD

标题: 基于弹头型屈服的轻骨料混凝土强度准则

来源出版物: 工程力学 卷: 36 期: 1 页: 138-145 出版年: 2019

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来源出版物: Engineering Mechanics 卷: 36 期: 1 页: 138-145 出版年: 2019

文献号: 1000-4750(2019)36:1<138:JYDTXQ>2.0.TX;2-J

语言: Chinese

文献类型: Article

作者关键词: lightweight aggregate (LWA) concrete; strength criterion; warhead type yield

function; pi-plane shape function; tensile and compressive meridian

作者关键词: 轻骨料混凝土; 强度准则; 弹头型屈服函数; pi 平面形状函数; 拉压子午线

摘要: Experiments show that lightweight aggregate (LWA) concrete and normal concrete have different mechanical properties and failure rules under multi-axial stress. Consequently, the strength criteria for normal concrete do not apply to LWA concrete. Considering the similar failure feature of LWA concrete with geomaterials, a continuum, smooth and closed warhead type strength criterion for LWA concrete was established. The criterion adjusted the warhead type yield function of geomaterials for meridian equation and selected the elliptic curve of the William-Warnke model for the pi-plane shape function. The criterion overcame the unsmooth disadvantage of the parabolic-type strength criterion and the conservatism of elliptic strength criterion under high hydrostatic pressure. It can better describe the geometrical characteristics of the LWA concrete. The strength criterion was quantified by using the least square method. Additionally, the rationality of the suggested warhead-type strength criterion was verified by comparing with experimental data.

摘要: 试验表明轻骨料混凝土和普通混凝土在多轴应力下具有不同的力学特性和破坏规律,因此那些针对普通混凝土建立的强度准则将不能完全适用于轻骨料混凝土。考虑到轻骨料混凝土和岩土材料具有相似的破坏特征,该文适当的调整了岩土材料的弹头型屈服函数作为子午线方程,并选取了 William-Warnke 模型的椭圆曲线作为 pi 平面形状函数,建立了一个连续、光滑、封闭的弹头型轻骨料混凝土强度准则。该准则克服了二次抛物线型强度准则不光滑和椭圆型强度准则在高静水压力下过于保守的缺陷,能够较好的描述轻骨料混凝土破坏曲面的几何特征。利用最小二乘法量化了强度准则,通过与试验数据对比,验证了所建议的弹头型强度准则的合理性。

入藏号: CSCD:6409949

地址: Ye Yanxia, School of Civil Engineering of Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Zhiyin, School of Civil Engineering of Chang'an University, Xi'an, Shaanxi 710061, China.

Liu Yue, School of Civil Engineering of Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Chunmiao, School of Civil Engineering of Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 叶艳霞, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

张志银, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

刘月, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

张春苗, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: yeyanxia@chd.edu.cn; 2311208316@qq.com; 1151798658@qq.com; 765336996@qq.com

电子邮件地址: yeyanxia@chd.edu.cn; 2311208316@qq.com; 1151798658@qq.com; 765336996@qq.com

使用次数 (最近 180 天): 0

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作者: Zhu Jian; Zhao Junhai; Tan Ping; Jin Jianmin

作者: 朱健; 赵均海; 谭平; 金建敏

标题: SEISMIC LIFE-CYCLE LOSS ESTIMATION OF CFRP REINFORCED INDUSTRIAL BUILDINGS

标题: 基于 CFRP 加固的钢混排架厂房全寿命周期地震成本研究

来源出版物: 工程力学 卷: 36 期: 2 页: 141-153 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: Seismic life-cycle cost; reinforced concrete industrial buildings; CFRP reinforcement; Nonlinear incremental dynamic analysis; Monte Carlo stochastic method; hybrid weight factors

作者关键词: 全寿命周期地震成本; 钢混排架厂房结构; 碳纤维布加固; 非线性增量分析; 蒙特卡洛随机样本法; 加权混合参数法

摘要: The seismic life-cycle cost (SLCC) is a estimated measure of the damage cost due to future earthquakes that will occur during the service period of industrial buildings. Thusly, the structural seismic vulnerability and life-cycle seismic cost of single story factory buildings with or without the CFRP strengthen bent frame columns in multiple earthquake hazard levels (HL) is studied using nonlinear incremental dynamic analysis (IDA). The seismic hazardous probability model of the selected region in Western China is established based on China seismic code and strong waves database from The Pacific Earthquake Engineering Research Center (PEER). Four damage indices (DIs) are used creatively, whose hybrid weight factors can be calculated statistic results of SLCC related to particular structural & nonstructural damage limit states (LS). The Monte Carlo Samplings (MCS) method is integrated into the SLCC framework with taking into account the uncertainty on mass, material properties and ground waves. The seismic life-cycle statistical median cost of CFRP reinforced industrial buildings in the selected area is 5.75 yuan/m² annually and more economical in budget with 18 percent savings compared to the original structures. The Coefficient variance of results is only 1.35%~1.36%.

摘要: 采用增量动力分析(incremental dynamic analysis,IDA)对坐落于我国西部具体地区的单层钢混排架工业厂房基于碳纤维布(carbon fiber reinforced polymer,CFRP)加固前后的地震损伤和全寿命周期地震成本进行对比计算分析,研究中参考了中国抗震规范和美国太平洋地震工程研究中心(PEER)强震数据库后拟合建立了与分析地区地质场地条件接近的当地地震风险度概率模型。采用多参数混合加权推导计算出 CFRP 加固钢混排架柱厂房结构全寿命周期地震损失成本统计值,计算过程中的结构尺寸、材料强度、地震荷载等相关参数变量采用蒙特卡洛(Monte Carlo Sampling,MCS)随机样本法予以考虑,研究结果显示该地区 CFRP 加固单层钢混排架厂房结构全寿命周期地震成本统计中位值在 5.75 元/(年·m²),扣除加固材料成本及加工费用后较同类型未加固普通厂房全寿命期地震成本费用综合节省约 16.5%,显示厂房

采用 CFRP 加固技术后具有良好的全寿命周期地震成本经济性,同时 CFRP 加固后的厂房结构地震年平均成本直接费 CoV 统计偏差在 1.35%~1.36%。

入藏号: CSCD:6419401

地址: Zhu Jian, Department of Civil Engineering, Chang'an University;;Department of Civil and Hydraulic Engineering, Ningxia University, ;; Xi'an;;Yinchuan, ;; 710064;;750021.

Zhao Junhai, Department of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Tan Ping, Earthquake Engineering Research and Test Center, Guangzhou University, Guangzhou, Guangdong 510405, China.

Jin Jianmin, Earthquake Engineering Research and Test Center, Guangzhou University, Guangzhou, Guangdong 510405, China.

地址: 朱健, 长安大学建筑工程学院;;宁夏大学土木与水利工程学院, ;; 西安;;银川, ;; 710064;;750021.

赵均海, 长安大学建筑工程学院, 西安, 陕西 710064, 中国.

谭平, 广州大学工程抗震研究中心, 广州, 广东 510405, 中国.

金建敏, 广州大学工程抗震研究中心, 广州, 广东 510405, 中国.

电子邮件地址: zhujian@nxu.edu.cn; zhaojh@chd.edu.cn; ptan@gzu.edu.cn; jinjianmin152@aliyun.com

电子邮件地址: zhujian@nxu.edu.cn; zhaojh@chd.edu.cn; ptan@gzu.edu.cn; jinjianmin152@aliyun.com

使用次数 (最近 180 天): 0

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作者: Tian Wei; Wang Zhen; Han Nyu

作者: 田威; 王震; 韩女

标题: Study of Meso-damage Mechanism of Concrete under Sulfate Attack

标题: 硫酸盐侵蚀作用下混凝土微观破损机理研究

来源出版物: 防灾减灾工程学报 卷: 39 期: 1 页: 16-22,60 出版年: 2019

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来源出版物: Journal of Disaster Prevention and Mitigation Engineering 卷: 39 期: 1 页: 16-22,60 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: concrete; sulfate attack; drying-wetting cycles; CT scan; pore structure

作者关键词: 混凝土; 硫酸盐侵蚀; 干湿循环; CT 扫描; 孔隙结构

摘要: The evolution and spatial distribution of internal random meso-porous structure are key problems in studying damage mechanism and macro-mechanical properties of concrete material under sulfate attack. X-ray tomography(CT) were used to scan the meso-damage process of concrete under sulfate attack. Based on this, combined with image processing and 3D reconstruction technology, the spatial distribution characteristics and evolution laws of pore in concrete was investigated using the proposed method of pore partitioning. The experimental results show that the concentration of Ca^{2+} and Mg^{2+} in the solution increased slowly. The compressive strength of concrete is closely related to its meso-pore structure under the coupling of sulfate attack and drying-wetting cycles. The evolution laws of pore in different regions of concrete specimen are different under the coupled effect of sulfate attack and drying-wetting cycles. Generally, the porosity increased after a slight decrease, and the corrosion depth increases with the corrosion time. There was a negative correlation between the uniaxial compressive strength and porosity. This study laid foundation for further research on meso-damage mechanism of concrete under sulfate attack.

摘要: 侵蚀环境下混凝土材料的内部孔隙空间分布特征与演化规律是材料破损机理及宏观力学性能研究的关键问题. 采用 X 射线断层扫描技术(CT)对硫酸盐侵蚀与干湿循环耦合作用下混凝土的细观损伤过程进行实时扫描, 在此基础上, 结合图像处理与三维重构技术开展了混凝土内部孔隙结构的分布特征与演化规律研究, 并通过提出的孔隙分区的方法深入研究了材料细观破损特征和机理. 结果表明: 宏观上试样质量、抗压强度均呈现规律性变化, 溶液中钙镁离子浓度有明显的累积性趋势; 细观上试样孔隙率随侵蚀时间的增加呈先减小后增大的变化, 单轴抗压强度与孔隙率大体上呈负相关关系. 同时, 混凝土试样不同分区内孔隙率演化规律各不相同, 但总体呈现先减小后增大的趋势, 侵蚀作用深度随侵蚀时间不断增长. 结论可为深入研究硫酸盐侵蚀下混凝土材料细观破损机理提供依据。

入藏号: CSCD:6451500

地址: Tian Wei, School of Architectural Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wang Zhen, School of Architectural Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Han Nyu, School of Architectural Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 田威, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

王震, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

韩女, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: tianwei@chd.edu.cn

电子邮件地址: tianwei@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

引用的参考文献数: 15

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材料科学与工程学院

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作者: Chen Yongnan; Yang Wenqing; Yang Zehui; Zhang Fengying; Zhao Yongqing

作者: 陈永楠; 杨雯清; 杨泽慧; 张凤英; 赵永庆

标题: Effect of Alloying Elements on the Burning Behavior of Burn Resistant Titanium Alloys

标题: 合金元素对典型阻燃钛合金燃烧行为的影响

来源出版物: 稀有金属材料与工程 卷: 48 期: 11 页: 3608-3614 出版年: 2019

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作者关键词: 阻燃钛合金; 燃烧特征; 半固态锻造; 阻燃机理

摘要: To alleviate "Titanium Fire" produced during high pressure and friction of titanium alloy, Ti-V-Cr series and Ti-Cu-Al series burn resistant titanium alloys have been developed. In this work, through a modified direct current simulation burning tests, the burning characteristics, e.g., flame height, velocity and burning products were measured to evaluate the burn resistant behavior. The results show the burning behavior and reveal the corresponding burning mechanisms of titanium alloys with different alloying elements. The formation of V₂O₅ and Cr₂O₃ oxides during burning of Ti40 alloy enhances the density of oxide layer to block the oxygen diffusion, which leads to excellent burn resistant behavior indicated by the smaller burning velocity and lower flame height. For Ti14 alloys, in comparison, a clear Cu-rich layer is formed at the interface between burning product and heat affected zone, where it consumes oxygen by producing Cu-O compounds, thus reducing the burning reaction with Ti-matrix. This work has established a fundamental understanding of how the alloying elements improve the burning resistance of titanium alloys.

摘要: 阻燃钛合金是飞机发动机核心部件中的重要材料,由于钛合金燃烧过程难以控制,燃烧参数难以获得加大了研究难度。以典型阻燃钛合金 Ti40 和 Ti14 为研究对象,利用高速摄影在不同氧分压环境下通过直流点火研究其燃烧行为,探索其燃烧过程中的氧扩散过程,明确合金元素对阻燃行为的影响。研究发现,2 种合金燃烧后均形成分层结构, Ti40 合金中 Cr 和 V 元素向外扩散,和氧反应生成 Cr₂O₃/V₂O₅,密度高于 TiO₂ 的密度, Ti 原子很难通过 Cr₂O₃ 向外扩散与氧反应,提高燃烧表面致密度,抑制氧的扩散;而对于 Ti14 合金,共析反应生成大量的液相,富 Cu 相包裹 Ti 相球化晶粒形成 Cu 元素富集层,隔离氧并减少钛与氧的接触,从而降低氧向基体的扩散速率,同时 Cu 相的包裹作用增加氧扩散的距离,氧需要更多的能量扩散与 Ti 接触并反应,从而抑制了反应的发生。

入藏号: CSCD:6614666

地址: Chen Yongnan, Chang'an University, Xi'an, Shaanxi 710064, China.

Yang Wenqing, Chang'an University, Xi'an, Shaanxi 710064, China.

Yang Zehui, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Fengying, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Yongqing, Northwest Institute for Nonferrous Metal Research, Xi'an, Shaanxi 710016, China.

地址: 陈永楠, 长安大学, 西安, 陕西 710064, 中国.

杨雯清, 长安大学, 西安, 陕西 710064, 中国.

杨泽慧, 长安大学, 西安, 陕西 710064, 中国.

张凤英, 长安大学, 西安, 陕西 710064, 中国.

赵永庆, 西北有色金属研究院, 西安, 陕西 710016, 中国.

电子邮件地址: frank_cyn@163.com

电子邮件地址: frank_cyn@163.com

使用次数 (最近 180 天): 2

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作者: Zhang Xuemin; Zeng Weidong; Li Yue; Cao Yuxia; Liang Mengyan; Guo Yajie

作者: 张学敏; 曾卫东; 李悦; 曹宇霞; 梁梦妍; 郭亚杰

标题: Dynamic Softening Behavior of Coarse-Grained Ti40 Alloy During Superplastic Deformation

标题: 粗晶 Ti40 合金超塑性变形时的动态软化行为研究

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作者关键词: coarse-grain; Ti40 alloy; superplasticity; dynamic softening

作者关键词: 粗晶; Ti40 合金; 超塑性; 动态软化

摘要: The dynamic softening during superplastic deformation and its mechanism was studied by means of tensile tests, TEM observation and EBSD analysis for coarse-grained Ti40 alloy. The results show that the coarse-grained Ti40 alloy exhibits good superplasticity under the test conditions and the maximum elongation of 436% is obtained under the condition of 840 °C, $1 \times 10^{-3} \sim 10^{-1}$ s. The deformation conditions can be divided into three areas: none superplasticity area, dynamic recovery area and dynamic recrystallization area based on the Zener-Hollomon

factor and elongation combined with the microstructure analysis. The critical strain model and dislocation density evolution model of dynamic recrystallization were established based on Sellars model and KM equation, respectively. The dynamic recovery mechanism is dominated by dislocation motion-dislocation cells-polygonization-subgrain formation, while the recrystallization mechanism is mainly the continuous dynamic recrystallization resulting from high-angle grain boundaries caused by the subgrains rotation.

摘要: 采用单向拉伸试验对粗晶 Ti40 合金进行了超塑性能测试,并结合 TEM 和 EBSD 分析技术研究了该合金超塑性变形过程中的动态软化行为及机制。结果表明:粗晶 Ti40 合金在所选实验条件下具有良好的超塑性能并在 840 °C、 1×10^{-3} s⁻¹条件下获得最大延伸率 436%;基于形变 Z 因子和断裂延伸率并结合微观组织分析可将变形条件划分为无超塑性、动态回复、动态再结晶 3 个区域;分别基于 Sellars 模型和 KM 方程建立了 Ti40 合金超塑性变形的动态再结晶临界应变模型和位错密度演变模型;粗晶 Ti40 合金超塑性变形过程中的动态回复以位错运动-位错胞-多边形化-形成亚晶的机制为主;动态再结晶机制主要为亚晶持续转动导致大角度晶界形成的连续动态再结晶。

入藏号: CSCD:6596174

地址: Zhang Xuemin, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Yue, Chang'an University, Xi'an, Shaanxi 710064, China.

Cao Yuxia, Chang'an University, Xi'an, Shaanxi 710064, China.

Liang Mengyan, Chang'an University, Xi'an, Shaanxi 710064, China.

Guo Yajie, Chang'an University, Xi'an, Shaanxi 710064, China.

Zeng Weidong, Northwestern Polytechnical University, State Key Laboratory of Solidification Processing, Xi'an, Shaanxi 710072, China.

地址: 张学敏, 长安大学, 西安, 陕西 710064, 中国.

李悦, 长安大学, 西安, 陕西 710064, 中国.

曹宇霞, 长安大学, 西安, 陕西 710064, 中国.

梁梦妍, 长安大学, 西安, 陕西 710064, 中国.

郭亚杰, 长安大学, 西安, 陕西 710064, 中国.

曾卫东, 西北工业大学, 凝固技术国家重点实验室, 西安, 陕西 710072, 中国.

电子邮件地址: xueminzhang@chd.edu.cn

电子邮件地址: xueminzhang@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

引用的参考文献数: 19

在中国科学引文数据库中的被引频次: 0

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作者: Xu Ouming; Cao Zhifei; Li Mingyue; Cheng Xianpeng; Han Sen

作者: 徐鸥明; 曹志飞; 李明月; 程贤鹏; 韩森

标题: Thermo-oxidative and ultraviolet radiation aging effect on property of star-shaped SBS modified asphalt

标题: 星型 SBS 改性沥青热氧和紫外光老化特性研究

来源出版物: 南京理工大学学报. 自然科学版 卷: 43 期: 5 页: 660-666 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: styrene-butadiene-styrene modified asphalt; thermo-oxidative aging; ultraviolet radiation aging; apparent viscosity; kinetic models

作者关键词: 苯乙烯-丁二烯-苯乙烯嵌段共聚物改性沥青; 热氧老化; 紫外光老化; 表观黏度; 动力学模型

摘要: In order to evaluate effects of thermo-oxidative aging and ultraviolet radiation(UV)aging on the primary technical properties of star-shaped styrene-butadiene-styrene(SBS)modified asphalt,the penetration,ductility,softening point and apparent viscosity of binders after various aging times are studied by laboratory simulation tests. The aging kinetic models of star-shaped SBS modified asphalt are established in accordance with the apparent viscosity values. The results show that the aging affects of star-shaped SBS modified asphalt caused by UV aging are as well as those binders subjected to the thermo-oxidative aging. The penetration values and ductility values tend to decrease as aging times increase. The apparent viscosity values of 135 °C grow continually with extended aging time,while non-monotonic development trends of softening point values are observed for the binders with increasing aging times. There are differences in aging reaction rates between the SBS modified asphalt binders prepared by different matrix asphalts in the process of thermo-oxidative aging. However,the rates are almost the same for the two SBS modified asphalt binders in the UV aging process. The thermo-oxidative aging and the UV aging of the SBS modified asphalt can be characterized by the first-order oxidation reaction equation,and the established aging models can estimate the apparent viscosity values of star-shaped SBS modified asphalt binders subjected to the coupled effects of the thermo-oxidative aging and the UV aging.

摘要: 为了评价热氧和紫外光老化对星型苯乙烯-丁二烯-苯乙烯嵌段共聚物(SBS)改性沥青主要技术性质的影响,通过室内老化模拟试验,研究了沥青经不同老化时间的针入度、延度、软化点和表观黏度的变化规律,基于表观黏度建立了星型 SBS 改性沥青老化动力学模型。结果表明,热氧老化与紫外光老化对星型 SBS 改性沥青主要技术特性的影响基本相同,即针入度、延度随老化时间延长呈减小趋势,135 °C表观黏度呈增大趋势,而软化点呈非单调性变化趋势;不同基质沥青制成的 SBS 改性沥青在热氧老化过程中老化反应速率存在差异,而在紫外光老化过程中基本接近;SBS 改性沥青热氧老化与紫外光老化均遵循一级氧化动力反应方程,建立的老化模型能预估热氧和紫外光耦合作用下星型 SBS 改性沥青的表观黏度。

入藏号: CSCD:6613153

地址: Xu Ouming, Chang'an University, Engineering Research Center of Transportation Materials, Xi'an, Shaanxi 710064, China.

Cao Zhifei, Chang'an University, Engineering Research Center of Transportation Materials, Xi'an,

Shaanxi 710064, China.

Li Mingyue, Chang'an University, Engineering Research Center of Transportation Materials, Xi'an, Shaanxi 710064, China.

Cheng Xianpeng, Chang'an University, Key Laboratory of Highway Engineering in Special Region of Education Ministry, Xi'an, Shaanxi 710064, China.

Han Sen, Chang'an University, Key Laboratory of Highway Engineering in Special Region of Education Ministry, Xi'an, Shaanxi 710064, China.

地址: 徐鸥明, 长安大学, 交通铺面材料教育部工程研究中心, 西安, 陕西 710064, 中国.

曹志飞, 长安大学, 交通铺面材料教育部工程研究中心, 西安, 陕西 710064, 中国.

李明月, 长安大学, 交通铺面材料教育部工程研究中心, 西安, 陕西 710064, 中国.

程贤鹏, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

韩森, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: xuouming@yahoo.com

电子邮件地址: xuouming@yahoo.com

使用次数 (最近 180 天): 0

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作者: Xu Ouming; Zhang Hong; Cao Zhifei; Li Mingyue; He Yihua

作者: 徐鸥明; 张鸿; 曹志飞; 李明月; 何义华

标题: Pavement Performance of Asphalt Mixtures with Economical Low Content Crumb Rubber Modified Asphalt

标题: 经济型低胶粉掺量橡胶沥青混合料路用性能研究

来源出版物: 重庆交通大学学报. 自然科学版 卷: 38 期: 5 页: 52-56 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: highway engineering; rubber asphalt; low content; continuous dense gradation; pavement performance

作者关键词: 道路工程; 橡胶沥青; 低掺量; 连续密级配; 路用性能

摘要: In order to evaluate the effect of low content crumb rubber modified asphalt on the pavement performance of continuous graded asphalt mixtures,the storage stability test,wheel track

test,low temperature bending test,moisture susceptibility test and fatigue test were carried out to compare the engineering properties of asphalt and mixtures prepared with base binder,7% (by mass of asphalt) and 18% ((by mass of asphalt) crumb rubber modified asphalt. The results show that the high temperature stability,low temperature performance and fatigue life of asphalt mixtures modified with 7% crumb rubber are reduced to a certain extent compared with those of mixtures produced with 18% crumb rubber modified asphalt,but they are still significantly improved compared with ordinary asphalt mixtures. In addition,the immersion residual stability of specimens made with low content crumb rubber modified asphalt is higher than that of ordinary asphalt mixture and conventional rubber powder content asphalt mixture,while freeze-thaw splitting ratio is slightly lower than that of ordinary asphalt mixture,but higher than that of conventional rubber powder content asphalt mixture. Meanwhile,the storage stability of rubber asphalt with low rubber powder content is better than that of rubber asphalt with conventional rubber powder content,and when the asphalt content decreases,it has good technical economy.

摘要: 为了评价低胶粉掺量橡胶沥青对连续密级配混合料性能的影响,采用储存稳定性试验、车辙试验、低温弯曲试验、水稳定性试验和疲劳试验,分别对采用基质沥青、外掺 7%和 18%胶粉的橡胶沥青混合料工程特性进行了评价。结果表明:外掺 7%胶粉制成的橡胶沥青混合料相比于 18%胶粉掺量橡胶沥青混合料高温性能、低温性能和疲劳性能均有一定程度衰减,但比普通沥青混合料仍有明显提高;低胶粉掺量沥青混合料试件浸水残留稳定度高于普通沥青混合料和常规胶粉掺量沥青混合料,而冻融劈裂比略低于普通沥青混合料,但高于常规胶粉掺量沥青混合料试样;同时,低胶粉掺量橡胶沥青储存稳定性优于常规胶粉掺量橡胶沥青,且沥青用量降低,具有良好的技术经济性。

入藏号: CSCD:6511274

地址: Xu Ouming, Chang'an University;;School of Materials Science and Engineering,Chang'an University, Engineering Research Center of Transportation Materials,Ministry of Education;;, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710061;;710061.

Zhang Hong, Chang'an University;;School of Materials Science and Engineering,Chang'an University, Engineering Research Center of Transportation Materials,Ministry of Education;;, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710061;;710061.

Cao Zhifei, Chang'an University;;School of Materials Science and Engineering,Chang'an University, Engineering Research Center of Transportation Materials,Ministry of Education;;, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710061;;710061.

Li Mingyue, Chang'an University;;School of Materials Science and Engineering,Chang'an University, Engineering Research Center of Transportation Materials,Ministry of Education;;, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710061;;710061.

He Yihua, Chang'an University;;School of Materials Science and Engineering,Chang'an University, Engineering Research Center of Transportation Materials,Ministry of Education;;, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710061;;710061.

地址: 徐鸥明, 长安大学;;长安大学材料科学与工程学院, 交通铺面材料教育部工程研究中心;;, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

张鸿, 长安大学;;长安大学材料科学与工程学院, 交通铺面材料教育部工程研究中心;;, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

曹志飞, 长安大学;;长安大学材料科学与工程学院, 交通铺面材料教育部工程研究中心;;, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

李明月, 长安大学;;长安大学材料科学与工程学院, 交通铺面材料教育部工程研究中心;;, 西

安;;西安, 陕西;;陕西 710061;;710061, 中国.

何义华, 长安大学;;长安大学材料科学与工程学院, 交通铺面材料教育部工程研究中心;;, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

电子邮件地址: joe52005@126.com

电子邮件地址: joe52005@126.com

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

引用的参考文献数: 12

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作者: Zhang Zhe; Zhao Peng; Sun Guodong; Li Hui; Yu Pengfei; Xie Jing; Pan Xianqing; Ji Zefan; Wang Wei

作者: 张哲; 赵鹏; 孙国栋; 李辉; 俞鹏飞; 解静; 潘宪清; 纪则藩; 王伟

标题: Effect of concentration of phenolic resin on impregnation efficiency of carbon/carbon composites prepared by liquid impregnation-carbonization method

标题: 酚醛树脂溶液浓度对液相浸渍-碳化法制备 C/C 复合材料浸渍效率的影响

来源出版物: 固体火箭技术 卷: 42 期: 6 页: 771-778 出版年: 2019

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作者关键词: phenolic resin; liquid impregnation-carbonization; impregnation efficiency

作者关键词: 酚醛树脂; 液相浸渍-碳化; 浸渍固化碳化过程; 浸渍效率

摘要: In this study, carbon/carbon composites have been prepared by liquid impregnation-carbonization method. The 2.5D needle carbon felts were impregnated with phenolic resin precursor. Comprehensive properties of the phenolic resin, such as rheological properties, gelation properties, curing behavior, and thermostability have been analyzed to provide a guidance for the optimization of subsequent processes. The effect of concentration of phenolic resin on the impregnation efficiency of 2.5D needle carbon felt was studied. The results show that the viscosity of phenolic resin is 200 mPa·s in 4 hours when the temperature was 60 °C. Moreover, the impregnation efficiency toward phenolic resin at a concentration of 75% is the best after six I/CR cycles.

摘要: 以 2.5D 针刺炭毡为增强体, 酚醛树脂为先驱体, 采用液相浸渍-碳化法制备 C/C 复合材料。对酚醛树脂先驱体溶液的流变性能、凝胶性能、固化行为及失重行为等性能进行全面的分析, 为后续工艺优化提供指导, 研究了酚醛树脂溶液浓度对 2.5D 针刺炭毡浸渍效率的影响。

结果表明,当浸渍温度为 60 °C时,酚醛树脂溶液的粘度在 4 h 的浸渍时间内保持在 200 mPa·s 左右,在 1.5 MPa 下加压浸渍 3 h,循环 6 个周期的浸渍固化炭化工艺过程后,浓度为 75%的酚醛树脂溶液的浸渍效果较好,浸渍效率高。

入藏号: CSCD:6638224

地址: Zhang Zhe, College of Materials, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhao Peng, College of Materials, Chang'an University, Xi'an, Shaanxi 710061, China.

Sun Guodong, College of Materials, Chang'an University, Xi'an, Shaanxi 710061, China.

Li Hui, College of Materials, Chang'an University, Xi'an, Shaanxi 710061, China.

Yu Pengfei, College of Materials, Chang'an University, Xi'an, Shaanxi 710061, China.

Xie Jing, College of Materials, Chang'an University, Xi'an, Shaanxi 710061, China.

Pan Xianqing, College of Materials, Chang'an University, Xi'an, Shaanxi 710061, China.

Ji Zefan, College of Materials, Chang'an University, Xi'an, Shaanxi 710061, China.

Wang Wei, College of Materials, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 张哲, 长安大学材料科学与工程学院无机非金属材料系, 西安, 陕西 710061, 中国.

赵鹏, 长安大学材料科学与工程学院无机非金属材料系, 西安, 陕西 710061, 中国.

孙国栋, 长安大学材料科学与工程学院无机非金属材料系, 西安, 陕西 710061, 中国.

李辉, 长安大学材料科学与工程学院无机非金属材料系, 西安, 陕西 710061, 中国.

俞鹏飞, 长安大学材料科学与工程学院无机非金属材料系, 西安, 陕西 710061, 中国.

解静, 长安大学材料科学与工程学院无机非金属材料系, 西安, 陕西 710061, 中国.

潘宪清, 长安大学材料科学与工程学院无机非金属材料系, 西安, 陕西 710061, 中国.

纪则藩, 长安大学材料科学与工程学院无机非金属材料系, 西安, 陕西 710061, 中国.

王伟, 长安大学材料科学与工程学院无机非金属材料系, 西安, 陕西 710061, 中国.

电子邮件地址: 2016131025@chd.edu.cn

电子邮件地址: 2016131025@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Li Hongwei; Gao Ying; Zeng Dejun

作者: 李红伟; 高莹; 曾德军

标题: Effect of Mesocarbon Microbeads (MCMB) on Pore Morphology and Thermal Conductivity of Mullite Whisker Framework

标题: MCMB 对莫来石晶须框架微孔形貌与导热性的影响

来源出版物: 中国陶瓷 卷: 55 期: 12 页: 27-32 出版年: 2019

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文献类型: Article

作者关键词: Mullite whiskers; Mesocarbon microbeads; Pore Morphology; Thermal Conductivity

作者关键词: 莫来石晶须; 中间相碳微球; 微孔形貌; 热导率

摘要: Mullite whisker framework (MWF) with high apparent porosity was prepared by using mesocarbon microbeads (MCMB) as pore-former. The effect of MCMB on phase composition, microstructure and thermal conductivity of MWF were studied by XRD, SEM and flash thermal diffusivity instrument. The results show that the bulk density, apparent porosity and linear expansion rate at 0.25 ~ 0.92 g·cm⁻³, 67.3% ~ 90.9% and -7.87% ~ 14.18% respectively can be well controlled by the content of MCMB when MMW calcined at 1300 °C for 3 h. The bulk density of WMF displays linear improvement with content of MCMB, but linear expansion rate exhibits exponential growth. The pore mostly consists of complex tortuous submicron pores among mullite whiskers isolated spherical macrospores from MCMB. Thermal conductivity coefficient of MWF slightly increases as the temperature rises, and the thermal conductivity at room temperature meets the Maxwell-Eucken1 thermal conductivity model.

摘要: 以中间相碳微球(MCMB)为造孔剂制备出高显气孔率的莫来石晶须框架(MWF),通过XRD、SEM和激光导热仪研究了MCMB对MWF的相组成、微观形貌以及热导率的影响。结果表明:以AlF₃催化1300 °C保温3 h煅烧时,MCMB引入量可实现MWF体积密度、显气孔率以及线膨胀率分别在0.25~0.92 g·cm⁻³、67.3%~90.9%、-7.87%~14.18%范围调控,MCMB引入量与MWF体积密度呈线性关系,与线性膨胀呈指数关系;孔结构由晶须框架搭建的复杂曲折亚微米孔和分散的球状宏孔组成;热导系数随温度升高而略增,其室温导热符合Maxwell-Eucken1导热模型。

入藏号: CSCD:6632921

地址: Li Hongwei, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Gao Ying, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Zeng Dejun, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 李红伟, 长安大学材料科学与工程学院, 西安, 陕西 710054, 中国.

高莹, 长安大学材料科学与工程学院, 西安, 陕西 710054, 中国.

曾德军, 长安大学材料科学与工程学院, 西安, 陕西 710054, 中国.

电子邮件地址: 58575344@qq.com

电子邮件地址: 58575344@qq.com

使用次数 (最近 180 天): 0

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作者: Zhang Lijun; Tian Wu; Chang Yongqiang; Ren Weining; Zhang Changjun; Bao Mingdong

作者: 张丽俊; 田武; 常勇强; 任伟宁; 张长军; 鲍明东

标题: Synthesis and Characterization of Cu-Ag Alloy Coatings by Magnetron Co-Sputtering

标题: 银靶电流及溅射偏压对溅射沉积 Cu/Ag 薄膜导电性能的影响研究

来源出版物: 真空科学与技术学报 卷: 39 期: 12 页: 1090-1095 出版年: 2019

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来源出版物: Chinese Journal of Vacuum Science and Technology 卷: 39 期: 12 页: 1090-1095 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: Magnetron sputtering; Cu/Ag film; Sputtering current; Bias; Sheet resistance

作者关键词: 磁控溅射; Cu/Ag 薄膜; 溅射电流; 偏压; 面电阻

摘要: The Cu-Ag alloy coatings, an electrical contact material, were synthesized by magnetron co-sputtering of Cu and Ag targets on substrates of lead-bronze, ceramics and glass. The sheet-resistance was measured with square resistance meter. The effect of the sputtering current of Ag-target and substrate bias voltage on roughness, thickness, Ag-content, microstructure and sheet-resistance was investigated with interferometer, scanning electron microscope and X-ray diffraction. The results show that the sputtering current and bias had a major impact. For example, as the current increased to above 0.5 A, the slowly increased Ag-content increased at a higher rate, accompanied by an increase of the thickness, and the sheet resistance decreased due to formation of the vertically penetrating columnar grains; as the bias increased, the sheet resistance and thickness decreased because the Cu-Ag coating, with decreasing defect-density and surface roughness, became increasingly more smooth and compact. Possible mechanisms were also tentatively discussed.

摘要: 磁控溅射技术制备有望作为电接触材料的 Cu-Ag 薄膜的工艺探索。利用方块电阻仪测试薄膜电阻, 借助白光干涉仪和扫描电镜分析不同电流和不同偏压下粗糙度、薄膜厚度、Ag 含量及微观结构对薄膜电阻影响规律。结果表明: 不同银靶溅射电流下, Ag 含量及微观结构为影响薄膜面电阻的主要因素, Ag 含量低于 18.13% (原子比) 时膜中 Cu-Ag 固溶体相占比增大, 这可能是引起薄膜面电阻增大的主要原因, 柱状晶的贯穿程度越高电阻越小。不同偏压下, 薄膜致密性和粗糙度对面电阻的影响较为明显, 薄膜致密性越好, 缺陷越少, 电阻越小, 而致密性相差不大时薄膜表面越光滑面电阻越小。

入藏号: CSCD:6634040

地址: Zhang Lijun, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Ren Weining, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Changjun, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Tian Wu, School of Material Science and Engineering, Taiyuan University of Technology, Taiyuan,

Shanxi 030024, China.

Chang Yongqiang, School of Material Science and Engineering, Taiyuan University of Technology, Taiyuan, Shanxi 030024, China.

Bao Mingdong, School of Material and Chemistry, Ningbo University of Technology, Ningbo, Zhejiang 315211, China.

地址: 张丽俊, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

任伟宁, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

张长军, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

田武, 太原理工大学材料科学与工程学院, 太原, 山西 030024, 中国.

常勇强, 太原理工大学材料科学与工程学院, 太原, 山西 030024, 中国.

鲍明东, 宁波工程学院材料与化学工程学院, 宁波, 浙江 315211, 中国.

电子邮件地址: uzi_ljzhang@163.com

电子邮件地址: uzi_ljzhang@163.com

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Qiu Ying; Zhang Fengying; Hu Tengting; Wang Kun; Wang Gang

作者: 邱莹; 张凤英; 胡腾腾; 王坤; 王刚

标题: Effect of Laser Power on Microstructure and Hardness of Ti40 Flame-Retardant Titanium Alloy Deposited by Laser Cladding on TC4 Surface

标题: 激光功率对 TC4 表面熔覆 Ti40 阻燃钛合金组织及硬度的影响

来源出版物: 中国激光 卷: 46 期: 11 出版年: 2019

文献号: 0258-7025(2019)46:11<JGGLDT>2.0.TX;2-Y

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文献号: 0258-7025(2019)46:11<JGGLDT>2.0.TX;2-Y

语言: Chinese

文献类型: Article

作者关键词: materials; laser cladding deposition; flame-retardant titanium alloy; laser power; microstructure; microhardness

作者关键词: 材料; 激光熔覆沉积; 阻燃钛合金; 激光功率; 显微组织; 显微硬度

摘要: Laser cladding deposition is used to fabricate the Ti40(Ti-25V-15Cr-0.2Si)flame-retardant layers on the surfaces of traditional TC4 alloys. Further, the composition, microstructure, and microhardness distribution of the cladding layer are subsequently investigated. Subsequently, theoretical methods are established for predicting the dilution rate and composition of transition zone of cladding layer under different laser powers. The experimental

and analysis results show that there is a transition zone with respect to the composition and microhardness at the interface between the TC4 matrix and the Ti40 laser cladding zone; in 300-350μm of the transition zone, significant composition and microhardness changes are observed under four laser powers. Among the four laser powers, the laser power of 1800 W results in the most substantial changes with respect to the microhardness and element contents of Al, V, and Cr. With increasing laser power, the size of the transition zone gradually decreases. Furthermore, the results of composition analysis of transition zone and Mo equivalent calculation show that the direct transformation of α + β causes the sudden change of microhardness at the cladding interface when the heat affected zone transfers to the cladding area.

摘要: 采用激光熔覆沉积工艺, 在传统 TC4 合金表面以单道多层的方式熔覆 Ti40(Ti-25V-15Cr-0.2Si) 阻燃钛合金。重点研究了不同激光功率下熔覆层形貌特征、成分及显微硬度的演变规律, 并建立了不同激光功率下的稀释率及熔覆层过渡区成分的理论预测方法。实验及分析结果表明: TC4 基体区与 Ti40 激光熔覆区交界处存在成分及显微硬度过渡区域, 特别是在过渡初期的 300~350μm 范围内, 4 种激光功率下均出现成分及显微硬度的显著变化; 当激光功率为 1800W 时, Al、V、Cr 元素含量及显微硬度过渡得最快; 随着激光功率的增大, 过渡区尺寸逐渐减小。基于过渡区成分分析及 Mo 当量计算发现, 由热影响区向熔覆区域过渡时, 显微组织直接发生 α + β 转变, 导致熔覆界面处显微硬度显著降低。

入藏号: CSCD:6620376

地址: Qiu Ying, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Fengying, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Hu Tengpeng, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Kun, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Gang, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 邱莹, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

张凤英, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

胡腾腾, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

王坤, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

王刚, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: zhangfengying@chd.edu.cn

电子邮件地址: zhangfengying@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Zheng Suining; Geng Yao; Zhang Hao; He Rui

作者: 郑睢宁; 耿瑶; 张豪; 何锐

标题: Road performance of graphene oxide modified cement-based composites

标题: 氧化石墨烯改性水泥基复合材料的路用性能

来源出版物: 深圳大学学报. 理工版 卷: 36 期: 6 页: 614-620 出版年: 2019

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来源出版物: Journal of Shenzhen University. Science and Engineering 卷: 36 期: 6 页: 614-620 出版年: 2019

文献号: 1000-2618(2019)36:6<614:YHSMXG>2.0.TX;2-S

语言: Chinese

文献类型: Article

作者关键词: building materials; cement-based composites; graphene oxide; road performance; frost resistance; modification mechanism

作者关键词: 建筑材料; 水泥基复合材料; 氧化石墨烯; 路用性能; 抗冻性; 改性机理

摘要: In order to investigate the effect of graphene oxide (GO) on the pavement performance of cement-based composites, modified cement-based composites with different content of GO were prepared, and the pavement performance was evaluated by the fluidity, strength and frost resistance. The modification mechanism was investigated by scanning electron microscope (SEM) and X-ray diffraction. The results show that the mechanical properties and frost resistance of GO modified cement-based composites increase greatly and the fluidity decreases. When the content of GO is 0.04% (by mass), the strength of cement-based composites is the highest, and the compressive and flexural strength of the composites at 28 d increase by 31.3% and 44.2% compared with the group with the content of GO of 0. When the content of GO is 0.02%, the cement-based composites have the best frost resistance. After 300 cycles of freezing-thawing, the mass loss rate is only 0.6% as well as the residual compressive strength ratio and residual flexural strength ratio are 69% and 75% respectively. According to the micro-analysis, oxygen-containing hydrophilic groups (hydroxyl group, carboxyl group, etc) on the GO surface can provide growing points for the crystallization of cement hydration products and the calcium silicate gel (C-S-H) grows and cross-links on it and the effect of cross-linking increases with the hydration age. GO can improve the mechanical properties and frost resistance of cement-based composites.

摘要: 为研究氧化石墨烯(graphene oxide, GO)对水泥基复合材料路用性能的影响, 制备了含不同质量分数 GO 的改性水泥基复合材料. 采用流动度、强度和抗冻性等指标评价 GO 水泥基复合材料路用性能, 结合扫描电镜(scanning electron microscope, SEM)与 X 射线衍射(X-ray diffraction, XRD)试验探究其改性机理. 结果表明, GO 改性水泥基复合材料力学性能和抗冻性增幅较大, 流动度有所下降; GO 质量分数为 0.04% 时, 水泥基复合材料的强度最高, 其 28 d 抗压与抗折强度较 GO 质量分数为 0 的对照组分别提高了 31.3% 与 44.2%; GO 质量分数为 0.02% 时, 抗冻性最好, 冻融循环 300 次后, 质量损失率仅为 0.6%, 残留抗压与抗折强度比分别为 69% 和 75%. 微观分析可知, GO 表面的含氧亲水基团(羟基、羧基等)可为水泥水化产物结晶提供生长点, 硅酸钙凝胶(C-S-H)在其上生长、交联, 并且随水化龄期增长交联作用日益增强, GO 可以改善水泥基复合材料的力学性能和抗冻性.

入藏号: CSCD:6615884

地址: Zheng Suining, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Geng Yao, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Hao, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

He Rui, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 郑睢宁, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

耿瑶, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

张豪, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

何锐, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: zhengsuining@163.com; heruia@163.com

电子邮件地址: zhengsuining@163.com; heruia@163.com

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

引用的参考文献数: 11

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作者: Chen Tongdan; Wen Yiping; Song Lifang; Xia Huiyun; Xu Peng; Chen Huaxin

作者: 陈彤丹; 文一平; 宋莉芳; 夏慧芸; 徐鹏; 陈华鑫

标题: Preparation of waterborne fluorocarbon coating and application on concrete anticorrosion

标题: 水性氟碳涂料的制备及其用于混凝土防腐研究

来源出版物: 化工新型材料 卷: 47 期: 10 页: 246-249,254 出版年: 2019

文献号: 1006-3536(2019)47:10<246: SXFTTL>2.0.TX;2-F

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语言: Chinese

文献类型: Article

作者关键词: fluoroacrylate emulsion; emulsion polymerization; waterborne fluoroacrylate coating; concrete anticorrosion

作者关键词: 含氟乳液; 乳液聚合; 水性氟碳涂料; 混凝土防腐

摘要: The fluoroacrylate emulsion was prepared by stepwise emulsion polymerization, in which dodecafluoroheptyl methacrylate (DEMA), butyl acrylate (BA), methacrylic acid (MAA) and methyl methacrylate (MMA) as monomers, ammonium persulfate (APS) as initiator. The optimal preparation

process was determined by the emulsion appearances,particle size distribution and infrared spectrum.The results shown that when the amount of emulsifier was 2.1wt%,the amount of initiator 0.4wt% and the amount of monomer DEMA 8.4wt%,the prepared waterborne fluoroacrylate emulsion had concentrated particle size.The average particle size was 136.2nm nearly light blue color.The solid content was 48.2%.The monomer conversion rate was 97.6%.The waterborne fluoroacrylate coating was prepared with fluoroacrylate emulsion and functional additives to provide a long-term protection for concrete by reducing water absorption,improved corrosion resistance and weatherability.

摘要: 通过半连续乳液聚合法,以甲基丙烯酸十二氟庚酯、丙烯酸丁酯、甲基丙烯酸和甲基丙烯酸甲酯为单体,在聚氧乙烯辛基苯酚醚-10(OP-10)和十二烷基硫酸钠(SDS)复合乳化剂的作用下,以过硫酸氢氨(APS)为引发剂合成了水性含氟丙烯酸乳液,综合乳液性状、粒径及分布、红外光谱结果确定水性含氟丙烯酸乳液的最佳制备工艺。将水性含氟丙烯酸乳液配以功能性助剂,制备高耐候、环保的水性氟碳涂料,考察了其对混凝土耐酸碱性、吸水率、抗氯离子渗透性和耐候性的影响。结果表明:当复合乳化剂质量分数为2.1%(wt,质量分数,下同)、引发剂用量为0.4%、含氟单体用量为8.4%时,制备的水性含氟乳液离心稳定性好,固含量为48.2%,转化率为97.6%,平均粒径为136.2nm,涂装水性氟碳涂料的混凝土试块的综合防腐效果较好。

入藏号: CSCD:6599305

地址: Chen Tongdan, School of Materials Science and Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Song Lifang, School of Materials Science and Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Xia Huiyun, School of Materials Science and Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Chen Huaxin, School of Materials Science and Engineering,Chang'an University, Xi'an, Shaanxi 710061, China.

Wen Yiping, Highway Administration of Hainan, Haikou, Hainan 570125, China.

Xu Peng, School of Materials Science and Engineering,Chang'an University;;Xi'an Highway Institute, ;; Xi'an;;Xi'an, ;; 710061;;710065.

地址: 陈彤丹, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

宋莉芳, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

夏慧芸, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

陈华鑫, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

文一平, 海南省公路管理局, 海口, 海南 570125, 中国.

徐鹏, 长安大学材料科学与工程学院;;西安公路研究院, ;; 西安;;西安, ;; 710061;;710065.

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作者: Feng Chao; Guan Bowen; Zhang Ben; Chen Huaxin; Fang Jianhong

作者: 冯超; 关博文; 张奔; 陈华鑫; 房建宏

标题: Influence of admixtures on hydration process of magnesium oxychloride cement

标题: 外加剂对氯氧镁水泥水化过程影响

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语言: Chinese

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作者关键词: road engineering; magnesium oxychloride cement; water reducer; retarder; hydration

作者关键词: 道路工程; 氯氧镁水泥; 减水剂; 缓凝剂; 水化

摘要: To further enhance the rapid hydration rate and short setting time of magnesium oxychloride cement (MOC), suitable polycarboxylic acid water reducer and an acid retarder was added to the MOC to improve its workability. Firstly, the hydration process of a standard sample of MOC was explored, and the hydration stage was analyzed through the hydration heat test. The main control factors at different hydration stages were investigated using the method of hydration kinetics. Furthermore, the effects of admixtures on MOC hydration heat release, hydration rate, hydration product type, and morphology were then analyzed. Kinetic equations were used to compare the changes in the MOC hydration process under the action of admixtures. Finally, the rotational viscosity test was used to characterize the changes in the MOC hydration process under the action of admixtures, and the ratio of mechanical strength before and after immersion was used to characterize the water resistance under the action of admixtures. The results show that the MOC hydration process is similar to that of Portland cement and can be divided into initial period, induction period, acceleration period, deceleration period, and stable period. The hydration rate in the acceleration phase is completely controlled by crystal nucleation and crystal growth under acceleration period, after then the phase boundary reaction and diffusion factors gradually affect the hydration rate. Therefore, the crystallization nucleation and crystal growth rate directly affect the setting time of MOC, and a major way to reduce the hydration rate of MOC is to control the crystallization rate. The hydration product of MOC is unaltered by adding a water reducing agent and retarder, but admixtures change the crystal morphology and improve the water resistance. The immersion test shows that the improved crystal morphology is better for water resistance. The water reducing agent improves the fluidity of the slurry. The retarder effectively prolongs the hydration induction period, and postpones the acceleration period for approximately 2 h, but the mechanical strength of MOC is slightly reduced. The rotational viscosity test shows that admixtures are beneficial for improving the fluidity of MOC.

摘要: 为改善氯氧镁水泥(MOC)水化速率快、凝结时间短的特性,选择适宜的聚羧酸减水剂和某酸类缓凝剂掺入到 MOC 中以提高水泥的和易性。首先,通过水化热试验研究了基准 MOC 水化历程,并划分了水化阶段,运用水化动力学方法研究不同水化阶段的主要受控因素;然后,

分析外加剂对 MOC 水化放热量、水化速率、水化产物类型及形貌的影响,采用动力学方程对比研究了外加剂作用下 MOC 水化历程的变化;最后,以旋转黏度试验表征外加剂作用下 MOC 水化过程的变化,以浸水后力学强度与未浸水强度的比值表征外加剂作用下 MOC 耐水性变化。研究表明:MOC 水化过程与硅酸盐水泥类似,可分为起始期、诱导期、加速期、减速期和稳定期,其中加速期阶段水化速率完全受控于结晶成核和晶体生长,之后相边界反应和扩散因素逐渐影响水化速率;MOC 结晶成核和晶体生长速率直接影响水泥浆体的凝结时间,降低 MOC 水化速率的主要措施为控制其结晶速率;掺入减水剂、缓凝剂等外加剂并没有改变 MOC 水化产物,但其晶体形貌得到改善,浸水试验表明改善后的晶体形貌耐水能力更加优异;减水剂提高了浆体流动度,缓凝剂能够有效延长水化诱导期,加速期向后推迟了约 2 h,但会小幅降低 MOC 的力学强度;旋转黏度试验表明添加外加剂有利于提高 MOC 的流动度。

入藏号: CSCD:6600068

地址: Feng Chao, School of Materials Science and Engineering, Chang'an University;; Chang'an University, ;; Engineering Research Center of Transportation Materials, Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710061;; 710061.

Guan Bowen, School of Materials Science and Engineering, Chang'an University;; Chang'an University, ;; Engineering Research Center of Transportation Materials, Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710061;; 710061.

Zhang Ben, School of Materials Science and Engineering, Chang'an University;; Chang'an University, ;; Engineering Research Center of Transportation Materials, Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710061;; 710061.

Chen Huaxin, School of Materials Science and Engineering, Chang'an University;; Chang'an University, ;; Engineering Research Center of Transportation Materials, Ministry of Education, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710061;; 710061.

Fang Jianhong, Qinghai Research Institute of Transportation, Xining, Qinghai 810000, China.

地址: 冯超, 长安大学材料科学与工程学院;; 长安大学, ;; 交通铺面材料教育部工程研究中心, 西安;; 西安, 陕西;; 陕西 710061;; 710061, 中国.

关博文, 长安大学材料科学与工程学院;; 长安大学, ;; 交通铺面材料教育部工程研究中心, 西安;; 西安, 陕西;; 陕西 710061;; 710061, 中国.

张奔, 长安大学材料科学与工程学院;; 长安大学, ;; 交通铺面材料教育部工程研究中心, 西安;; 西安, 陕西;; 陕西 710061;; 710061, 中国.

陈华鑫, 长安大学材料科学与工程学院;; 长安大学, ;; 交通铺面材料教育部工程研究中心, 西安;; 西安, 陕西;; 陕西 710061;; 710061, 中国.

房建宏, 青海省交通科学研究院, 西宁, 青海 810000, 中国.

电子邮件地址: shangdxial@sina.com; chen_hxin@sina.com

电子邮件地址: shangdxial@sina.com; chen_hxin@sina.com

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作者: 苟蕾; 赵少攀; 刘鹏刚; 杨江帆; 樊小勇; 李东林

作者: Gou Lei; Zhao Shaopan; Liu Penggang; Yang Jiangfan; Fan Xiaoyong; Li Donglin

标题: Metal-Organic Framework Derived Co₃O₄/C Composite as High-Performance Anode Material for Lithium-Ion Batteries

标题: 金属有机框架衍生的高性能锂离子电池负极 Co₃O₄/C 复合材料

来源出版物: 无机化学学报 卷: 35 期: 10 页: 1834-1842 出版年: 2019

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作者关键词: electrochemistry; lithium-ion battery; anode; composite; Co₃O₄; MOF; Co₃O₄; MOF

作者关键词: 电化学; 锂离子电池; 负极; 复合材料

摘要: In order to overcome the disadvantages of the low electrical conductivity and poor cycling stability of Co₃O₄ anode material, a Co₃O₄/C composite was obtained by the judicious selection of Co₂(NDC)₂DMF₂ (NDC=1,4-naphthalene dicarboxylate) as precursor through a two-step calcination process. The sample was characterized by X-ray diffraction (XRD), scanning electronic microscopy (SEM), X-ray photoelectron spectroscopy (XPS) and Raman spectroscopy. The content of amorphous carbon in Co₃O₄/C was tested by thermogravimetric analysis (TGA). As anode material for lithium-ion batteries (LIBs), Co₃O₄/C material showed a high reversible specific capacity, remarkable cycling performance (the specific discharge capacity was stable at 1 000 mAh·g⁻¹) under the current density of 200 mA·g⁻¹ even after 200 cycles) and an excellent rate performance with high average discharge specific capacities of 1 076.3, 976.2, 872.9, 783.6 and 670.1 mAh·g⁻¹ at 100, 200, 500, 1 000 and 2 000 mA·g⁻¹, respectively. The excellent electrochemical performance was attributed to the amorphous carbon derived from the organic ligand, which served as conductive path for easy electric charge transfer and buffer layer to slow down the volumetric stresses.

摘要: 为克服 Co₃O₄ 负极材料导电率低、循环稳定性差的缺点,选择 Co₂(NDC)₂DMF₂(NDC=1,4-萘二甲酸根)为前驱体采用两步煅烧工艺,制备了具有高碳含量的 Co₃O₄/C 复合材料。采用 X 射线衍射(XRD)、扫描电子显微镜(SEM)、X 射线光电子能谱(XPS)和拉曼光谱对样品进行了表征。采用热重分析法(TGA)测定了 Co₃O₄/C 中非晶态碳的含量。作为锂离子电池的负极材料,Co₃O₄/C 具有高的可逆比容量、优异的循环性能(在 200 mA·g⁻¹的电流密度下,循环 200 圈后放电比容量稳定保持在 1 000 mAh·g⁻¹)和良好的倍率性能(在 100、200、500、1 000 和 2 000 mA·g⁻¹的电流密度下,放电比容量为分别 1 076.3、976.2、872.9、783.6 和 670.1 mAh·g⁻¹)。材料优异的电化学性能归结为有机配体衍生的高含量非晶态碳的导电和缓冲作用有利于电子的快速传递并有效减缓了金属氧化物充放电过程中的体积膨胀。

入藏号: CSCD:6592314

地址: Gou Lei, Institute of New Energy Materials and Device, School of Materials Science and Engineering, Chang'an University, Xi'an, 710061.

Zhao Shaopan, Institute of New Energy Materials and Device, School of Materials Science and Engineering, Chang'an University, Xi'an, 710061.

Liu Penggang, Institute of New Energy Materials and Device, School of Materials Science and Engineering, Chang'an University, Xi'an, 710061.

Yang Jiangfan, Institute of New Energy Materials and Device, School of Materials Science and Engineering, Chang'an University, Xi'an, 710061.

Fan Xiaoyong, Institute of New Energy Materials and Device, School of Materials Science and Engineering, Chang'an University, Xi'an, 710061.

Li Donglin, Institute of New Energy Materials and Device, School of Materials Science and Engineering, Chang'an University, Xi'an, 710061.

地址: 苟蕾, 长安大学材料科学与工程学院, 新能源材料与器件研究所, 西安, 陕西 710061, 中国.

赵少攀, 长安大学材料科学与工程学院, 新能源材料与器件研究所, 西安, 陕西 710061, 中国.

刘鹏刚, 长安大学材料科学与工程学院, 新能源材料与器件研究所, 西安, 陕西 710061, 中国.

杨江帆, 长安大学材料科学与工程学院, 新能源材料与器件研究所, 西安, 陕西 710061, 中国.

樊小勇, 长安大学材料科学与工程学院, 新能源材料与器件研究所, 西安, 陕西 710061, 中国.

李东林, 长安大学材料科学与工程学院, 新能源材料与器件研究所, 西安, 陕西 710061, 中国.

电子邮件地址: leigou@chd.edu.cn; dlli@chd.edu.cn

电子邮件地址: leigou@chd.edu.cn; dlli@chd.edu.cn

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作者: 李江; 韩森; 陈团结; 苟召曦; 张琦; 聂晓双; 曹海如

作者: Li Jiang; Han Sen; Chen Tuanjie; Gou Zhaoxi; Zhang Qi; Nie Xiaoshuang; Cao Hairu

标题: Two Homologous Metal-Organic Frameworks Based on Zn(II)and Cd(II): Luminescent Sensors for Nitro Aromatic Compounds in Solution and Vapor Medium

标题: 两个金属有机框架化合物对硝基芳香化合物在气/液相的荧光传感

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作者关键词: metal-organic frameworks; luminescent sensing; nitro aromatic compounds

作者关键词: 金属有机框架; 荧光传感; 硝基芳香化合物

摘要: Two homologous luminescent metal-organic frameworks (LMOFs), [Cd₂(DDCPB)(DMF)₂(H₂O)]_n (CHD-1) and {[Zn₂(DDCPB)(DMA)₂·DMA]_n (CHD-2) (H₄DDCPB=1,1':3',1-terphenyl-3,3,5,5-tetracarboxylic acid), were constructed to explore sensing mechanisms for series of nitro aromatic compounds (NACs). Among various kinds of organic compounds, both CHD-1 and CHD-2 only respond to a series of nitro aromatic compounds through luminescence quenching with distinct analytes concentration in vapor and liquid phase. Quantitative experiments in solution were conducted to confirm the higher dynamic quenching efficiency and to calculate the quenching constants. Meanwhile, both CHD-1 and CHD-2 show high selectivity and excellent sensitivity for NACs with low detection limits in solution. Moreover, the film based on the MOFs sample identifies high sensitivity towards nitrobenzene (NB) and 2-nitrotoluene (o-MNT) vapor. In addition, the relationship between the sensing efficiency and the inherent structure of compounds the sensing mechanisms were discussed in detail.

摘要: 制备了2个金属有机框架化合物 [Cd₂(DDCPB)(DMF)₂(H₂O)]_n(CHD-1) 和 {[Zn₂(DDCPB)(DMA)₂·DMA]_n(CHD-2)(H₄DDCPB= 1,1':3',1-三联苯-3,3,5,5-四羧酸)。荧光测试表明:2个化合物均能在气/液两相中高效地选择性识别系列硝基芳香化合物(NACs)。溶液中NACs对2个化合物的荧光有较高的淬灭率,其淬灭常数可通过定量实验计算。CHD-1和CHD-2对溶液中的NACs显示出高选择性、优异的灵敏度和低检测限。基于2个化合物的薄膜检测对硝基苯(NB)和2-硝基甲苯(o-MNT)蒸气时也具有高灵敏度。此外,详细讨论了化合物的荧光传感机理。

入藏号: CSCD:6592315

地址: Li Jiang, School of Materials Science and Engineering, Chang'an University, Xi'an, 710064.

Han Sen, School of Materials Science and Engineering, Chang'an University, Xi'an, 710064.

Gou Zhaoxi, School of Materials Science and Engineering, Chang'an University, Xi'an, 710064.

Zhang Qi, School of Materials Science and Engineering, Chang'an University, Xi'an, 710064.

Nie Xiaoshuang, School of Materials Science and Engineering, Chang'an University, Xi'an, 710064.

Cao Hairu, School of Materials Science and Engineering, Chang'an University, Xi'an, 710064.

Chen Tuanjie, CCCC First Highway Consultans Co., Ltd., Xi'an, 710062.

地址: 李江, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

韩森, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

苟召曦, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

张琦, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

聂晓双, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

曹海如, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.
陈团结, 中交第一公路勘察设计研究院有限公司, 西安, 陕西 710062, 中国.
电子邮件地址: lijiang@chd.edu.cn
电子邮件地址: lijiang@chd.edu.cn
使用次数 (最近 180 天): 6
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作者: Geng Jiuguang; Chen Shuai; Liu Guangjun; Zhou Hengyu; Liu Runxi

作者: 耿九光; 陈帅; 刘光军; 周恒玉; 刘润喜

标题: Review of improvement for the adhesion between asphalt and aggregate by different materials

标题: 不同材料对改善沥青与集料粘附性研究进展

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作者关键词: 沥青混合料; 无机材料; 高分子材料; 新型材料; 粘附性

摘要: The research on the improvement of adhesion between asphalt and aggregate were review by inorganic materials, polymer materials and new modified materials. The inorganic material is a practical anti-flaking additive, but there is a problem that the fineness is difficult to control and the dosage is uncertain. The polymer material has good adhesion to asphalt and aggregate, but the amine antistripping agent has poor thermal ageing resistance. At high temperature it is easy to decompose and loses the modification effect for adhesion. The new modified material has a good effect on the aggregate surface, but it only works for acidic aggregates. Other types of aggregates need further research. Finally, the improvement effect of various materials on the adhesion between asphalt and aggregate and the future development direction are summarized.

摘要: 通过归纳总结现有研究成果, 综述了无机材料、高分子材料及新型改性材料对沥青与集料粘附性改善技术的研究。其中, 无机材料是一种实用型的抗剥落添加剂, 但存在细度难控制、掺量不确定问题; 高分子材料对沥青与集料粘附性改善良好, 但胺类高分子材料耐热性差, 高温易分解, 对沥青与集料粘附性改善效果变差; 新型材料对集料表面有很好的改善作用, 但其仅对酸性集料有明显的改善作用, 其它类型集料有待进一步的研究。最后总结了各类材料对沥青与集料粘附性的改善效果与今后的发展方向。

入藏号: CSCD:6573652

地址: Geng Jiuguang, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Shuai, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Guangjun, China Communications Second Public Office Fourth Engineering Co., Ltd., Xi'an, Shaanxi 710000, China.

Zhou Hengyu, China Communications Second Public Office Fourth Engineering Co., Ltd., Xi'an, Shaanxi 710000, China.

Liu Runxi, China Communications Second Public Office Fourth Engineering Co., Ltd., Xi'an, Shaanxi 710000, China.

地址: 耿九光, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

陈帅, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

刘光军, 中交二公局第四工程有限公司, 西安, 陕西 710000, 中国.

周恒玉, 中交二公局第四工程有限公司, 西安, 陕西 710000, 中国.

刘润喜, 中交二公局第四工程有限公司, 西安, 陕西 710000, 中国.

电子邮件地址: 38780839@qq.com

电子邮件地址: 38780839@qq.com

使用次数 (最近 180 天): 0

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作者: Zhou Zhenjun; Zhang Hao; Luo Weihua; Xu Peijun; Cong Peiliang

作者: 周振君; 张皓; 罗伟华; 许培俊; 丛培良

标题: Effect of hydrothermal ion exchange time on remodeling of leucite by cesium ion

标题: 水热离子交换时间对铯离子改型白榴石的影响

来源出版物: 无机盐工业 卷: 51 期: 9 页: 17-20 出版年: 2019

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作者关键词: hydrothermal ion exchange method; leucite; remodeling; kinetic analysis

作者关键词: 水热离子交换法; 白榴石; 改型; 动力学分析

摘要: In order to control the thermal expansion coefficient of leucite effectively, the leucite

powders were remodeled by cesium ion. The leucite powders were treated by hydrothermal ion exchange in 0.3 mol/L cesium sulfate solution. The phase composition and morphology of the samples obtained at 180 °C for different ion exchange time were analyzed and observed by X-ray diffraction (XRD) and scanning electron microscopy (SEM). Results showed that the cesium ions introduced crystal lattice of leucite can make conversion of partial leucite into pollucite. The pollucite crystals gradually transited from the tetragonal system to the cubic system with the increasing of the holding time. When the holding time exceeded 10 h, the increasing of internal stress between two phases led to pollucite falling off from the surface of leucite grains, so the holding time should be controlled at 2~10 h. The fitting analysis of the kinetics of the synthetic pollucite using the JMA equation showed that the Avrami exponent n of the hydrothermal ion exchange reaction was less than 0.5. That indicates that the reaction was dominated by diffusion.

摘要: 为实现对白榴石热膨胀系数的有效调控,利用铯离子对白榴石粉体进行改型。将白榴石粉体在浓度为 0.3 mol/L 的硫酸铯溶液中进行水热离子交换处理。利用 X 射线衍射仪(XRD)和扫描电子显微镜(SEM)对 180 °C 下不同离子交换时间得到样品的物相和形貌进行了分析和观察。结果表明:铯离子进入白榴石晶格后,使部分白榴石转变生成了铯榴石,并且随着保温时间的延长,产物铯榴石晶体会逐渐由四方晶系过渡为立方晶系。当保温时间超过 10 h 时,两相间内应力增加会导致铯榴石从白榴石颗粒表面脱落,所以保温时间应该控制在 2~10 h。利用 JMA 方程对合成铯榴石生长动力学过程进行拟合分析,从 Avrami 指数 n 小于 0.5 可知,整个反应主要由扩散控制。

入藏号: CSCD:6573180

地址: Zhou Zhenjun, School of Materials Science and Engineering, Chang'an University, Xi'an, 710064.

Zhang Hao, School of Materials Science and Engineering, Chang'an University, Xi'an, 710064.

Luo Weihua, School of Materials Science and Engineering, Chang'an University, Xi'an, 710064.

Xu Peijun, School of Materials Science and Engineering, Chang'an University, Xi'an, 710064.

Cong Peiliang, School of Materials Science and Engineering, Chang'an University, Xi'an, 710064.

地址: 周振君, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

张皓, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

罗伟华, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

许培俊, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

丛培良, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: zhenjunz@chd.edu.cn

电子邮件地址: zhenjunz@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Xiong Rui; Yang Fa; Guan Bowen; Xie Chao; Li Liding; Sheng Yanping; Chen Huaxin

作者: 熊锐; 杨发; 关博文; 谢超; 李立顶; 盛燕萍; 陈华鑫

标题: Wear Resistance of Highly Anti-skid Aggregate for Pavement: Evaluation and Mechanism Analysis

标题: 路用高抗滑集料耐磨性能评价与机理分析

来源出版物: 材料导报 卷: 33 期: 10B 页: 3436-3440 出版年: 2019

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作者关键词: road engineering; highly anti-skid aggregate; Los Angeles abrasion test; fractal dimension; Vickers-hardness

作者关键词: 道路工程; 高抗滑集料; 洛杉矶磨耗试验; 分形维数; 维氏硬度

摘要: The abrasion resistance of aggregates plays a decisive role in the anti-skid performance of asphalt pavement. The Los Angeles abrasion test (LA) was carried out to investigate the abrasion loss rate of the calcined bauxite, basalt and granite aggregates, and the variation of their morphological characteristics with the abrasion cycles. Moreover, the Pearson correlation coefficient was used to analyze the abrasion loss rate and morphological characteristics of the aggregates. Accordingly, the correlation model of the fractal dimension change rate and Vickers hardness of aggregates as a function of the abrasion loss rate was established. Further, the abrasion mechanism of aggregates was analyzed by means of SEM and XRD. As can be seen from the results, 88# calcined bauxite aggregates exhibit exceptionally superiority in abrasion resistance compared to 75# calcined bauxite, basalt and granite. Corundum and mullite constitute were the main abrasion-resistant components in 88# calcined. The established model is able to well describe the relationship of aggregate abrasion loss rate with fractal dimension change rate and Vickers-hardness. In conclusion, this research results provide a novel approach for improving and maintaining the anti-skid performance of pavement.

摘要: 集料耐磨耗性能对沥青路面抗滑性能起着决定性作用。采用洛杉矶磨耗试验研究了煅烧铝矾土、玄武岩和花岗岩集料的磨耗损失率和集料形态特性参数随磨耗次数的变化规律; 利用皮尔森相关系数分析了集料磨耗损失率和形态特征参数的相关性, 并构建了磨耗损失率与分形维数变化率及维氏硬度的关系模型; 采用 SEM 和 XRD 测试手段分析了集料的耐磨机理。结果表明, 88# 煅烧铝矾土集料的抗磨耗性能明显优于 75# 煅烧铝矾土、玄武岩和花岗岩, 其主要抗磨耗成分为刚玉和莫来石; 所构建的模型能够较好地反映出集料磨耗损失率与分形维数变化率及维氏硬度的关系。研究成果为路面抗滑性能的提升与持久提供了新思路。

入藏号: CSCD:6575045

地址: Xiong Rui, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Guan Bowen, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Xie Chao, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Sheng Yanping, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi

710061, China.

Chen Huaxin, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Yang Fa, Yunnan Communications Investment & Construction Group Co., Ltd, Kunming, Yunnan 650200, China.

Li Liding, School of Transportation, Jilin University, Changchun, Jilin 130022, China.

地址: 熊锐, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

关博文, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

谢超, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

盛燕萍, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

陈华鑫, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

杨发, 云南省交通投资建设集团有限公司, 昆明, 云南 650200, 中国.

李立顶, 吉林大学交通学院, 长春, 吉林 130022, 中国.

电子邮件地址: xiongr61@126.com

电子邮件地址: xiongr61@126.com

使用次数 (最近 180 天): 1

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作者: Sun Yanghui; Ai Cheng; Zhang Xiaofeng; Liu Lin

作者: 孙阳辉; 艾诚; 张晓峰; 刘林

标题: Research Progress on Solution Treatment Regimes of Ni Based Single Crystal Superalloy

标题: 镍基单晶高温合金固溶处理制度的研究进展

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作者关键词: single crystal superalloy; solution treatment; microstructure; microsegregation

作者关键词: 单晶高温合金; 固溶处理; 显微组织; 显微偏析

摘要: Single crystal turbine blades are the key hot end components of aeroengine, which need serve at high temperature for relatively long time. Therefore, single crystal turbine blades should have excellent high temperature mechanical properties, good oxidation resistance and corrosion resistance at high temperature environment. As the preferred material of single crystal turbine

blades, Ni based single crystal superalloy has been widely concerned by many researchers in the past few decades. In order to further improve the high temperature mechanical properties of advanced Ni based single crystal superalloys, the content of high refractory elements (such as Re and W) in advanced Ni based single crystal superalloys continuously increased. Meanwhile, typical as-cast single crystal superalloys contain inhomogeneities of composition (severe microsegregation) and microstructure (massive interdendritic precipitations). It should be noteworthy that if the inhomogeneities of composition and microstructure cannot be eliminated by high temperature solution treatment, the mechanical properties and long-term service properties of single crystal superalloys will be significantly deteriorated. Therefore, appropriate solution treatment regimes should be designed for advanced Ni based single crystal superalloys. The development of solid solution treatment process can be divided into two stages. The first stage: with regard to 1st generation single crystal superalloys without Re element, the homogenization of microstructure and composition in this kind of alloy can be achieved by solution treated between the γ' -solvus temperature and the initial melting temperature of alloy for a relatively short time. The second stage started from the 2nd generation single crystal superalloy, the content of refractory elements (especially Re element) in single crystal superalloy continuously increased the difficulty of homogenization of composition significantly increased, i.e. both the temperature and time of solution treatment obviously increased. Therefore, the research hotspot of solution treatment regimes of advanced Ni based single crystal superalloy changed from phase transformation temperature and incipient melting temperature of the alloy to the homogenization degree of alloying elements in single crystal superalloy. As cast Ni based single crystal superalloys contained numerous interdendritic precipitations and severe microsegregation of alloying elements. Therefore, in order to obtain uniform microstructure and composition, high temperature solution treatment is necessary. Previous studies indicated that the aim of solution treatment at low-temperature stage is to eliminate interdendritic precipitation, and the aim of solution treatment at high-temperature stage is to eliminate/reduce microsegregation degree of alloying elements. With the development of single crystal superalloy, the content of refractory elements in advanced single crystal superalloy (e.g. Re and W) obviously increased. On the one hand, refractory elements had relatively low interdiffusion coefficients in Ni, on the other hand, refractory elements had severe microsegregation in as-cast alloy. Therefore, it is difficult to eliminate microsegregation of refractory elements and design suitable solution treatment regimes. Meanwhile, phase transformation temperatures of single crystal superalloys were also affected by solution treatment regimes. In this paper, the research progress of solution treatment regimes of Ni based single crystal superalloy is summarized. Solution treatment regimes of 2nd and 3rd generation Ni based single crystal superalloys are detailed analyzed, and the effects of solution treatment on microstructure and microsegregation are also illustrated. Moreover, the conventional stepwise solution treatment method and newly developed continuous heating solution treatment method are compared. Meanwhile, the remelting solution treatment is also introduced in this paper.

摘要: 单晶涡轮叶片是航空发动机的关键热端部件,需要在高温和高腐蚀的环境下长时服役,这就需要单晶涡轮叶片具有优异的高温力学性能、较高的抗氧化和抗腐蚀性能,而镍基单晶高温合金作为航空发动机涡轮叶片的首选材料,近几十年来一直受到研究者的关注。为进一步提高先进镍基高温合金的承温能力,需不断提高先进镍基单晶高温合金中难熔元素(例如 Re 和 W)的含量。同时,铸态镍基单晶高温合金中存在成分不均匀(严重的显微偏析)和组织不均匀(大量的枝晶间析出物)的缺陷,这种成分和组织的不均匀性如果不能被高温固溶处理消

除,则将显著恶化单晶高温合金的力学性能与长时服役性能。因此,有必要探索适用于先进镍基单晶高温合金的固溶处理工艺。固溶处理工艺的发展可以分为两个阶段。第一阶段:第一代单晶高温合金,由于合金中不含 Re 元素,合金只需要在 γ' 回溶温度和初熔温度之间保温较短的时间即可实现合金组织和成分的均匀化。第二阶段:从第二代单晶高温合金开始,合金中难熔元素(尤其是 Re 元素)的含量不断增加,合金的成分均匀化难度显著增大,即固溶温度显著升高、固溶时间显著延长。因此,先进镍基单晶高温合金固溶处理工艺的研究重点从关注合金中各相的溶解温度和合金的初熔温度转变为合金中各元素的均匀化程度。大量的研究表明,低温段固溶的目的是通过固态相变的方式消除枝晶间析出物,而高温段固溶的目的是通过固相扩散的方式消除或降低合金元素的显微偏析。随着单晶高温合金的发展,先进单晶高温合金中难熔元素(例如 Re 和 W)的含量显著提高,一方面,难熔合金元素在 Ni 中具有较低的互扩散系数;另一方面,难熔元素在铸态单晶高温合金中的显微偏析程度较高。因此对于先进镍基单晶高温合金,实现元素均匀化和制定合理的固溶处理工艺的难度显著提高。同时,单晶高温合金的相变温度也受到固溶处理工艺的影响。本文归纳总结了单晶高温合金固溶处理制度的研究进展,详细介绍了第二代和第三代镍基单晶高温合金的固溶处理制度,阐述了固溶处理对显微组织和成分分布的影响规律,对比了单晶高温合金传统的台阶式升温固溶处理工艺和新型的连续升温固溶处理工艺,并对重熔固溶处理工艺进行了介绍。

入藏号: CSCD:6575073

地址: Sun Yanghui, School Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Ai Cheng, School Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Xiaofeng, School Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Lin, Northwestern Polytechnical University, State Key Laboratory of Solidification Processing, Xi'an, Shaanxi 710072, China.

地址: 孙阳辉, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

艾诚, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

张晓峰, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

刘林, 西北工业大学, 凝固技术国家重点实验室, 西安, 陕西 710072, 中国.

电子邮件地址: aicheng@chd.edu.cn

电子邮件地址: aicheng@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 1

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作者: Chen Diandian; Bao Mingdong; Zhang Runmei; Wang Xinang; Zheng Jiahong

作者: 陈典典; 鲍明东; 张润梅; 王新刚; 郑佳红

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作者关键词: MnMoO₄; Supercapacitor; MnMoO₄; Electrochemical performance

作者关键词: 超级电容器; 电化学性能

摘要: As a new type of energy storage device that acts as a bridge between traditional capacitors and batteries, the appearance of supercapacitors effectively alleviates the environmental pollution of fossil fuels such as coal and oil. In order to obtain a supercapacitor with excellent performance, it is necessary to study its core component of electrode material. A simple one-step hydrothermal method was used to prepare MnMoO₄ sample, which can be used as a supercapacitor electrode material. By analyzing electrochemical performance, it is known that when the current density is 5 A·g⁻¹, a higher specific capacitance of 1284.12 F·g⁻¹ can be obtained. In addition, when the current density increases to 50 A·g⁻¹, the specific capacitance is 1055.56 F·g⁻¹. In terms of cycle stability, the specific capacitance still retains initial value of 93.80% after 3,000 cycles, indicating that MnMoO₄ has good cycle stability. Therefore, as-prepared MnMoO₄ can be served as a promising supercapacitor electrode material using the hydrothermal method.

摘要: 作为一种对静电电容器和电池起桥梁作用的新型储能装置, 超级电容器的出现有效地缓解了煤、石油等化石燃料对环境的污染, 如果要获得性能优良的超级电容器, 就必须对它的核心组成部件电极材料进行详细的研究。本文用水热法制备出一种可以作为超级电容器电极的 MnMoO₄ 材料, 电化学测试结果表明当电流密度为 5 A·g⁻¹ 时, 获得的电容为 1284.12 F·g⁻¹; 当电流密度升高到 50 A·g⁻¹ 时, 电容值为 1055.56 F·g⁻¹。通过对 MnMoO₄ 电极充放电循环性能测试可知, MnMoO₄ 有良好的循环稳定性, 当充放电持续 3000 圈后, 电容仍然保留了初始值的 93.80%。因此, 水热法制备出的 MnMoO₄ 是一种非常有前景的超级电容器电极材料。

入藏号: CSCD:6567914

地址: Chen Diandian, School of Materials Science and Engineering, Changan University;; School of Materials and Chemical Engineering, Ningbo University of Technology, ;; Xian;; Ningbo, ;; 710064;; 315211.

Bao Mingdong, School of Materials and Chemical Engineering, Ningbo University of Technology, Ningbo, Zhejiang 315211, China.

Zhang Runmei, School of Materials Science and Engineering, Changan University, Xian, 710064.

Wang Xinang, School of Materials Science and Engineering, Changan University, Xian, 710064.

Zheng Jiahong, School of Materials Science and Engineering, Changan University, Xian, 710064.

地址: 陈典典, 长安大学材料科学与工程学院;; 宁波工程学院材料与化学工程学院, ;; 西安;; 宁波, ;; 710064;; 315211.

鲍明东, 宁波工程学院材料与化学工程学院, 宁波, 浙江 315211, 中国.

张润梅, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

王新刚, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

郑佳红, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: zyxgwang@chd.edu.cn

电子邮件地址: zyxgwang@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Zhang Mengyao; Tian Xiaodong; Gao Shun

作者: 张梦瑶; 田晓东; 高顺

标题: Microstructure and wear resistance of nickel-silicon carbide-molybdenum disulfide composite coating electroplated on 5083 aluminum alloy

标题: 5083 铝合金复合电镀镍-碳化硅-二硫化钼的显微组织和耐磨性

来源出版物: 电镀与涂饰 卷: 38 期: 16 页: 843-846 出版年: 2019

文献号: 1004-227X(2019)38:16<843:5LHJFH>2.0.TX;2-7

来源出版物: Electroplating & Finishing 卷: 38 期: 16 页: 843-846 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: aluminum alloy; composite electroplating; nickel; silicon carbide; molybdenum disulfide; microstructure; wear resistance

作者关键词: 铝合金; 复合电镀; 镍; 碳化硅; 二硫化钼; 显微组织; 耐磨性

摘要: Pure Ni coating, Ni-SiC composite coating, and Ni-SiC-MoS₂ composite coating was electroplated respectively on 5083 aluminum alloy substrate from a sulfate bath. The bath composition and process conditions are as follows: NiSO₄·6H₂O 300 g/L, NiCl₂·6H₂O 45 g/L, H₃BO₃ 35 g/L, SiC 0 g/L or 80 g/L, MoS₂ 0 g/L or 8 g/L, sodium lauryl sulfate 0.1 g/L, pH 5, temperature 50 °C, cathodic current density 5 A/dm², mechanical agitation rate 200 r/min, and time 35 min. The microstructure, composition, and wear resistance of the coatings were compared. The results showed that the Ni-SiC-MoS₂ composite coating had the smallest average grain size, the highest microhardness (430.10 HV), and the best wear resistance.

摘要: 采用硫酸盐体系镀镍液在 5083 铝合金基体上电镀得到纯 Ni 镀层、Ni-SiC 复合镀层和 Ni-SiC-MoS₂ 复合镀层。镀液组成和工艺条件为: NiSO₄·6H₂O 300 g/L, NiCl₂·6H₂O 45 g/L, H₃BO₃ 35 g/L, SiC 0 g/L 或 80 g/L, MoS₂ 0 g/L 或 8 g/L, 十二烷基硫酸钠 0.1 g/L, pH 5, 温度 50 °C, 阴极电流密度 5 A/dm², 机械搅拌速率 200 r/min, 时间 35 min。对比了 3 种镀层的显微组织、成分和耐磨性。结果表明, Ni-SiC-MoS₂ 复合镀层的平均晶粒尺寸最小, 显微硬度最高(达到 430.10 HV), 耐磨性最优。

入藏号: CSCD:6570224

地址: Zhang Mengyao, First-author's address: School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Tian Xiaodong, First-author's address: School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Gao Shun, First-author's address: School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 张梦瑶, 长安大学材料科学与工程, 西安, 陕西 710064, 中国.

田晓东, 长安大学材料科学与工程, 西安, 陕西 710064, 中国.

高顺, 长安大学材料科学与工程, 西安, 陕西 710064, 中国.

使用次数 (最近 180 天): 0

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作者: Wei Junji; Shen Aiqin; Song Jiale; Yan Ni; Wang Fengyan; Ma Jiazhe

作者: 魏俊基; 申爱琴; 宋家乐; 晏妮; 王凤燕; 马佳哲

标题: Influence of surface modified BaTiO₃ on thermal stability and dielectric property of PVDF

标题: 表面修饰 BaTiO₃ 对聚偏氟乙烯热性能和介电性能的影响规律研究

来源出版物: 化工新型材料 卷: 47 期: 7 页: 103-106 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: nanocomposite film; dielectric relaxation; polyvinylidene fluoride; poly(arylene ether nitrile)

作者关键词: 纳米复合薄膜; 介电弛豫; 聚偏氟乙烯; 羧基聚芳醚腈

摘要: Polymer composites with high dielectric constant have broad application prospect in energy storage and artificial muscle. BaTiO₃ was surface modified by poly(arylene ether nitrile) containing side carboxyl (BT@PEN) in order to improve its dispersity in PVDF. Then PVDF/BT@PEN nanocomposite films with different loading of BT@PEN nanoparticles were prepared by solution cast technique. The experimental results showed that PVDF/BT@PEN nanocomposites had very good thermal stability, and the initial decomposing temperature was over 440°C. The dielectric properties of PVDF/BT@PEN nanocomposites revealed that the dielectric constant gradually increased with the loading of BT@PEN. Especially, when the loading of BT@PEN reached to 20%, the dielectric constant could be higher than 12 at 100Hz.

摘要: 高介电常数的高分子复合材料可以被广泛应用于能量存储和人工肌肉领域。利用含羧

基聚芳醚腈(PEN)对 BaTiO₃(BT)纳米粒子进行表面修饰,以增加 BT 在 高分子基体聚偏氟乙 烯(PVDF)中的分散性。通过溶液浇铸法,制备了一系列 BT@PEN 含量不同的高分子复合薄 膜(PVDF/BT@PEN)。结果表明:PVDF/BT@PEN 具有很好的热稳定性,起始分解温度超过了 440°C。同时,复合薄膜的介电常数 k 随着 BT@PEN 质量含量的增加逐渐增大。当 BT@PEN 质量含量为 20%时,复合薄膜在 100Hz 时的介电常数大于 12。

入藏号: CSCD:6559068

地址: Wei Junji, School of Materials Science and Engineering, Xi'an, Shaanxi 710064, China.

Song Jiale, School of Materials Science and Engineering, Xi'an, Shaanxi 710064, China.

Yan Ni, School of Materials Science and Engineering, Xi'an, Shaanxi 710064, China.

Wang Fengyan, School of Materials Science and Engineering, Xi'an, Shaanxi 710064, China.

Ma Jiazhe, School of Materials Science and Engineering, Xi'an, Shaanxi 710064, China.

Shen Aiqin, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 魏俊基, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

宋家乐, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

晏妮, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

王凤燕, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

马佳哲, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

申爱琴, 长安大学公路学院, 西安, 陕西 710064, 中国.

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作者: Ma Xiaoyan; Chen Huaxin; Yang Pingwen; Xing Mingliang; Wang Kai; Kuang Dongliang

作者: 马晓燕; 陈华鑫; 杨平文; 邢明亮; 王凯; 况栋梁

标题: Fatigue life prediction of asphalt mastics based on simplified viscoelastic continuum damage model

标题: 基于改进 S-VECD 模型的沥青胶浆疲劳寿命预估

来源出版物: 长安大学学报. 自然科学版 卷: 39 期: 4 页: 35-43 出版年: 2019

文献号: 1671-8879(2019)39:4<35:JYGJSV>2.0.TX;2-#

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文献类型: Article

作者关键词: road engineering; fatigue damage evolution; S-VECD model; asphalt mastic; fatigue

life

作者关键词: 道路工程; 疲劳损伤演化; S-VECD 模型; 沥青胶浆; 疲劳寿命

摘要: To study the effect of asphalt binder and filler volume fraction on the fatigue properties of asphalt mastics, the relation between shear stress and strain was analyzed and the fatigue loading times were calculated. SK90 and KL70 asphalts and a limestone filler were selected to fabricate asphalt mastics of four different filler volume fractions. The strain sweep test and a simplified viscoelastic continuum damage (S-VECD) model, which can predict the fatigue life of materials in a given loading history using a series of limited tests, were used to predict the fatigue loading times of asphalt mastics. Temperature-frequency sweep tests were conducted and complex modulus master curves were obtained according to the time-temperature equivalence principle. The CAM model was applied to fit the master curve. The slope of the frequency-modulus curve in double logarithmic coordinates and the shift factor were used as the input parameters of the S-VECD model. The results showed that adding fillers to asphalt decreased the peak width of the LAS stress-strain curves of the asphalt mastic and its strain dependence increases with the growth of filler volume fraction. There is an optimal volume fraction at which point the maximum allowable stress occurs. The fatigue life of asphalt mastics decreases with an increase in the filler volume fraction, and the better the fatigue property of the asphalt binder at the same filler volume fraction. The physico-chemical interaction between the asphalt and filler, the better the fatigue property of the corresponding mastics. 5 tabs, 14 figs, 19 refs.

摘要: 为了分析沥青结合料和填料体积分数对沥青胶浆疲劳特性的影响,研究沥青胶浆应力-应变、材料完整性系数与强度损伤演化关系,计算沥青胶浆的疲劳作用次数,采用石灰石磨细矿粉、SK90 和 KL70 基质沥青,分别制备 4 种不同填料体积分数的沥青胶浆。基于黏弹性连续损伤理论和疲劳破坏准则,建立了线性振幅扫描(LAS)试验沥青胶浆疲劳寿命预估模型(S-VECD),利用有限测试结果,预测在给定的加载历史中材料的损伤演化及疲劳寿命。同时,对沥青胶浆进行温度-频率扫描,根据时间-温度叠加原理和 CAM 模型,建立动态剪切模量主曲线,计算双对数坐标轴下频率-模量主曲线斜率和移位因子,作为疲劳寿命预估模型的输入参数。研究表明:填料的加入使沥青胶浆 LAS 应力-应变曲线峰值宽度减小,胶浆的应变依赖性增加;沥青胶浆的最大允许应变随填料体积分数增大呈现先增加后减小的趋势,且存在最佳体积分数;随着填料体积分数的增加,强度损伤参数 S 与材料完整性系数 C~*曲线斜率的绝对值增大,材料破坏速度加快;在相同的温度和测试频率下,随着填料体积分数的增加,沥青胶浆的疲劳寿命减小;在相同的填料体积分数下,基质沥青的疲劳寿命越大,其对应的沥青胶浆疲劳寿命也越大;沥青与填料之间相互作用系数越大,沥青胶浆疲劳性能越好。

入藏号: CSCD:6555489

地址: Ma Xiaoyan, School of Material Science and Engineering,Chang'an University;;Chang'an University, ;;Engineering Research Center of Transportation Material,Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710061;;710061.

Chen Huaxin, School of Material Science and Engineering,Chang'an University;;Chang'an University, ;;Engineering Research Center of Transportation Material,Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710061;;710061.

Xing Mingliang, School of Material Science and Engineering,Chang'an University;;Chang'an University, ;;Engineering Research Center of Transportation Material,Ministry of Education, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710061;;710061.

Kuang Dongliang, School of Material Science and Engineering,Chang'an University;;Chang'an University, ;;Engineering Research Center of Transportation Material,Ministry of Education,

Xi'an;;Xi'an, Shaanxi;;Shaanxi 710061;;710061.

Yang Pingwen, Gansu Luqiao Construction Group Maintenance Technology Co.,Ltd., Lanzhou, Gansu 730000, China.

Wang Kai, Ningbo Traffic Construction Project Testing and Inspection Center Co.,Ltd., Ningbo, Zhejiang 315121, China.

地址: 马晓燕, 长安大学材料科学与工程学院;;长安大学, ;;交通铺面材料教育部工程研究中心, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

陈华鑫, 长安大学材料科学与工程学院;;长安大学, ;;交通铺面材料教育部工程研究中心, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

邢明亮, 长安大学材料科学与工程学院;;长安大学, ;;交通铺面材料教育部工程研究中心, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

况栋梁, 长安大学材料科学与工程学院;;长安大学, ;;交通铺面材料教育部工程研究中心, 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

杨平文, 甘肃路桥建设集团养护科技有限责任公司, 兰州, 甘肃 730000, 中国.

王凯, 宁波市交通建设工程试验检测中心有限公司, 宁波, 浙江 315121, 中国.

电子邮件地址: xiaoyanma@chd.edu.com; chenhx_paper@163.com

电子邮件地址: xiaoyanma@chd.edu.com; chenhx_paper@163.com

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作者: Chen Hong; Wang Chengcheng; Kang Yabin; Zhu Xiaoyu; Chen Binbo; Chen Yongnan; Hao Jianmin

作者: 陈宏; 王成成; 康亚斌; 朱晓宇; 陈斌博; 陈永楠; 郝建民

标题: Research Status of Micro-arc Oxidation of Magnesium Alloy

标题: 镁合金微弧氧化的研究现状

来源出版物: 表面技术 卷: 48 期: 7 页: 49-60 出版年: 2019

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作者关键词: magnesium alloy; micro-arc oxidation; ceramic coating; growth mechanism; corrosion resistance

作者关键词: 镁合金; 微弧氧化; 陶瓷膜; 生长机理; 耐蚀性

摘要: With the research results on the micro-arc oxidation of magnesium alloys, the formation

mechanism of micro-arc oxidation coating of magnesium alloys was introduced. Optical emission spectroscopy was used to identify the elements presented in the plasma discharge process and the plasma temperature was calculated. The micro-arc oxidation functional coatings of magnesium alloys were also introduced. Furthermore, the effects of reinforcement phases on the corrosion resistance of micro-arc oxidation ceramic coatings of magnesium matrix composites were reviewed. The advantages and disadvantages of different electrolytes during the micro-arc oxidation were summarized and the significant influence on the structure and properties of the micro-arc oxidation ceramic coatings were analyzed. The additives could improve the conductivity and stability of the electrolyte and reduce the porosity of the ceramic coating. The effects of alloying elements, power types, electrical parameters and post-sealing processing on the structure, morphology and performance of the ceramic coatings were elaborated. Based on the research status in the micro-arc oxidation of magnesium alloys, the development direction in research of the micro-arc oxidation of magnesium alloys is prospected.

摘要: 结合国内外镁合金微弧氧化机理的研究成果,重点介绍了镁合金微弧氧化的生长机理,利用光发射谱识别等离子体放电过程中的反应元素,并计算等离子体温度。对镁合金微弧氧化功能膜以及增强相对镁基复合材料微弧氧化陶瓷膜耐蚀性的影响作了简要介绍。概述了在镁合金微弧氧化过程中,不同体系的电解液各自具有的优缺点,及对陶瓷膜结构和性能产生的重要影响。添加剂可以提高电解液的导电性和稳定性,减小陶瓷膜的孔隙率。详细阐述了合金元素、电源类型、电参数和后处理封孔技术对镁合金陶瓷膜结构、形貌及性能的影响。基于镁合金微弧氧化技术的研究现状,对镁合金微弧氧化技术的研究方向进行了展望。

入藏号: CSCD:6549394

地址: Chen Hong, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Chengcheng, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Kang Yabin, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhu Xiaoyu, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Binbo, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Yongnan, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Hao Jianmin, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 陈宏, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

王成成, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

康亚斌, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

朱晓宇, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

陈斌博, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

陈永楠, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

郝建民, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: chenhong@chd.edu.cn; h-jianmin@126.com

电子邮件地址: chenhong@chd.edu.cn; h-jianmin@126.com

使用次数 (最近 180 天): 0

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作者: Feng Chao; Guan Bowen; Zhang Ben; Chen Huaxin; Fang Jianhong

作者: 冯超; 关博文; 张奔; 陈华鑫; 房建宏

标题: Moisture Erosion Behavior of Magnesium Oxychloride Cement with the Action of Water Reducer

标题: 减水剂作用下氯氧镁水泥中水分侵蚀行为

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作者关键词: water reducer; magnesium oxychloride cement; moisture transport; water resistance; improvements measures

作者关键词: 减水剂; 氯氧镁水泥; 水分传输; 耐水性; 改善措施

摘要: The weak water resistance of magnesium oxychloride cement (MOC) is the main reason for limiting its wide application. In this paper, the water erosion behavior and improvement measures in MOC were explored by water absorption test. The material dissolution time point was found from the mass change curve, which was controlled by the water resistance of $5\text{Mg}(\text{OH})_2 \cdot \text{MgCl}_2 \cdot 8\text{H}_2\text{O}$ (P5) crystal. The point disappeared later after addition of the water reducer, which indicated that the water reducer improved the water resistance of the MOC. Capillary water absorption coefficient results showed that the water reducer improved the compactness of the MOC. The dissolution kinetics showed that the way to improve the water resistance of cement was to reduce aqueous solution temperature, increase the concentration of magnesium chloride in aqueous solution, and reduce the location of hydrolysis reaction. And the water reducer reduced the hydrolysis location by changing the morphology of the hydrated crystal and improving the cement compactness, and improves the water resistance of the cement. The performance test of MOC concrete indicated that water absorption test can characterize the water resistance of MOC and way.

摘要: 氯氧镁水泥(MOC)的弱耐水性是限制其广泛应用的主要原因,通过吸水试验探索了MOC中水分侵蚀行为及改善措施。由MOC质量变化曲线得出在水分扩散过程中存在物质溶出时间节点,该点与 $5\text{Mg}(\text{OH})_2 \cdot \text{MgCl}_2 \cdot 8\text{H}_2\text{O}$ (P5)晶体耐水能力有关;添加减水剂后物质溶出节点时间后移,表明减水剂可改善MOC耐水性,毛细吸水系数结果表明减水剂提高了

MOC 的密实性;溶蚀动力学表明提高水泥耐水性的途径有降低水溶液温度、提高水溶液中氯化镁浓度、减少水解反应场所,而减水剂通过改变水化晶体形貌和提高水泥密实度等措施减少水解反应场所,提高了水泥耐水性;MOC 混凝土性能试验结果表明,添加减水剂是改善 MOC 耐水性的有效途径之一。

入藏号: CSCD:6549141

地址: Feng Chao, School of Materials Science and Engineering, CHANG'AN University;;Ministry of Education Engineering Center for Traffic Pavement Materials, ;;Ministry of Education Engineering Center for Traffic Pavement Materials, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

Guan Bowen, School of Materials Science and Engineering, CHANG'AN University;;Ministry of Education Engineering Center for Traffic Pavement Materials, ;;Ministry of Education Engineering Center for Traffic Pavement Materials, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

Zhang Ben, School of Materials Science and Engineering, CHANG'AN University;;Ministry of Education Engineering Center for Traffic Pavement Materials, ;;Ministry of Education Engineering Center for Traffic Pavement Materials, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

Chen Huaxin, School of Materials Science and Engineering, CHANG'AN University;;Ministry of Education Engineering Center for Traffic Pavement Materials, ;;Ministry of Education Engineering Center for Traffic Pavement Materials, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

Fang Jianhong, Qinghai Research Institute of Transportation, Xining, Qinghai 810000, China.

地址: 冯超, 长安大学材料科学与工程学院;;交通铺面材料教育部工程中心, ;;交通铺面材料教育部工程中心, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

关博文, 长安大学材料科学与工程学院;;交通铺面材料教育部工程中心, ;;交通铺面材料教育部工程中心, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

张奔, 长安大学材料科学与工程学院;;交通铺面材料教育部工程中心, ;;交通铺面材料教育部工程中心, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

陈华鑫, 长安大学材料科学与工程学院;;交通铺面材料教育部工程中心, ;;交通铺面材料教育部工程中心, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

房建宏, 青海省交通科学研究院, 西宁, 青海 810000, 中国.

电子邮件地址: chen_hxin@sina.com

电子邮件地址: chen_hxin@sina.com

使用次数 (最近 180 天): 0

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作者: Yan Luke; He Miaomiao; Zan Xingjie

作者: 颜录科; 何苗苗; 詹兴杰

标题: Highly Tough Antibacterial Hydrogels Based on Chitosan/Poly(acrylic acid)/Nano-Silver

标题: 基于壳聚糖/聚丙烯酸/纳米银的高强抗菌水凝胶

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作者关键词: double network hydrogel; mechanical property; swelling; antibacterial

作者关键词: 双网络水凝胶; 力学性能; 溶胀; 抗菌性

摘要: The chitosan (CS)/poly(acrylic acid) (PAA) hydrogel with a double network (DN) was prepared by photoinitiated copolymerization of acrylic acid (AA) and CS, using N,N'-methylenebisacrylamide (MBA) as crosslinker. CS/PAA/nano-silver composite hydrogel was subsequently obtained by incorporating silver nitrate into the hydrogel networks. The chemical structure of the CS/PAA hydrogel was confirmed by Fourier Transform Infrared Spectroscopy (FTIR). The mechanical performance of the hydrogel was evaluated by the universal testing machine. The antibacterial properties of the composite hydrogel were also investigated. The experimental results show that the mechanical properties of the CS/PAA hydrogel reached at the highest level when the mass fraction of AA and CS are 20% and 5%, respectively. The high strength of CS/PAA DN hydrogel was mainly attributed to the hydrogen bonding between the two networks of the DN hydrogel and coordination interactions between the fragments of AA and MBA. Moreover, a further increase in mechanical strength as high as 5.2 MPa was observed for the CS/PAA/nano silver hydrogel which shows the antibacterial properties with zone of inhibition of 3.2 mm.

摘要: 首先以丙烯酸(AA)和壳聚糖(CS)为单体、N,N'-亚甲基双丙烯酰胺(MBA)为交联剂,通过光聚合法制备了CS/PAA双网络水凝胶,然后将Ag⁺以硝酸银的形式分散在水凝胶中并通过紫外光辐照获得CS/PAA/纳米银复合水凝胶,并对复合水凝胶的抗菌性能进行研究。采用红外光谱对其结构进行表征,研究单体含量对水凝胶力学性能以及溶胀行为的影响。结果表明,当丙烯酸质量分数为20%,壳聚糖质量分数为5%的情况下,水凝胶的拉伸性能最优。此外,纳米银的引入有效提高了水凝胶的抗菌性能。

入藏号: CSCD:6532474

地址: Yan Luke, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

He Miaomiao, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zan Xingjie, Wenzhou Institute of Biomaterials and Engineering, Wenzhou, Zhejiang 325000, China.

地址: 颜录科, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

何苗苗, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

管兴杰, 温州生物材料与工程研究所, 温州, 浙江 325000, 中国.

电子邮件地址: yanlk_79@hotmail.com; Zanxj@wibe.ac.cn

电子邮件地址: yanlk_79@hotmail.com; Zanxj@wibe.ac.cn

使用次数 (最近 180 天): 0

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作者: Wang Shan; Fan Xiaoyong; Cui Yu; Gou Lei; Wang Xingang; Li Donglin

作者: 王珊; 樊小勇; 崔宇; 苟蕾; 王新刚; 李东林

标题: Three-dimensional Porous Current Collector for Lithium Storage Enhancement of NiO Electrode

标题: 三维多孔集流体改善 NiO 电极的储锂特性

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作者关键词: NiO; lithium-ion battery; anode; NiO; three-dimensional porous; current density

作者关键词: 锂离子电池; 负极; 三维多孔; 集流体

摘要: Three-dimensional (3D) porous metals have been applied as current collector to improve the cycle stability and high-rate capacities of lithium-ion battery due to they can accommodate volumetric changes of electrodes during lithium storage, and provide rapid transfer channels for lithium ions. NiO has attracted more and more attention due to its high theoretical specific capacity as anode of lithium-ion battery. However its low electrical conductivity and large volumetric changes during electrochemical cycling result in poor cyclability and low high-rate capacity. Besides, the large first irreversible capacity causing from the low reaction activity between the first lithiation products Ni₂O₃ and Li₂O, hinders its commercial application. In this work, we produce 3D porous Cu with interconnected pores (ca. 5 μm) by a facile and scalable electroless plating method and investigate its role on electrochemical storage improvement for NiO electrode. NiO@3D porous Cu is produced by electrodepositing Ni(OH)₂ film coupled with sequential high temperature with 3D porous Cu as the substrate. The NiO film deposited on the 3D porous Cu has mesoporous structure. This unique architecture can provide rapid transfer channels for lithium-ion battery and free place for accommodating volumetric changes of NiO during electrochemical cycling, meanwhile increases reactive points for Ni₂O₃ and Li₂O. Thus, this electrode demonstrates excellent high-rate capacity and high first columbic efficiency. The

first discharge and charge capacities at $200 \text{ mA}\cdot\text{g}^{-1}$ are 1522.3 and $1230.2 \text{ mAh}\cdot\text{g}^{-1}$ respectively with high coulombic efficiency of 80.8%. The same electrode shows high capacity of $578 \text{ mAh}\cdot\text{g}^{-1}$ at high current density of $20 \text{ A}\cdot\text{g}^{-1}$, which is 48.8% of that at $0.2 \text{ A}\cdot\text{g}^{-1}$. The electrochemical impedance spectra (EIS) demonstrate the NiO@3D porous Cu electrode has smaller charge transfer resistance and large Li-ion diffusion efficiency compared with NiO@Cu foil. The SEM images show that the NiO@3D porous Cu electrode suffered 100 cycles remains well 3D porous structure. A full cell is assembled using NiO@3D porous Cu as negative electrode and $\text{LiNi}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3}\text{O}_2$ as positive electrode. The full cell delivers first charge and discharge capacities of 1514 and $1060 \text{ mAh}\cdot\text{g}^{-1}$ respectively at $0.2 \text{ A}\cdot\text{g}^{-1}$ (based on NiO) with a coulomb efficiency of 70%, a first discharge capacity of $873 \text{ mAh}\cdot\text{g}^{-1}$ at $1.0 \text{ A}\cdot\text{g}^{-1}$ with $709 \text{ mAh}\cdot\text{g}^{-1}$ remained after 100 cycles (the retention is 81%). This work may offer an effective method for lithium storage enhancement of transition metal oxides.

摘要: 三维多孔金属不仅可容纳电极在储锂过程中的体积变化,且为锂离子提供快速传输通道,因此被广泛用做锂离子电池集流体,以提升其循环稳定性和高倍率容量.NiO 作为锂离子电池负极具有高理论比容量而备受关注,但其电子导电性差和充放电过程中的巨大体积变化造成其循环寿命短和高倍率容量低.此外,NiO 首次放电(嵌锂)产物 Ni₀ 和 Li₂O 不能在充电(脱锂)过程中完全反应造成首次不可逆容量大,阻碍了其商业化应用.本工作采用简单、易规模化的化学镀法制备出具有三维贯穿孔的多孔铜(孔径 5 μm),并在其孔壁电沉积获得 NiO@三维多孔铜电极.由于三维多孔铜集流体可容纳 NiO 储锂过程中的体积变化;为锂离子提供快速传输通道,同时其高比表面积增大了 Ni₀ 和 Li₂O 的反应活性点,因此该电极显示出优异的高倍率容量和高首次库伦效率.该电极在 $200 \text{ mA}\cdot\text{g}^{-1}$ 电流密度下,首次放电(嵌锂)和充电(脱锂)容量分别为 1522.3 和 $1230.2 \text{ mAh}\cdot\text{g}^{-1}$,首次库伦效率达到 80.8%;在高电流密度 $20 \text{ A}\cdot\text{g}^{-1}$ 下显示 $578.1 \text{ mAh}\cdot\text{g}^{-1}$ 容量.以 NiO@三维多孔铜为负极, $\text{LiNi}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3}\text{O}_2$ 为正极组装成全电池,首次充电和放电容量分别为 1514 和 $1060 \text{ mAh}\cdot\text{g}^{-1}$ (基于 NiO 电极,电流密度 $0.2 \text{ A}\cdot\text{g}^{-1}$),首次库伦效率为 70%; $1.0 \text{ A}\cdot\text{g}^{-1}$ 电流密度下,首次放电比容量为 $873 \text{ mAh}\cdot\text{g}^{-1}$,100 次循环后保持 $709 \text{ mAh}\cdot\text{g}^{-1}$,保持率为 81%; $10 \text{ A}\cdot\text{g}^{-1}$ 电流密度下容量保持 $530.6 \text{ mAh}\cdot\text{g}^{-1}$.该工作将为过渡金属氧化物储锂性能提升提供新途径.

入藏号: CSCD:6528611

地址: Wang Shan, School of Materials Science and Engineering, Chang 'an University, Xi'an, Shaanxi 710061, China.

Fan Xiaoyong, School of Materials Science and Engineering, Chang 'an University, Xi'an, Shaanxi 710061, China.

Cui Yu, School of Materials Science and Engineering, Chang 'an University, Xi'an, Shaanxi 710061, China.

Gou Lei, School of Materials Science and Engineering, Chang 'an University, Xi'an, Shaanxi 710061, China.

Wang Xingang, School of Materials Science and Engineering, Chang 'an University, Xi'an, Shaanxi 710061, China.

Li Donglin, School of Materials Science and Engineering, Chang 'an University, Xi'an, Shaanxi 710061, China.

地址: 王珊, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

樊小勇, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

崔宇, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

苟蕾, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

王新刚, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

李东林, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: xyfan@chd.edu.cn; dlli@chd.edu.cn

电子邮件地址: xyfan@chd.edu.cn; dlli@chd.edu.cn

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作者: Kong Xiangze; Li Donglin; Wang Ziyun; He Xin; Li Tongxin; Zhou Xiaorong; Fan Xiaoyong; Gou Lei

作者: 孔祥泽; 李东林; 王子匀; 贺欣; 李童心; 周小荣; 樊小勇; 苟蕾

标题: Effect of W-Doping on Electrochemical Performance of LiNiO₂ Cathode for Lithium-Ion Batteries

标题: 钨掺杂对锂离子电池 LiNiO₂ 正极材料性能的影响

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作者关键词: 锂离子电池; 钨掺杂; 电化学性能

摘要: W-doping LiNiO₂ (LiNi_{1-x}W_xO₂, x=1% and 3%) cathode materials were prepared by sol-gel method. The effects of W-doping on electrochemical performances of LiNiO₂ materials were studied. The results showed that W-doping significantly improved the cycle performance of LiNiO₂ during charge-discharge process. The capacity retention of the LiNi_{0.99}W_{0.01}O₂ was 62.51% at a current density of 100 mA·g⁻¹ after 400 cycles in the voltage of 2.5~4.5 V, while the LiNiO₂ was only 47.06%. In addition, the rate performance of LiNiO₂ was improved at the same current rates.

摘要: 采用溶胶-凝胶法制备了钨掺杂镍酸锂正极材料(LiNi_{1-x}W_xO₂, x=1%、3%),研究了钨掺杂对 LiNiO₂ 正极材料电化学性能的影响.结果表明,钨掺杂明显地改善了 LiNiO₂ 的充放电循环性能,在 100 mA·g⁻¹ 的电流密度和 2.5~4.5 V 电压范围的测试条件下, LiNi_{0.99}W_{0.01}O₂ 材料循环 400 次后的容量保持率为 62.51%,而 LiNiO₂ 在相同循

环条件下的保持率仅为 47.06%。同时,钨掺杂也提升了 LiNiO₂ 的充放电倍率性能,掺杂材料在每一个倍率下放电比容量均高于未掺杂材料。

入藏号: CSCD:6523835

地址: Kong Xiangze, New Energy Materials and Devices Laboratory, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Donglin, New Energy Materials and Devices Laboratory, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Ziyun, New Energy Materials and Devices Laboratory, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

He Xin, New Energy Materials and Devices Laboratory, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Tongxin, New Energy Materials and Devices Laboratory, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhou Xiaorong, New Energy Materials and Devices Laboratory, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Fan Xiaoyong, New Energy Materials and Devices Laboratory, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Gou Lei, New Energy Materials and Devices Laboratory, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 孔祥泽, 长安大学材料科学与工程学院, 新能源材料与器件研究所, 西安, 陕西 710064, 中国.

李东林, 长安大学材料科学与工程学院, 新能源材料与器件研究所, 西安, 陕西 710064, 中国.

王子匀, 长安大学材料科学与工程学院, 新能源材料与器件研究所, 西安, 陕西 710064, 中国.

贺欣, 长安大学材料科学与工程学院, 新能源材料与器件研究所, 西安, 陕西 710064, 中国.

李童心, 长安大学材料科学与工程学院, 新能源材料与器件研究所, 西安, 陕西 710064, 中国.

周小荣, 长安大学材料科学与工程学院, 新能源材料与器件研究所, 西安, 陕西 710064, 中国.

樊小勇, 长安大学材料科学与工程学院, 新能源材料与器件研究所, 西安, 陕西 710064, 中国.

苟蕾, 长安大学材料科学与工程学院, 新能源材料与器件研究所, 西安, 陕西 710064, 中国.

电子邮件地址: dlli@chd.edu.cn

电子邮件地址: dlli@chd.edu.cn

使用次数 (最近 180 天): 12

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作者: Song Lifang; Chen Tongdan; Wen Yiping; Xu Peng; Xia Huiyun; Chen Huaxin

作者: 宋莉芳; 陈彤丹; 文一平; 徐鹏; 夏慧芸; 陈华鑫

标题: Preparation and properties of waterborne fluorinated polyacrylate coating for concrete anti-corrosion

标题: 混凝土用水性氟碳涂料的制备及耐腐蚀性能评价

来源出版物: 化学研究与应用 卷: 31 期: 6 页: 1209-1215 出版年: 2019

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文献类型: Article

作者关键词: concrete anti-corrosion; fluoroacrylate emulsion; waterborne fluoroacrylate coating

作者关键词: 混凝土防腐; 含氟丙烯酸乳液; 水性氟碳涂料

摘要: A series of waterborne fluorocarbon coatings were prepared from fluoroacrylate emulsion as film-forming material together with other additives such as dispersant, wetting agent and the defoaming agent. The effects of emulsion amount and pigment loading on the coating properties were discussed. The water resistance, corrosion resistance and UV aging resistance of the fluoroacrylate coating were analyzed by water absorption, chloride ion permeation test, scanning electron microscopy (SEM) and UV aging to inspect the protective effect on concrete. The results showed that the film forming was best when the emulsion dosage was 45% and titanium dioxide dosage was 25%. The adhesion of the coating was 2.18 MPa and the pencil hardness was 4H. The waterborne fluorocarbon coating can significantly reduce the water absorption rate and chloride ion permeability of the concrete, the water absorption rate is reduced to 0.74%, and the total electric conductivity is reduced from 4163C to 1636C after 6 hours of electricity. The corrosion percentage of fluorocarbon coating after 5% NaCl solution (14d), 10% H₂SO₄ solution (14d) and 10% NaOH solution (21d) was 28%, 47% and 12%, respectively. The corrosion resistance of fluorocarbon coating to acid, alkali, and salt was relatively good. The color difference after UV aging for 1000 h is 13.3, which is suitable for long-term protection of concrete under corrosive environment.

摘要: 以含氟聚丙烯酸酯乳液为主要成膜物质, 添加分散剂、润湿剂、消泡剂等功能助剂制备了一系列混凝土用防腐蚀水性氟碳涂料, 重点研究了含氟乳液用量和钛白粉用量对涂层基本性能的影响, 综合涂层吸水率、氯离子渗透试验、扫描电镜、紫外老化等结果对其耐水性、耐腐蚀性和耐紫外老化性能结果, 考察其对混凝土的防护作用。结果表明乳液用量 45%, 钛白粉用量 25% 时成膜效果较好, 涂层的附着力为 2.18 MPa, 铅笔硬度为 4H。水性氟碳涂料的使用能显著降低混凝土试件的吸水率及氯离子渗透性, 吸水率降至为 0.74%, 通电 6h 的总导电量由 4163C 降为 1636C; 氟碳涂层经 5% NaCl 溶液 (14d)、10% H₂SO₄ 溶液 (14d) 和 10% NaOH 溶液 (21d) 腐蚀后的腐蚀率分别为 28%、47% 和 12%, 耐酸碱盐腐蚀性较好; 紫外老化 1000 h 后的亮度色差? L* 值为 13.3, 适用于腐蚀环境下混凝土的长效防护。

入藏号: CSCD:6519861

地址: Song Lifang, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Chen Tongdan, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Xia Huiyun, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Chen Huaxin, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wen Yiping, Highway administration of Hainan, Haikou, Hainan 570125, China.

Xu Peng, School of Materials Science and Engineering, Chang'an University; Xi'an Highway Institute, Xi'an, Shaanxi 710061; 710065.

地址: 宋莉芳, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

陈彤丹, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

夏慧芸, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

陈华鑫, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

文一平, 海南省公路管理局, 海口, 海南 570125, 中国.

徐鹏, 长安大学材料科学与工程学院; 西安公路研究院, 西安, 陕西 710061; 710065.

电子邮件地址: slf@chd.edu.cn

电子邮件地址: slf@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Wu Lei; Liu Rong; Ye Wenlong; Yan Luke; Chen Huaxin

作者: 吴蕾; 刘荣; 叶文龙; 颜录科; 陈华鑫

标题: Preparation of nano MIL-53(Al) by modulation collaborative method

标题: 调制协同法制备纳米 MIL-53(Al) 材料

来源出版物: 化工新型材料 卷: 47 期: 6 页: 80-83 出版年: 2019

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作者关键词: MIL-53; metal organic frameworks; MIL-53; modulation coordinative method; nanocrystalline

作者关键词: 金属有机骨架; 调制协同法; 纳米晶

摘要: MIL-53(Al) was synthesized with aluminum nitrate and terephthalic acid by hydrothermal

method. The crystal size and morphology were regulated by modulation coordinative method with sodium formate and triethylamine as additives which taking advantage of the synergistic effect of deprotonation and capping agent. Accompanied with appropriate amount of sodium formate, nano MIL-53(Al) with uniform dimension was successfully prepared. The material had high thermal stability and high surface area.

摘要: 以硝酸铝和对苯二甲酸为反应物, 采用水热合成法制备 MIL-53(Al), 并采用调制协同法, 分别以甲酸钠和三乙胺为添加剂, 利用其去质子化和结构封端剂的协同作用对晶体尺寸和形貌进行调控。通过适量甲酸钠的添加成功制备了粒径均匀的纳米晶, 且该材料具有很高的热稳定性和高比表面积。

入藏号: CSCD:6520448

地址: Wu Lei, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Rong, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Ye Wenlong, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Yan Luke, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Huaxin, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 吴蕾, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

刘荣, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

叶文龙, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

颜录科, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

陈华鑫, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

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作者: Lyu Naixin; Liu Kaiping; Yin Chengxian; Fu Anqing; Zi Yang; Lei Xiaowei

作者: 吕乃欣; 刘开平; 尹成先; 付安庆; 訾杨; 雷晓维

标题: Effect of HCO₃⁻ on Passivation and Pitting Behavior of Super 13Cr Martensitic Stainless Steel

标题: HCO₃⁻对超级 13Cr 马氏体不锈钢钝化行为及点蚀行为的影响

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来源出版物: Surface Technology 卷: 48 期: 5 页: 36-42 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: HCO₃⁻; super 13Cr martensitic stainless steel; HCO₃⁻; stable pitting; metastable pitting; passive film properties

作者关键词: 超级 13Cr 不锈钢; 稳态点蚀; 亚稳态点蚀; 钝化膜特性

摘要: The work aims to investigate the influence of HCO₃⁻ on the passivation and pitting behavior of super 13Cr martensitic stainless steel in 0.1 mol/L NaCl containing borate acid buffer solution. Potentiodynamic and potentiostatic polarization tests, Mott-Schottky analysis and electrochemical impedance spectroscopy measurements were adopted to observe the pitting morphology and study the electrochemical corrosion behavior of super 13Cr martensitic stainless steel in combination with 3D ultra-depth-of-field microscope. The passive region of super 13Cr was enlarged with the increase of HCO₃⁻ concentration, thus contributing to more positive pitting potential and decreasing the sensitivity of stable pitting. HCO₃⁻ reduced the metastable pitting of super 13Cr and reduced the average value of peak current density of metastable pitting. With the increase of HCO₃⁻ concentration, the passivation film resistance R_f and the charge transfer resistance R_{ct} of super 13Cr increased, but the passivation film capacitance C_f decreased. The presence of HCO₃⁻ changed the semiconductivity of the passive film from n-type to n+p type and the donor density N_D and acceptor density N_A in passivation film decreased with the increase of HCO₃⁻ concentration. The addition of HCO₃⁻ effectively thickens the passive film of super 13Cr stainless steel and lowers the density of point defects in the passive film, which thereby enhances the protective effect of the passive film on the steel matrix and inhibits the occurrence of metastable and stable pitting corrosion of super 13Cr.

摘要: 目的研究在 0.1 mol/L NaCl 硼酸缓冲溶液中,研究 HCO₃⁻对超级 13Cr 马氏体不锈钢的钝化及点蚀行为的影响。方法采用动电位极化、恒电位极化、Mott-Schottky 曲线、电化学阻抗谱等电化学测试手段,并结合 3D 超景深显微镜进行点蚀形貌观察,研究超级 13Cr 马氏体不锈钢的电化学腐蚀行为。结果随着 HCO₃⁻浓度的增加,超级 13Cr 的钝化区间变宽,点蚀电位向正向移动,稳态点蚀发生的敏感性降低。HCO₃⁻减少了超级 13Cr 亚稳态点蚀数量,降低了亚稳态点蚀电流密度峰值的平均值。随着 HCO₃⁻浓度的增大,超级 13Cr 钝化膜电阻 R_f 升高,电荷转移电阻 R_{ct} 升高,钝化膜电容 C_f 逐渐减小。HCO₃⁻使得超级 13Cr 钝化膜半导体特性由 n 型转变为 n+p 型双极性,且随着溶液中 HCO₃⁻浓度的增大,钝化膜中的施主密度 N_D 和受主密度 N_A 减小。结论 HCO₃⁻的加入使得超级 13Cr 不锈钢钝化膜厚度增大,钝化膜内点缺陷密度降低,对基体的保护作用增强,抑制了超级 13Cr 的亚稳态和稳态点蚀发生。

入藏号: CSCD:6504862

地址: Lyu Naixin, School of Material Science and Engineering, Chang'an University;;CNPC Tubular Goods Research Institute, ;;State Laboratory for Performance and Structure Safety of Petroleum Tubular Goods and Equipment Materials, Xi'an;;Xi'an, ;; 710064;;710077.

Liu Kaiping, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Yin Chengxian, CNPC Tubular Goods Research Institute, State Laboratory for Performance and Structure Safety of Petroleum Tubular Goods and Equipment Materials, Xi'an, Shaanxi 710077, China.

Fu Anqing, CNPC Tubular Goods Research Institute, State Laboratory for Performance and Structure Safety of Petroleum Tubular Goods and Equipment Materials, Xi'an, Shaanxi 710077, China.

Zi Yang, School of Metallurgical Engineering, Xi'an University of Architecture and Technology, Xi'an, Shaanxi 710055, China.

Lei Xiaowei, School of Science, Northwestern Polytechnical University, Xi'an, Shaanxi 710072, China.

地址: 吕乃欣, 长安大学材料科学与工程学院;;中国石油集团石油管工程技术研究院,;;石油管材及装备材料服役行为与结构安全国家重点实验室, 西安;;西安,;; 710064;;710077.

刘开平, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

尹成先, 中国石油集团石油管工程技术研究院, 石油管材及装备材料服役行为与结构安全国家重点实验室, 西安, 陕西 710077, 中国.

付安庆, 中国石油集团石油管工程技术研究院, 石油管材及装备材料服役行为与结构安全国家重点实验室, 西安, 陕西 710077, 中国.

訾杨, 西安建筑科技大学冶金工程学院, 西安, 陕西 710055, 中国.

雷晓维, 西北工业大学理学院, 西安, 陕西 710072, 中国.

电子邮件地址: lvnx@cnpc.com.cn

电子邮件地址: lvnx@cnpc.com.cn

使用次数 (最近 180 天): 0

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作者: 张凤英; 胡腾腾; 谭华; 邱莹; 梅敏; 杨海欧

作者: Zhang Fengying; Hu Tengting; Tan Hua; Qiu Ying; Mei Min; Yang Haiou

标题: Effect of Heat Treatment on the Microstructure and Hardness of Novel Ti-6Al-6Mo Alloy Formed by Laser Solid Forming

标题: 热处理对激光立体成形新型 Ti-6Al-6Mo 合金显微组织和硬度的影响

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作者关键词: laser additive manufacturing; Ti-6Al-6Mo; heat treatment; microstructure;

microhardness; Ti-6Al-6Mo

作者关键词: 激光增材制造; 热处理; 微观组织; 显微硬度

摘要: A novel Ti-6Al-6Mo alloy sample was fabricated by laser solid forming (LSF) using blended elemental powders as raw material. The microstructure of the as-deposited sample was investigated, and the effects of solution and aging treatment on the microstructure and microhardness of LSF Ti-6Al-6Mo alloy were discussed. The results show that the heat treatment conducted in this study has no obvious effect on the morphologies of prior β grains of the alloy. The solution temperature, solution time, and cooling method after solution treatment have a significant effect on the morphology and size of α phase in the prior β grains and the microhardness of the LSF Ti-6Al-6Mo alloy. When the aging time exceeds 4 h, the microstructure and microhardness of the alloy change little with aging time. Based on the precipitation mechanism of the primary α laths and secondary α laths and their strengthening effect on the β matrix in LSF Ti-6Al-6Mo alloy under different heat treatment conditions, the influence mechanism of heat treatment on the microstructure and microhardness of LSF Ti-6Al-6Mo was revealed.

摘要: 以混合元素粉末为原料, 采用激光立体成形(Laser solid forming, LSF)技术制备新型 Ti-6Al-6Mo 合金。研究了沉积态试样的显微组织以及固溶时效处理对合金显微组织形成及硬度的影响。结果表明, 本研究所采用的热处理制度对原始 β 晶粒形貌没有显著的影响; 固溶温度、固溶时间和固溶后的冷却方式对原始 β 晶粒中 α 相的形貌和尺寸以及 LSF Ti-6Al-6Mo 合金的显微硬度均有显著影响。当时效时间超过 4 h 后, 随着时效时间的延长, 合金的显微组织和显微硬度均未产生明显变化。基于不同热处理条件下 LSF Ti-6Al-6Mo 合金中初生 α 板条和次生 α 板条的析出机制及其对 β 基体的强化作用分析, 揭示了热处理对 LSF Ti-6Al-6Mo 合金的显微组织和显微硬度的影响机理。

入藏号: CSCD:6436232

地址: Zhang Fengying, Changan University, Xian, 710064.

Hu Tengting, Changan University, Xian, 710064.

Qiu Ying, Changan University, Xian, 710064.

Mei Min, Changan University, Xian, 710064.

Tan Hua, Northwestern Polytechnical University, State Key Laboratory of Solidification Processing, Xian, 710072.

Yang Haiou, Northwestern Polytechnical University, State Key Laboratory of Solidification Processing, Xian, 710072.

地址: 张凤英, 长安大学, 西安, 陕西 710064, 中国.

胡腾腾, 长安大学, 西安, 陕西 710064, 中国.

邱莹, 长安大学, 西安, 陕西 710064, 中国.

梅敏, 长安大学, 西安, 陕西 710064, 中国.

谭华, 西北工业大学, 凝固技术国家重点实验室, 西安, 陕西 710072, 中国.

杨海欧, 西北工业大学, 凝固技术国家重点实验室, 西安, 陕西 710072, 中国.

电子邮件地址: zhangfengying@chd.edu.cn; yanghaiou@nwpu.edu.cn

电子邮件地址: zhangfengying@chd.edu.cn; yanghaiou@nwpu.edu.cn

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作者: Hu Tengting; Zhang Fengying; Qiu Ying; Wang Kun; Wang Gang; Yang Erkai

作者: 胡腾腾; 张凤英; 邱莹; 王坤; 王刚; 杨二凯

标题: Effect of Element Addition Method on Formability and Microstructure of Laser Cladding Deposited Ti-25V-15Cr Alloy

标题: 元素添加方式对激光熔覆沉积 Ti-25V-15Cr 成形性的影响

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作者关键词: Ti-25V-15Cr; laser cladding deposition; Ti-25V-15Cr; bond coating method; microstructure, formability; deposition efficiency

作者关键词: 激光熔覆沉积; 粘结剂包覆法; 显微组织; 成形性; 沉积效率

摘要: The work aims to investigate the effect of the addition method of elemental powders V and Cr on the microstructure and formability of laser cladding deposited Ti-25V-15Cr alloy with Ti-25V-15Cr alloy as research subject. The deposition experiments were performed from three kinds of powder feedstock, including bonded coated Ti(150 mm)+V(15 mm)+Cr(15 mm), directly mixed Ti(150 mm)+V(15 mm)+Cr(15 mm) and directly mixed Ti(150 mm)+V(100 mm)+Cr(150 mm), and the height, width and microstructure of the deposited samples were analyzed. Deposited efficiency of the samples from the bonded coated Ti (150 mm)+V(15 mm)+Cr(15 mm) and directly mixed Ti(150 mm)+V(100 mm)+Cr(150 mm) were much higher than that from the directly mixed Ti(150 mm)+V(15 mm)+Cr(15 mm). The microstructure of the deposited samples from Ti(150 mm)+V(15 mm)+Cr(15 mm) and from directly mixed Ti(150 mm)+V(100 mm)+Cr(150 mm) were mainly composed of fine equiaxed grains and near-equiaxed grains, while that from the directly mixed Ti(150 mm)+V(15 mm)+Cr(15 mm) consisted of epitaxially columnar grains. When the bonded coated Ti (150 mm) + V (15 mm) + Cr (15 mm) is used as the deposited material, the grain size can be refined to some extent while the deposition efficiency can be improved. This method has a significant influence on the formability, composition uniformity and microstructure of the laser cladding deposited samples.

摘要: 目的以阻燃钛合金 Ti-25V-15Cr 为研究对象,主要研究 V、Cr 元素粉末的添加方式对激光熔覆沉积 Ti-25V-15Cr 合金的显微组织及成形性的影响。方法分别以经过粘结包覆 Ti(150 mm)+V(15 mm)+ Cr(15 mm)、直接混合 Ti(150 mm)+V(15 mm)+Cr(15 mm)以及直接混合 Ti(150 mm)+V(100 mm)+Cr(150 mm)的元素混合粉末为原料,进行激光熔覆沉积实验,对沉积试样的高度、宽度以及显微组织特征进行研究。结果以粘结包覆 Ti(150 mm)+V(15

mm)+Cr(15 mm)和直接混合 Ti(150 mm)+V(100 mm)+Cr(150 mm)为原料获得的沉积试样,其沉积效率显著高于直接混合 Ti(150 mm)+V(15 mm)+Cr(15 mm)为原料的沉积试样,且沉积试样组织由相对细小的等轴晶和类等轴晶组成,而直接混合 Ti(150 mm)+V(15 mm)+Cr(15 mm)为原料的试样组织主要由外延生长的柱状晶组成。结论以粘结包覆 Ti(150 mm)+V(15 mm)+Cr(15 mm)为原材料时,在提高沉积效率的同时能够一定程度上细化晶粒。该方法对激光熔覆沉积材料的成形性、成分均匀性及显微组织具有显著影响。

入藏号: CSCD:6504874

地址: Hu Tengpeng, School of Materials, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Fengying, School of Materials, Chang'an University, Xi'an, Shaanxi 710064, China.

Qiu Ying, School of Materials, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Kun, School of Materials, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Gang, School of Materials, Chang'an University, Xi'an, Shaanxi 710064, China.

Yang Erkai, School of Materials, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 胡腾腾, 长安大学材料学院, 西安, 陕西 710064, 中国.

张凤英, 长安大学材料学院, 西安, 陕西 710064, 中国.

邱莹, 长安大学材料学院, 西安, 陕西 710064, 中国.

王坤, 长安大学材料学院, 西安, 陕西 710064, 中国.

王刚, 长安大学材料学院, 西安, 陕西 710064, 中国.

杨二凯, 长安大学材料学院, 西安, 陕西 710064, 中国.

电子邮件地址: zhangfengying@chd.edu.cn

电子邮件地址: zhangfengying@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Ding Yigeng; Sang Kezheng; Wang Fan; Zeng Dejun

作者: 丁一耕; 桑可正; 王凡; 曾德军

标题: Effect of MgO Content on Properties of Al₂O₃/ZrO₂/Mullite Composite Ceramics

标题: MgO 含量对 Al₂O₃/ZrO₂/ 莫来石复相陶瓷性能的影响

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作者关键词: Composite ceramics; Flexural strength; Thermal shock resistance

作者关键词: 复相陶瓷; 弯曲强度; 抗热震性

摘要: The Al₂O₃/ZrO₂/mullite composite ceramics with different MgO content were prepared by pressureless sintering. The microstructure, flexural strength, fracture toughness and thermal shock resistance of the composite ceramics were investigated. The results show that the addition of MgO benefits the stabilization of tetro-ZrO₂ phase, which improved flexural strength, fracture toughness and thermal shock resistance of the composite ceramics. When content of MgO was 4%, the flexural strength and fracture toughness of Al₂O₃/ZrO₂/ mullite composite ceramics reached 365 MPa and 5.31 MPa·m^{-(1/2)}, respectively. The loss rate of the flexural strength after the thermal shock of the composite ceramics were only 5.61%.

摘要: 采用 ZrSiO₄ 和 Al₂O₃ 为原料,通过无压烧结法制备了不同 MgO 含量的 Al₂O₃/ZrO₂/莫来石复相陶瓷,研究了复合陶瓷的显微组织、弯曲强度、断裂韧性和抗热震性能。结果表明:添加 MgO 有利于 ZrO₂ 四方相的稳定,从而提高了陶瓷的弯曲强度、断裂韧性和抗热震性。MgO 添加量为 4%时,Al₂O₃/ZrO₂/莫来石复相陶瓷的弯曲强度达到最大值 365 MPa,陶瓷的断裂韧性达到 5.31 MPa·m^{-(1/2)}。复相陶瓷热震后强度的损失率仅为 5.61%。

入藏号: CSCD:6490588

地址: Ding Yigeng, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Sang Kezheng, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Fan, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zeng Dejun, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 丁一耕, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

桑可正, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

王凡, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

曾德军, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: 923951966@qq.com

电子邮件地址: 923951966@qq.com

使用次数 (最近 180 天): 0

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作者: Zhang Shilong; Li Donglin; Li Tongxin; Zhou Junxiang; Cao Ting; Kong Xiangze; Fan

Xiaoyong; Gou Lei

作者: 张世龙; 李东林; 李童心; 周俊祥; 曹婷; 孔祥泽; 樊小勇; 苟蕾

标题: Improving long-cycle stability of $\text{Li}_{(1.2)}\text{Mn}_{(0.56)}\text{Ni}_{(0.16)}\text{Co}_{(0.08)}\text{O}_2$ lithium-rich manganese-based layered oxide cathode material by F-doping

标题: 氟掺杂改善 $\text{Li}_{(1.2)}\text{Mn}_{(0.56)}\text{Ni}_{(0.16)}\text{Co}_{(0.08)}\text{O}_2$ 富锂锰基层状氧化物正极材料的长循环稳定性

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语言: Chinese

文献类型: Article

作者关键词: lithium-rich manganese-based layered material; cycle performance; fluo-rine doping; discharge voltage plateau

作者关键词: 富锂锰基层状材料; 循环性能; 氟掺杂; 放电电位平台

摘要: To overcome poor stability of the lithium-rich and manganese-based layered material $x\text{Li}_2\text{MnO}_3 \cdot (1-x)\text{LiMO}_2$ ($M=\text{Mn}, \text{Co}, \text{Ni}$) during charge-discharge long-cycles, we prepared the fluorine-doped $\text{Li}_{(1.2)}\text{Mn}_{(0.56)}\text{Ni}_{(0.16)}\text{Co}_{(0.08)}\text{O}_{2-x}\text{F}_x$ by sol-gel method in this paper. Our results show that the crystal structure of the fluorine doped materials is similar to that of the undoped material, but the fluorine doping significantly improves the long-cycling stability of the materials during charge-discharge process. After cycling 500 times at a current density of 125 mA/g, the $\text{Li}_{(1.2)}\text{Mn}_{(0.56)}\text{Ni}_{(0.16)}\text{Co}_{(0.08)}\text{O}_{(1.95)}\text{F}_{(0.05)}$ doped with 5% exhibits 79.2% of its initial specific capacity, and the loss of the discharge voltage plateau was greatly decreased. However, the undoped $\text{Li}_{(1.2)}\text{Mn}_{(0.56)}\text{Ni}_{(0.16)}\text{Co}_{(0.08)}\text{O}_2$ material exhibits only 16% of its initial capacity, and its discharge voltage plateau has completely disappeared. These results indicate that fluorine doping can effectively decrease the loss of specific capacity and discharge platform of lithium-rich manganese-based layered cathode materials during charge and discharge process.

摘要: 针对富锂锰基层状材料 $x\text{Li}_2\text{MnO}_3 \cdot (1-x)\text{LiMO}_2$ (M 为 Mn 、 Co 、 Ni) 存在着充放电循环性能差的缺点, 采用溶胶-凝胶法制备氟掺杂 $\text{Li}_{(1.2)}\text{Mn}_{(0.56)}\text{Ni}_{(0.16)}\text{Co}_{(0.08)}\text{O}_{2-x}\text{F}_x$ 正极材料, 以提高这种材料的长循环充放电性能。研究表明, 氟掺杂材料的晶体结构与未掺杂材料相似, 但氟掺杂明显改善了充放电长循环性能的稳定性。在 125 mA/g 电流密度下电池循环 500 次, 掺杂 5% F 的 $\text{Li}_{(1.2)}\text{Mn}_{(0.56)}\text{Ni}_{(0.16)}\text{Co}_{(0.08)}\text{O}_{(1.95)}\text{F}_{(0.05)}$ 材料比容量保持率为 79.2%, 并且极大地抑制了放电平台电位的衰减, 而未掺杂的 $\text{Li}_{(1.2)}\text{Mn}_{(0.56)}\text{Ni}_{(0.16)}\text{Co}_{(0.08)}\text{O}_2$ 材料的比容量保持率仅为 16%, 其放电电位平台已经消失。这些结果表明氟掺杂能有效地抑制富锂锰基层状结构正极材料充放电过程中比容量和放电平台的衰减。

入藏号: CSCD:6484886

地址: Zhang Shilong, Energy Materials and Devices Laboratory, School of Materials Science and Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Li Donglin, Energy Materials and Devices Laboratory, School of Materials Science and Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Li Tongxin, Energy Materials and Devices Laboratory, School of Materials Science and Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Zhou Junxiang, Energy Materials and Devices Laboratory, School of Materials Science and Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Cao Ting, Energy Materials and Devices Laboratory, School of Materials Science and Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Kong Xiangze, Energy Materials and Devices Laboratory, School of Materials Science and Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Fan Xiaoyong, Energy Materials and Devices Laboratory, School of Materials Science and Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Gou Lei, Energy Materials and Devices Laboratory, School of Materials Science and Engineering, Changan University, Xi'an, Shaanxi 710064, China.

地址: 张世龙, 长安大学材料科学与工程学院, 能源材料与电子器件研究所, 西安, 陕西 710064, 中国.

李东林, 长安大学材料科学与工程学院, 能源材料与电子器件研究所, 西安, 陕西 710064, 中国.

李童心, 长安大学材料科学与工程学院, 能源材料与电子器件研究所, 西安, 陕西 710064, 中国.

周俊祥, 长安大学材料科学与工程学院, 能源材料与电子器件研究所, 西安, 陕西 710064, 中国.

曹婷, 长安大学材料科学与工程学院, 能源材料与电子器件研究所, 西安, 陕西 710064, 中国.

孔祥泽, 长安大学材料科学与工程学院, 能源材料与电子器件研究所, 西安, 陕西 710064, 中国.

樊小勇, 长安大学材料科学与工程学院, 能源材料与电子器件研究所, 西安, 陕西 710064, 中国.

苟蕾, 长安大学材料科学与工程学院, 能源材料与电子器件研究所, 西安, 陕西 710064, 中国.

电子邮件地址: dlli@chd.edu.cn

电子邮件地址: dlli@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Feng Xiao; Zhao Xuexue; Xing Yazhe

作者: 冯潇; 赵雪雪; 邢亚哲

标题: Research Progress on Preparation of Solid Oxide Fuel Cells Electrolyte Layer by Thermal Spraying

标题: 热喷涂制备固体氧化物燃料电池电解质层的研究进展

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作者关键词: solid oxide fuel cells; low cost; lower working temperature; electrolyte; preparation method; thermal spraying technology

作者关键词: 固体氧化物燃料电池; 低成本; 降低工作温度; 电解质; 制备方法; 热喷涂技术

摘要: The development trend of solid oxide fuel cell (SOFC) and the influence of preparation and characteristics of electrolyte on the operating temperature and conductivity of SOFC are analyzed. The research status of SOFC electrolyte materials is elaborated. The advantages of thermal spraying technology in the preparation of SOFC electrolyte layer are introduced. The application of thermal spraying technology in the preparation of SOFC electrolyte layer materials is reviewed, concluded and expected. By analyzing relevant research results, the reduction of the working temperature is bound to become one of the main directions of SOFC research in the future, and the development of electrolyte materials with high conductivity at medium and low temperatures is the key for future research work. The most widely used high temperature SOFC electrolyte material is fluorite structured yttria stabilized zirconia, and the perovskite doped magnesium and lanthanum gallium silicate is the most promising medium and low temperature SOFC electrolyte material. Thermal spraying technology has a series of advantages such as unrestricted matrix material, fast deposition speed, flexibility and low cost, and has been widely used in the preparation of SOFC electrolyte coatings. For high temperature SOFC electrolyte coatings, plasma spray assisted post-treatment processes or direct optimization of the process can be used to obtain highly dense and high-conductivity electrolyte coatings, while there is still large space in research of thermal sprayed medium and low temperature electrolyte layers.

摘要: 分析了固体氧化物燃料电池(SOFC)的发展趋势以及电解质的制备和特性对 SOFC 的工作温度及导电性的影响,并对 SOFC 电解质材料的研究现状进行了详细阐述。介绍了热喷涂技术在 SOFC 电解质材料制备中的技术优势,综述了热喷涂技术在 SOFC 电解质层材料制备中的应用,并对其进行了总结和展望。通过分析相关研究成果,认为降低工作温度必然成为未来 SOFC 研究的主要方向之一,而开发更多在中、低温下具有高电导率的电解质材料是未来研究工作的关键。应用最广泛的高温 SOFC 电解质材料是萤石结构的氧化钇稳定氧化锆,而钙钛矿结构的掺杂镁和锶的镓酸镧是最有前景的中、低温 SOFC 电解质材料。热喷涂技术具有基体材料不受限制、沉积速度快、灵活、成本低等一系列优点,在 SOFC 电解质涂层的制备中得到了广泛应用。对于高温 SOFC 电解质涂层可采用等离子喷涂辅助后处理工艺或直接优化其工艺,从而获得高致密、高电导率的电解质涂层,而中、低温电解质层的热喷涂制备方面的研究还有较大的拓展空间。

入藏号: CSCD:6484300

地址: Feng Xiao, School of Materials Science and Engineering, Chang'an University, Engineering Research Center of the Ministry of Education for Pavement Materials, Xi'an, Shaanxi 710061, China.

Zhao Xuexue, School of Materials Science and Engineering, Chang'an University, Engineering Research Center of the Ministry of Education for Pavement Materials, Xi'an, Shaanxi 710061,

China.

Xing Yazhe, School of Materials Science and Engineering, Chang'an University, Engineering Research Center of the Ministry of Education for Pavement Materials, Xi'an, Shaanxi 710061, China.

地址: 冯潇, 长安大学材料科学与工程学院, 道路铺面材料教育部工程研究中心, 西安, 陕西 710061, 中国.

赵雪雪, 长安大学材料科学与工程学院, 道路铺面材料教育部工程研究中心, 西安, 陕西 710061, 中国.

邢亚哲, 长安大学材料科学与工程学院, 道路铺面材料教育部工程研究中心, 西安, 陕西 710061, 中国.

电子邮件地址: xingyz@chd.edu.cn

电子邮件地址: xingyz@chd.edu.cn

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作者: Sun Zengzhi; Xue Cheng; Song Lifang; Qiu Shujun; Chu Hailiang; Xia Yongpeng; Sun Lixian

作者: 孙增智; 薛程; 宋莉芳; 邱树君; 褚海亮; 夏永鹏; 孙立贤

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作者关键词: metal-organic frameworks(MOFs); carbon dioxide capture; adsorptive separation

作者关键词: 金属有机骨架化合物(MOFs); 二氧化碳捕获; 吸附分离

摘要: Energy and environment are the essential conditions for human survival and development, furthermore, the mutual coordination between them is a vital guarantee for social sustainable development. In recent years, the negative impact of fossil fuels on human survival has gradually attracted widespread attention from society. The greenhouse effect is mainly attributed to the release of CO₂ from the burning of fossil fuel. Therefore, the development of efficient and environmental-friendly carbon capture and storage technologies in a low-carbon economy

environment play a crucial role in energy recycling and environmental protection. Utilizing the amine solutions for scrubbing and absorbing CO₂ is one of the most commonly technologies for industrial capture and storage (CCS) (e.g., separating CO₂ from flue gas of power plant flue gas), which can significantly reduce the CO₂ emissions, but also increases the plant energy consumption by 25%~40%, hence leading to an increase in additional costs to a large extent. In addition, other disadvantages of amine scrubbing include corrosion of the equipment by the alkaline solution, loss of solvent, degradation of the amine caused by heat production, and difficulty of separation after capturing. Solid materials such as alkali metal ceramics, solid amines, layered double hydroxides or calcium-based adsorbents for high temperature absorption (chemisorption) are another method of capturing CO₂, while the energy consumption and the sensitivity of water molecules and other components limit their scope of application. In addition, it is also a feasible method to selectively separate the mixed gases with different mechanisms by utilizing polymers or inorganic membranes, yet the membranes with high stability, high selectivity, and high throughput are hard to obtain, and it is necessary to ameliorate the membranes' adsorption and separation and their selectivity. For solid adsorbents, the capture of CO₂ by porous materials at high pressure is dominated by adsorptive interactions, while selective capture at low pressure or low CO₂ concentrations is primarily influenced by the interaction of adsorbents and a chemical affinity to CO₂. Metal organic frameworks (MOFs) exhibit tremendous potential for gas adsorption, especially for CO₂ capture, due to their high crystallinity, high specific surface area and tunable pore structure. Compared with other solid adsorbents, such as activated carbon, zeolites, MOFs have higher adsorption selectivity. Applying it to the carbon capture and storage technology can dramatically broaden the range of CO₂ adsorbents, increase the adsorption selectivity, meanwhile, effectively reduce the costs. Currently, MOFs are expected to capture CO₂ in power plants, separation of CH₄/CO₂ in natural gas, CO₂ collection from vehicles, and even direct capture from the air. Therefore, the development of MOFs materials capable of efficiently adsorbing and separating CO₂ is of great significance for relieving environmental stress. This paper summarizes the establishment of CO₂ adsorption model and proposes several methods to improve the adsorption capacity of CO₂, such as increasing the density of open metal sites, doping metal or nitrogen atoms, adjusting their pore size or amino-functionalization, and synthesizing MOFs composite materials, and compared the effects of different methods on the adsorption capacity of CO₂ under low pressure. In addition, they are expected to be applied to the capture of CO₂ in post-combustion flue gas, vehicle exhaust and other small emission sources.

摘要: 能源与环境是人类生存和发展的必要条件,两者协调发展是社会实现可持续发展的重要保证。近几年来,人类赖以生存的化石燃料所带来的负面影响逐渐受到社会的关注,而化石燃料燃烧所释放出的CO₂是造成温室效应的主要原因。因此在低碳经济环境下开发出高效环保的碳捕获和封存技术,对能源循环利用及环境保护起到至关重要的作用。使用胺溶液进行洗涤及吸收CO₂是工业上捕获和存储(CCS)最常用的技术之一(例如从电厂烟气中分离CO₂),该法可以大幅减少CO₂的排放量,但同时也会增大工厂的能源消耗(25%~40%),从而大幅增加额外成本。胺洗涤的其他缺点包括碱溶液对设备的腐蚀、溶剂的损失、大量产热引起的胺降解以及捕获之后不易被分离出来。另一种捕获CO₂的方法是采用高温下吸收(化学吸附)的固体材料如碱金属陶瓷、固体胺、层状双氢氧化物或钙基吸附剂,但此类方法的能量消耗和对水分子及其他组分的敏感性限制了其应用范围。此外,采用聚合物或无机膜,在不同的机制下选择性分离混合气体也是一种可行的方法,但很难获得具有高稳定性、高选择性

和高通量的薄膜,并且提高膜的吸附分离作用和选择性非常必要。对于固体吸附剂而言,高压下多孔材料对 CO₂ 的捕获是以吸附剂与被吸附物相互作用为主,而在低压或低 CO₂ 浓度下的选择性捕获主要受吸附剂与被吸附物相互作用以及吸附剂对 CO₂ 的化学亲和力两者共同影响。金属有机骨架化合物(MOFs)具有高结晶度、高比表面积和可调的孔隙结构,在气体吸附尤其是 CO₂ 捕获方面展示出巨大的潜力。相对于活性炭、沸石等固体吸附剂来说,MOFs 具有更高的吸附选择性。将其应用于碳捕获和封存技术中,可以大幅拓宽 CO₂ 吸附剂的可选择范围,在提高吸附选择性的同时,也可以有效地降低成本。目前,有望采用 MOFs 材料捕获 CO₂ 的场合包括发电厂的碳捕集、天然气中 CH₄/CO₂ 的分离、交通工具排放的 CO₂ 的收集甚至直接从空气中捕获。因此,研发能够高效吸附分离 CO₂ 的 MOFs 材料对于缓解环境压力意义重大。本文概括了 CO₂ 吸附模型的建立方法,提出了几种提高 MOFs 对 CO₂ 捕获量的策略。如提高开放金属位点的密度、掺杂金属或氮原子、调节孔径或进行氨基功能化以及合成 MOFs 复合材料等,并比较了不同方法对于改善低压条件下 CO₂ 吸附量的影响,有望将其应用于捕获燃烧后烟道气、汽车尾气以及其他小型排放源中的 CO₂。

入藏号: CSCD:6471712

地址: Sun Zengzhi, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Xue Cheng, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Song Lifang, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Qiu Shujun, School of Materials Science and Engineering, Guilin University of Electronic Technology, Guilin, Guangxi 541004, China.

Chu Hailiang, School of Materials Science and Engineering, Guilin University of Electronic Technology, Guilin, Guangxi 541004, China.

Xia Yongpeng, School of Materials Science and Engineering, Guilin University of Electronic Technology, Guilin, Guangxi 541004, China.

Sun Lixian, School of Materials Science and Engineering, Guilin University of Electronic Technology, Guilin, Guangxi 541004, China.

地址: 孙增智, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

薛程, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

宋莉芳, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

邱树君, 桂林电子科技大学材料科学与工程学院, 桂林, 广西 541004, 中国.

褚海亮, 桂林电子科技大学材料科学与工程学院, 桂林, 广西 541004, 中国.

夏永鹏, 桂林电子科技大学材料科学与工程学院, 桂林, 广西 541004, 中国.

孙立贤, 桂林电子科技大学材料科学与工程学院, 桂林, 广西 541004, 中国.

电子邮件地址: slf@chd.edu.cn

电子邮件地址: slf@chd.edu.cn

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作者: He Rui; Yang Zhe; Zhang Jiali; Chen Huaxin

作者: 何锐; 杨哲; 张佳丽; 陈华鑫

标题: Mechanical performance of carbon nanotubes reinforced cement composites based on interface modification

标题: 基于界面改性的碳纳米管水泥基复合材料力学性能

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作者关键词: road engineering; carbon nanotube; cement composite; bridging agent; mechanical property

作者关键词: 道路工程; 碳纳米管; 水泥基复合材料; 桥连剂; 力学性能

摘要: Aiming at the technical problems of weak bonding capacity of interface between carbon nanotubes and cement substrate in carbon nanotubes reinforced cement composites. Polyvinyl alcohol and polyacrylamide were used as interfacial bridging agents to investigate the effect of bridging agents on the mechanical properties of carbon nanotube-based cement composites by strengthening the interface between the carbon nanotubes and the cement matrix, Arabic gum was used as water-based dispersant for carbon nanotubes. Five kinds of cement-based composites with different amounts of carbon nanotubes were prepared by using two kinds of carbon nanotubes with common and surface carboxyl groups. Different ages compressive, flexural strength of specimens were tested. The microstructure of the interfacial region of carbon nanotubes and cement was analyzed by scanning electron microscopy (SEM) at the fracture site. The results show that the mechanical strength of cement-based composites with carbon nanotubes and bridging agents is maximized. The 28-day flexural strength and compressive strength of the carboxy nanotube cement composites added with bridging agent are 47.4% and 22.7% higher than those of the same group without the addition of carbon nanotubes. The 28-day flexural strength and compressive strength of the carboxy nanotube cement composites are 15.4% and 8.84% higher than baseline group. The SEM test found that the carbon nanotubes and the cement matrix are closely connected at the fracture site of the carbon nanotubes cement-matrix composite material added with the bridging agent, while the carbon nanotubes at the fractures of the specimens without the bridging agent are completely pulled out. This shows that the bridging agent improves the bonding between the carbon nanotubes and the cement matrix, so that the two are approximately subjected to a force. The pull-out effect of carbon nanotubes is enhanced, more damage can be absorbed by the carbon nanotubes when the cement matrix is broken, and the macro-mechanical properties of the cement matrix composites are significantly improved.

摘要: 针对碳纳米管水泥基复合材料中碳纳米管与水泥基体界面结合弱的技术问题,以聚乙

烯醇和聚丙烯酰胺分别作为界面桥连剂,探究桥连剂通过强化碳纳米管与水泥基体间的界面对碳纳米管水泥基复合材料力学性能的增强效果;利用阿拉伯树胶作为碳纳米管的水性分散剂,采用普通和表面带有羧基的 2 种碳纳米管制备 5 组不同碳纳米管掺量的水泥基复合材料,对其进行了不同龄期的抗压、抗折强度测试,并利用扫描电子显微镜(SEM)在断口处对碳纳米管与水泥基体界面区进行了微结构分析。结果表明:采用羧基碳纳米管并掺入桥连剂的水泥基复合材料力学强度得到最大提升,相较于配合比相同但未加入碳纳米管的基准组,加入桥连剂的羧基碳纳米管水泥基复合材料 28 d 抗折、抗压强度分别提升了 47.4%和 22.7%,仅加入羧基碳纳米管的水泥基复合材料则提高了 15.4%和 8.84%;SEM 测试发现加入桥连剂的碳纳米管水泥基复合材料破坏断口处碳纳米管与水泥基体连接处结构密实,未加入桥连剂试件断口处碳纳米管被完全拔出,说明桥连剂改善了碳纳米管与水泥基体间界面结合,使二者近似成为一个整体进行受力,增强了碳纳米管的拔出效应,水泥基体断裂时碳纳米管拔出吸收了更多的破坏能,显著改善了水泥基复合材料的宏观力学性能。

入藏号: CSCD:6470855

地址: He Rui, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Yang Zhe, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Jiali, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Chen Huaxin, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 何锐, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

杨哲, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

张佳丽, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

陈华鑫, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: heruia@163.com

电子邮件地址: heruia@163.com

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作者: Zhao Mingjuan; Xia Jiwen; Gou Lei

作者: 赵明娟; 夏霁雯; 苟蕾

标题: Synthesis and electrochemical performance of NaTi₂(PO₄)₃/C prepared by using aMOF as precursor

标题: 以 MOFs 为前驱体合成 NaTi₂(PO₄)₃/C 及其电化学性能

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作者关键词: MIL-125; NaTi₂(PO₄)₃; electrochemical performance

作者关键词: 磷酸钛钠; 电化学性能

摘要: NaTi₂(PO₄)₃/C(NTP/C) composites were synthesized by the reaction of a metal-organic framework MIL-125 with phosphate, in which MIL-125 was used not only as titanium source and carbon source but also as the template, playing a very important role for the reaction. NTP/C composites was characterized by XRD, SEM and electrochemical tests. The influence of different calcination conditions on the electrochemical performances was discussed. The experimental results indicate that NTP/C obtained by calcining at 900°C for 1 h shows the best crystallinity and electrochemical performance.

摘要: 以金属有机骨架结构 MIL-125 与磷酸盐反应制备了磷酸钛钠/碳(NTP/C)复合材料。MIL-125 前驱体既用作钛源和碳源,还充当模板剂,在该复合材料的合成和形貌控制中发挥了重要作用。对材料进行 XRD,SEM 以及电化学性能分析测试,讨论了不同煅烧条件对材料电化学性能的影响。实验结果表明:在 900°C 煅烧 1h 的条件下得到的磷酸钛钠/碳复合材料的结晶性能良好,并且具有最佳的电化学性能。

入藏号: CSCD:6466352

地址: Zhao Mingjuan, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Xia Jiwen, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Gou Lei, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 赵明娟, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

夏霁雯, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

苟蕾, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

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作者: Wu Lei; Chen Hui; Li Xueshuo; Chen Huaxin

作者: 吴蕾; 陈慧; 李学硕; 陈华鑫

标题: Research progress of nano TiO₂ photocatalysis technology applied in ecological road

标题: 纳米 TiO₂ 光催化技术在生态道路中的应用研究进展

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文献类型: Review

作者关键词: nano TiO₂; photocatalysis; exhaust degradation; ecological road

作者关键词: 纳米 TiO₂; 光催化; 尾气降解; 生态道路

摘要: The research progress of nano TiO₂ photocatalysis technology applied in ecological road was described. Firstly, the general preparing methods of nano TiO₂ photocatalytic pavement material and the influence factors of degradation efficiency were summarized. Then the application status of nano TiO₂ photocatalytic technology in ecological road, including the application in cement concrete pavement, asphalt pavement and ancillary facilities of roads, were discussed in detail. Its existing shortcomings and problems as well as the corresponding improvement measures were put forward. Finally, the application of material in the ecological road in the future was prospected.

摘要: 近年纳米 TiO₂ 光催化技术在生态道路中的应用备受关注。因路面材质的不同, 纳米 TiO₂ 光催化路面材料的制备方法也有所差异, 影响该材料尾气降解效率的主要因素包括纳米 TiO₂ 的掺量、污染物浓度、光源与光照强度等。目前纳米 TiO₂ 光催化技术在水泥混凝土路面、沥青路面和道路附属设施中已得到了应用, 但还存在光催化效率不足、在沥青基的负载技术研究不足等诸多问题, 有待进一步的深入研究开发。

入藏号: CSCD:6421884

地址: Wu Lei, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Hui, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Xueshuo, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Huaxin, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 吴蕾, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

陈慧, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

李学硕, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

陈华鑫, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

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作者: Wang Zhichen; Guo Naisheng; Zhao Yinghua; Chen Zhongda

作者: 王志臣; 郭乃胜; 赵颖华; 陈忠达

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作者关键词: road engineering; relaxation time spectrum; retardation time spectrum; viscoelasticity; master curve; conversion

作者关键词: 道路工程; 松弛时间谱; 延迟时间谱; 黏弹性; 主曲线; 换算

摘要: To analyze the method of determining different time spectra of asphalt mixture and the conversion relationship mutually, the discrete relaxation and retardation time spectrum and continuous relaxation and retardation time spectrum were determined by using Prony series and integral transformation expression, respectively. The relationship of discrete time spectrum converted from continuous time spectrum was established based on the discretization of continuous time spectrum, the conversion linear equations of discrete relaxation and retardation time spectrum were obtained from constitutive relation in time domain, Laplace transform domain, and frequency domain, respectively, and the validity of determination and conversion methods were verified by the test results of dynamic modulus and creep compliance master curves. Results show that four kinds of time spectrum of asphalt mixtures can be determined simultaneously by the master curve, and the relaxation and retardation time spectrum obtained from conversion are consistent with test results. The method provides effective means to comprehensive viscoelastic parameters analysis of asphalt mixtures.

摘要: 为了分析沥青混合料不同时间谱的确定方法和相互换算关系,采用 Prony 级数和积分变换表达式分别对沥青混合料的离散松弛和延迟时间谱及连续松弛和延迟时间谱进行确定,并将连续时间谱进行离散化表示,建立了由连续时间谱换算离散时间谱的关系式,由时间域、Laplace 变换域和频率域内本构关系分别导出了离散松弛与延迟时间谱之间的换算线性方程组,并通过动态模量和蠕变柔量主曲线试验结果对本研究确定和换算方法的有效性进行了验证.结果表明,沥青混合料的4种时间谱可以通过试验主曲线同时确定,松弛与延迟时间谱之间的换算结果与试验结果吻合较好,该方法能够为沥青混合料黏弹性参数的全面分析提供有效工具.

入藏号: CSCD:6461150

地址: Wang Zhichen, School of Materials Science and Engineering, Chang'an University;;College

of Transportation Engineering, Dalian Maritime University;;Chang'an University, ;;;Key Laboratory of Highway Engineering in Special Region of Ministry of Education, Xi'an;;Dalian;;Xi'an, ;;; 710061;;116026;;710064.

Guo Naisheng, College of Transportation Engineering, Dalian Maritime University, Dalian, Liaoning 116026, China.

Zhao Yinghua, College of Transportation Engineering, Dalian Maritime University, Dalian, Liaoning 116026, China.

Chen Zhongda, Chang'an University, Key Laboratory of Highway Engineering in Special Region of Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 王志臣, 长安大学材料科学与工程学院;;大连海事大学交通运输工程学院;;长安大学, ;;;特殊地区公路工程教育部重点实验室, 西安;;大连;;西安, ;;; 710061;;116026;;710064.

郭乃胜, 大连海事大学交通运输工程学院, 大连, 辽宁 116026, 中国.

赵颖华, 大连海事大学交通运输工程学院, 大连, 辽宁 116026, 中国.

陈忠达, 长安大学, 特殊地区公路工程教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: zhichenwang@aliyun.com; naishengguo@126.com

电子邮件地址: zhichenwang@aliyun.com; naishengguo@126.com

使用次数 (最近 180 天): 0

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作者: An Xin; Zheng Xueping; Chen Huaxin; Wen Jiuran; Lai Xinyue; Peng Yiqiong; Zhao Yan

作者: 安鑫; 郑雪萍; 陈华鑫; 温久然; 赖歆玥; 彭祎琼; 赵艳

标题: Effects of mixed catalyst $\text{CoCl}_2/\text{Y}_2\text{O}_3$ on hydrolysis capacity of NaBH_4

标题: $\text{CoCl}_2/\text{Y}_2\text{O}_3$ 对 NaBH_4 水解放氢性能的影响

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作者关键词: NaBH_4 ; NaBH_4 ; hydrogen performance; hydrogen release amount; hydrogen release rate

作者关键词: 放氢性能; 放氢量; 放氢速率

摘要: The effect of mixed catalyst $\text{CoCl}_2/\text{Y}_2\text{O}_3$ on hydrolysis capacity of NaBH_4 was studied experimentally. The result showed that the hydrogen liberation amount and hydrogen release rate of sodium borohydride showed the change trend of first increasing and then

decreasing with increase of mixed catalyst ratio and CoCl₂ percent in mixed catalyst. And when the mixed catalyst content is 12% and the doping ratio is 40% Y₂O₃ + 60% CoCl₂, the hydrogen liberation reaction of sodium borohydride reaches the best state, and the hydrogen release amount and the average hydrogen release rate also reach the maximum values of the catalyst system were 3 885 mL and 215.833 mL/min, respectively.

摘要: 研究了混合催化剂 CoCl₂/Y₂O₃ 比例对 NaBH₄ 水解放氢的影响. 结果表明, 随着混合催化剂比例的增加, 以及混合催化剂中 CoCl₂ 的含量增加, 硼氢化钠水解的放氢量和放氢速率呈现出了先增大后减小的变化趋势, 并且当混合催化剂含量占硼氢化钠的 12%, 掺杂比为 40% Y₂O₃ + 60% CoCl₂ 时, 硼氢化钠水解放氢反应达到最佳状态, 其放氢量和放氢平均速率均达到整个催化剂体系的最大值, 分别为 3 885 mL 和 215.833 mL/min.

入藏号: CSCD:6451321

地址: An Xin, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zheng Xueping, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Chen Huaxin, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wen Jiuran, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Lai Xinyue, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Peng Yiqiong, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhao Yan, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 安鑫, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

郑雪萍, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

陈华鑫, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

温久然, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

赖歆玥, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

彭祎琼, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

赵艳, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: 771969838@qq.com

电子邮件地址: 771969838@qq.com

使用次数 (最近 180 天): 0

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作者: Li Zuzhong; Guan Yu; Zhao Hongyan; Li Bin; Zhang Jie; Zhao Zepeng

作者: 李祖仲; 关羽; 赵红艳; 李斌; 张杰; 赵泽鹏

标题: Strength Characteristics of Cement Mortar with Coal Gasification Coarse Slag under Alkali-Salt Compound Activation

标题: 碱-盐复合激发煤气化粗渣的水泥胶砂强度特性

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文献类型: Article

作者关键词: cement concrete; alkali-salt activation; coal gasification coarse slag; mortar strength; microstructure

作者关键词: 水泥混凝土; 碱-盐激发; 煤气化粗渣; 胶砂强度; 微观结构

摘要: In order to explore the utilization of coal gasification coarse slag in concrete, the microstructure, element distribution and phase composition of coal gasification coarse slag were characterized conventionally. Subsequently, the suitable alkali-salt compound activators were selected to prepare the cement mortar involving coarse slag, and the influences of alkali-salt compound activator on the compressive and flexural strength of the mortar were then analyzed. Simultaneously, the microstructure and phase composition of the hydration products of the slag and the cement activated with the alkali-salt were detected. The results show that the slag, rich in C, O, Si, Al, Ca, Fe, are mainly composed of lamellar and irregular granular particles. Besides, there exist active Si-O, Al-O or Al-Si-O phases in the coarse slag. It is also found that the effect of compound activation is better than separateness, and the combination of calcium sulfate and sodium hydroxide has optimal effect. The addition of activators can promote the formation of the hydration products, and then enhance the mortar strength because the activators can effectively facilitate the pozzolanic reaction of slag.

摘要: 采用扫描电子显微镜(SEM)、能谱仪(EDS)和 X 射线衍射仪(XRD)分析了煤气化粗渣的微观结构、元素分布及物相组成, 优选碱-盐复合激发剂, 制备了掺煤气化粗渣水泥胶砂试件, 分析了碱-盐激发剂对胶砂抗压、抗折强度的影响, 并探讨了碱-盐激发下煤气化粗渣水泥胶凝硬化产物的微观结构和物相组成。结果表明: 煤气化粗渣以层片状、不规则粒状颗粒居多, 富含 C、O、Si、Al、Ca、Fe 等元素, 存在火山灰活性的硅氧、铝氧或铝-硅-氧相; 复合激发效果优于各自单掺的激发效果, 其中掺硫酸钙与氢氧化钠组合激发效果最佳; 激发剂有助于发挥煤气化粗渣的火山灰活性, 促进煤气化粗渣水泥胶凝体系中水化产物的生成, 提升了胶凝材料的结构强度。

入藏号: CSCD:6434906

地址: Li Zuzhong, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Guan Yu, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Li Bin, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Jie, School of Material Science and Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhao Hongyan, College of Water & Architectural Engineering, Shihezi University, Shihezi, Xinjiang 832003, China.

Zhao Zepeng, Research Institute of Dushanzi Petrochemical Company, CNPC, Karamay, Xinjiang 834000, China.

地址: 李祖仲, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

关羽, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

李斌, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

张杰, 长安大学材料科学与工程学院, 西安, 陕西 710061, 中国.

赵红艳, 石河子大学水利建筑工程学院, 石河子, 新疆 832003, 中国.

赵泽鹏, 中国石油独山子石化公司研究院, 克拉玛依, 新疆 834000, 中国.

电子邮件地址: zuzhongli@126.com; zhy123chd@163.com

电子邮件地址: zuzhongli@126.com; zhy123chd@163.com

使用次数 (最近 180 天): 0

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作者: Xia Huiyun; Geng Tong; Zhao Xu; Li Fangfang; Wang Fengyan; Gao Lining

作者: 夏慧芸; 耿通; 赵旭; 李芳芳; 王凤燕; 高莉宁

标题: Preparation and Sensing Properties of Organic Gel Fluorescence Films Based on ZnS Nanoparticles

标题: 基于 ZnS 纳米粒子的有机凝胶荧光薄膜的制备及其传感性能

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作者关键词: ZnS nanoparticles; Supramolecular organic gels; Fluorescence; Hybrid film; Sensing properties

作者关键词: ZnS 纳米粒子; 超分子有机凝胶; 荧光; 杂化薄膜; 传感性能

摘要: Accurate and rapid detection of organic amines in the vapor phase is essential for various

applications such as agricultural use, industrial and environmental testing, and food security. Supramolecular gels composed of cholesterol derivative-based low-molecular-mass gelators (LMMGs) have attracted considerable attention owing to their unique character and formation mechanisms. In this study, a ZnS-supramolecular organogel hybrid film for amine vapor sensors was reported. It must be pointed out that the method of preparation of hybrid films considered here is different from that of the ZnS-organogel hybrid films previously reported. Because the sensing performance of nanomaterials strongly depends on their nanostructures, it is expected that nanomaterials synthesized by different methods exhibit different nanostructures and ultimately different sensing properties. The luminescent ZnS nanoparticles were first prepared by the oil-water interface method, before being dispersed in an organic solution containing the LMMG. Finally, the aforementioned solution was casted onto the surface of a glass substrate to fabricate a ZnS-supramolecular organogel fluorescent hybrid film after drying at room temperature. Scanning electron microscopy observations revealed that the surface morphology of the hybrid film was uniform cross-linked nanofibers. Transmission electron microscopy results revealed that the average particle size of the obtained ZnS nanoparticles is about 200 nm. The crystal structure of the ZnS nanoparticles is cubic, as revealed by X-ray diffraction. The photoluminescence emission spectra of the ZnS-supramolecular organogel film were recorded for various quantities of ZnS loading; the maximum emission wavelength of the hybrid films hardly changed, indicating that the dispersity of the ZnS nanoparticles in the hybrids is very well. Because the film network formed by the gelator has a good confinement effect on the ZnS nanoparticles, the hybrid film exhibits stable luminescence performance. Sensing experiments showed that the hybrid films are sensitive to the existence of organic monoamine and diamine vapors, and the sensitivity improved as the dosage of ZnS nanoparticles was increased. The quenching mechanism was discussed by comparing the fluorescence lifetimes of the hybrid films in the presence of air and ethylenediamine (EDA) vapor. It was found that the sensing mechanism is mainly static quenching, with a very small amount of dynamic quenching. The sensing performances of the film for common volatile organic compounds were investigated with a detection limit of 10.13 ppm ($1 \text{ ppm} = 1 \times 10^{-6}$, volume fraction) obtained for the EDA vapor. Reversible experiments indicated that the films have a good reversible response in the presence of EDA vapor. It is anticipated that this type of supramolecular organogel hybrid film could find applications in the monitoring of volatile organic amines in the areas of industry and environment.

摘要: 本文首先采用油水界面法制备发光纳米 ZnS 粒子,再通过物理混合法,将其分散在溶有小分子胶凝剂的有机溶液中,流延于玻璃基质表面,得到 ZnS 荧光薄膜.实验结果表明,ZnS 纳米粒子的平均粒径大小约为 200 nm,具有立方晶型结构,并且在杂化薄膜中具有良好的分散性;胶凝剂形成的网络结构对 ZnS 纳米粒子具有良好的限域效应,表现为稳定的发光性能;气敏实验表明,该杂化膜对挥发性有机单胺和二胺具有灵敏的选择性传感作用;且其灵敏度随着杂化薄膜中 ZnS 负载量的增大逐渐提高;可逆性实验表明该薄膜对乙二胺蒸汽具有良好的可逆响应性.

入藏号: CSCD:6457168

地址: Xia Huiyun, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710062, China.

Geng Tong, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710062, China.

Zhao Xu, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi

710062, China.

Li Fangfang, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710062, China.

Wang Fengyan, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710062, China.

Gao Lining, School of Materials Science and Engineering, Chang'an University, Xi'an, Shaanxi 710062, China.

地址: 夏慧芸, 长安大学材料科学与工程学院, 西安, 陕西 710062, 中国.

耿通, 长安大学材料科学与工程学院, 西安, 陕西 710062, 中国.

赵旭, 长安大学材料科学与工程学院, 西安, 陕西 710062, 中国.

李芳芳, 长安大学材料科学与工程学院, 西安, 陕西 710062, 中国.

王凤燕, 长安大学材料科学与工程学院, 西安, 陕西 710062, 中国.

高莉宁, 长安大学材料科学与工程学院, 西安, 陕西 710062, 中国.

电子邮件地址: xiahy@chd.edu.cn

电子邮件地址: xiahy@chd.edu.cn

使用次数 (最近 180 天): 7

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作者: Tian Yaogang; Wang Shuaifei; Lu Dong; Zhao Cheng; Yang Wenqi; Li Weiguang

作者: 田耀刚; 王帅飞; 卢东; 赵成; 杨文奇; 李炜光

标题: Research on the Performance of High Early Strength Quick Repair Mortar for Shallow Layer of Airport Pavement

标题: 机场道面浅层高早强快速修补砂浆的性能研究

来源出版物: 航空工程进展 卷: 10 期: 1 页: 139-146 出版年: 2019

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作者关键词: airport pavement; shallow damages; quick repair; high early strength mortar; flight safety

作者关键词: 机场道面; 浅层病害; 快速修补; 高早强砂浆; 飞行安全

摘要: In order to meet the requirements of non-suspend air construction of busy airports, the

preparation of high early strength quick repairing mortar is of great significance to ensure on-time operation of aircraft and the safety of aircraft take-off and landing. The special cementing material is used to prepare quick repair mortar. It is obtained by optimizing the sand to binder ratio, the water to binder ratio and the proportion of admixtures. The mechanical properties, bond properties and durability of the repaired mortar are studied. Results indicate that its 2h compressive strength and flexural strength can reach 32.5MPa and 4.8MPa, respectively, and the bending strength reached 75% and 84% of the flexural strength at 2h and 28d, respectively. Compared with C40 concrete, the repair mortar has micro-expansion in the early stage, which can compensate for shrinkage and reduce the deformation difference between the old concrete. The shrinkage rate of the 120d is reduced by 60.5%, and the wear resistance of 3d can reach the wear resistance of C40 concrete for 28d. At the same time, it has excellent impermeability and impact resistance.

摘要: 在满足繁忙机场不停航施工要求下,制备出道面浅层高早强快速修补砂浆对保障飞机准点运行及安全起降具有重要意义。采用自制的特种胶凝材料,通过优选砂胶比、水胶比及外加剂复配等技术制备出高早强快速修补砂浆,研究该修补砂浆的力学性能、黏结性能与耐久性能。结果表明:高早强快速修补砂浆 2h 抗压、抗折强度分别为 32.5MPa 和 4.8MPa,且 2h 和 28d 黏结强度可分别达到其抗折强度的 75%和 84%;与 C40 混凝土相比,该修补砂浆早期具有微膨胀性,可补偿收缩,减小与旧混凝土间变形差异,120d 收缩率降低了 60.5%,3d 耐磨性可达到 C40 混凝土 28d 的耐磨性,且具有优良的抗渗性与抗冲击性。

入藏号: CSCD:6429057

地址: Tian Yaogang, School of Materials Science and Engineering, Changan University, Xian, 710064.

Wang Shuaifei, School of Materials Science and Engineering, Changan University, Xian, 710064.

Lu Dong, School of Materials Science and Engineering, Changan University, Xian, 710064.

Zhao Cheng, School of Materials Science and Engineering, Changan University, Xian, 710064.

Yang Wenqi, Construction Office, Shaanxi Provincial Transport Department, Xian, 710075.

Li Weiguang, School of Highway, Changan University, Xian, 710064.

地址: 田耀刚, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

王帅飞, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

卢东, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

赵成, 长安大学材料科学与工程学院, 西安, 陕西 710064, 中国.

杨文奇, 陕西省交通运输厅建设处, 西安, 陕西 710075, 中国.

李炜光, 长安大学公路学院, 西安, 陕西 710064, 中国.

电子邮件地址: tiangang78@126.com

电子邮件地址: tiangang78@126.com

使用次数 (最近 180 天): 0

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汽车学院

第 1 条, 共 37 条

作者: Xiong Yanfeng; Yu Qiang; Yan Shengyu; Wang Hengkai

作者: 熊演峰; 余强; 闫晟煜; 王恒凯

标题: Research on the Influence of Working Conditions Characteristic Parameters on Energy Consumption for Plug-in Hybrid Electric Vehicle

标题: 工况特征参数对插电式混合动力汽车能耗影响特性的研究

来源出版物: 汽车技术 期: 12 页: 23-28 出版年: 2019

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来源出版物: Automobile Technology 期: 12 页: 23-28 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: PHEV; Working condition characteristic parameters; WLTC working condition; Influencing factors

作者关键词: 插电式混合动力汽车; 工况特征参数; WLTC 工况; 影响因子

摘要: In order to determine the influence of the characteristic parameters of working conditions on the energy consumption of plug-in hybrid electric vehicle, the principal component analysis method is used to prove that the vehicle speed parameters can preferably represent the vehicle working condition than acceleration and proportion, which are the main influencing factors of vehicle energy consumption. Taking a PHEV as an example, the WLTC test condition is reconstructed and the positive results are obtained. The sensitivity of energy consumption is analyzed by alternating test. The simulation results show that speed parameters make the greatest contribution in energy consumption. Single factor analysis is carried out by choosing parameters such as the maximum speed of pure electric mode, the lower limit of SOC in pure electric mode and the coefficient of charging torque, which confirms the strong correlation between them and energy consumption.

摘要: 为明确各工况特征参数对插电式混合动力汽车能耗的影响程度,运用主成分分析法证明车速类特征参数相对于加速度类、比例类特征参数更能表征整车工况,是整车能耗的主要影响因子。以某插电式混合动力汽车为例,重构世界轻型汽车测试循环(WLTC),通过正交试验分析了能耗灵敏度,仿真结果表明,车速类特征参数贡献度最大,选取纯电模式最高车速、纯电模式 SOC 下限、行车充电扭矩系数等车速类参数开展单因子分析,证明了其与能耗的强相关性。

入藏号: CSCD:6627966

地址: Xiong Yanfeng, Changan University, Xian, 710064.

Yu Qiang, Changan University, Xian, 710064.

Yan Shengyu, Changan University, Xian, 710064.

Wang Hengkai, China FAW Co., Ltd. Intelligent & Connected Vehicle Development Institute, Changchun, Jilin 130011, China.

地址: 熊演峰, 长安大学, 西安, 陕西 710064, 中国.

余强, 长安大学, 西安, 陕西 710064, 中国.

闫晟煜, 长安大学, 西安, 陕西 710064, 中国.

王恒凯, 中国第一汽车股份有限公司智能网联开发院, 长春, 吉林 130011, 中国.

使用次数 (最近 180 天): 0

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引用的参考文献数: 20

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第 2 条, 共 37 条

作者: Yin Pei; Jiang Zhengmin; Ye Mao; Zhao Shuai; Zhou Bolin

作者: 阴培; 蒋拯民; 叶茂; 赵帅; 周博林

标题: Research on Active Collision Avoidance Control System Considering Steering

标题: 考虑转向的汽车主动避撞控制系统研究

来源出版物: 汽车技术 期: 7 页: 1-7 出版年: 2019

文献号: 1000-3703(2019)7<1:KLZXDQ>2.0.TX;2-5

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语言: Chinese

文献类型: Article

作者关键词: Intelligent vehicle; Collision avoidance decision; Avoidance control; Steering collision avoidance; Brake collision avoidance

作者关键词: 智能车辆; 避撞决策; 避撞控制; 转向避撞; 制动避撞

摘要: In order to exploit the collision potential of intelligent vehicle, a collision avoidance reference path with lateral acceleration constraints was constructed based on the fifth-order polynomial. Vehicle steering control was realized based on the preview steering geometry theory, and the longitudinal acceleration was obtained using the Linear Quadratic regulator (LQR). Based on the collision avoidance structure, the risk of driving was predicted based on the Time Collision To (TTC) and the Time Head Way (THW). The ride comfort of active collision avoidance was evaluated with the maximum acceleration and average acceleration, and the steering control path tracking accuracy was evaluated with the maximum lateral position error and heading angle error. The simulation results under different working conditions show this method contributes to high steering stability and path tracking accuracy, and the collision avoidance safety and ride comfort are considered.

摘要: 为挖掘智能车避撞潜力,基于五次多项式构建含侧向加速度约束的避撞参考路径,基于预瞄转向几何理论实现车辆转向控制,利用线性二次型调节器(LQR)得到期望纵向加速度,在避撞结构基础上,基于碰撞时间(TTC)和跟车时距(THW)预判行车风险,以最大加速度和平均加速度评价主动避撞的乘坐舒适性,以最大横向位置误差和航向角误差评价转向控制路径跟踪精度。不同工况下仿真结果表明,该方法转向稳定性和路径跟踪精度较高,且兼顾了避撞安全性和乘坐舒适性。

入藏号: CSCD:6535147

地址: Yin Pei, Chang'an University, Xi'an, Shaanxi 710064, China.

Jiang Zhengmin, Chang'an University, Xi'an, Shaanxi 710064, China.

Ye Mao, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Shuai, China Automotive Technology & Research Center Co., Ltd. Automotive Data Center, Tianjin 300300, China.

Zhou Bolin, China Automotive Technology & Research Center Co., Ltd. Automotive Data Center, Tianjin 300300, China.

地址: 阴培, 长安大学, 西安, 陕西 710064, 中国.

蒋拯民, 长安大学, 西安, 陕西 710064, 中国.

叶茂, 长安大学, 西安, 陕西 710064, 中国.

赵帅, 中国汽车技术研究中心有限公司数据资源中心, 天津 300300, 中国.

周博林, 中国汽车技术研究中心有限公司数据资源中心, 天津 300300, 中国.

使用次数 (最近 180 天): 0

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第 3 条, 共 37 条

作者: Wang Tong

作者: 王童

标题: A One-Step Fast Algorithm for Bus Rollover Collision Based on Total Strain Theory

标题: 基于全量理论的客车侧翻一步碰撞快速算法

来源出版物: 汽车技术 期: 4 页: 44-48 出版年: 2019

文献号: 1000-3703(2019)4<44:JYQLLL>2.0.TX;2-#

来源出版物: Automobile Technology 期: 4 页: 44-48 出版年: 2019

文献号: 1000-3703(2019)4<44:JYQLLL>2.0.TX;2-#

语言: Chinese

文献类型: Article

作者关键词: Bus; Rollover; Total strain theory; One-step fast collision algorithm

作者关键词: 客车; 侧翻; 全量理论; 一步碰撞快速算法

摘要: A one-step fast algorithm of bus rollover collision is proposed in the paper used to conduct rollover collision simulation for typical body of a 12 m length bus, the simulation is compared with LS-DYNA simulation and rollover test results. The results show that this one-step fast algorithm can predict safety performance of bus structure in rollover, and the error between the simulation with two other methods is less than 15%, the simulation duration is approx. 1/ 10 of LS-DYNA simulation, which increases calculation efficiency greatly while ensuring calculation accuracy.

摘要: 提出了一种客车侧翻一步碰撞快速算法,利用该算法对某款长 12 m 的公路客车典型车

身段进行了侧翻碰撞模拟,并与 LS-DYNA 仿真及侧翻试验结果进行了对比,结果表明,侧翻一步碰撞快速算法可以较好的预测客车结构的侧翻安全性能,其模拟结果与其它两种方法之间的误差小于 15%,模拟时长约为 LS-DYNA 仿真的 1/10,在基本保证计算精度的同时使得计算效率大幅提升。

入藏号: CSCD:6472871

地址: Wang Tong, Changan University, Xi'an, Shaanxi 710064, China.

地址: 王童, 长安大学, 西安, 陕西 710064, 中国.

使用次数 (最近 180 天): 0

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第 4 条, 共 37 条

作者: Jiang Jinke; Fang Zongde; Liu Hongmei

作者: 蒋进科; 方宗德; 刘红梅

标题: Loaded Tooth Contact Characteristic Analysis of Multi-gear for Planetary Transmission

标题: 行星传动多体齿轮承载接触特性分析

来源出版物: 机械工程学报 卷: 55 期: 15 页: 174-182 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: planetary gear; loaded contact analysis(LTCA); tooth contact analysis(TCA); load distribution; transmission error; load sharing coefficient

作者关键词: 行星齿轮; 承载接触分析; 接触分析; 载荷分配; 传动误差; 均载系数

摘要: An approach of loaded tooth contact analysis of multi-gear for planetary transmission was proposed to simulate gears performances. The relative tooth clearances of external (internal) gear pair were calculated based on tooth contact analysis(TCA) considering accurate topography of tooth surfaces with alignment errors. The normal flexibility matrix caused by unit normal force of tooth surface point were obtained by computing flexibility coefficients based on finite element, and based on which normal flexibility coefficient of points on tooth contact lines for external (internal) gear pairs were calculated by interpolating and summing the the flexibility coefficient from sun and planet gears (planet gears and ring gear). With geometric analysis and mechanical analysis of gears, the tooth contact problem for gear pairs under load were represented to mechanical equilibrium problem of finite contact points. Besides, deformation, meshing stiffness, loads distribution and load sharing coefficient were obtained by solving the non-linear equations applied

mathematical programming. Simulation results from transmission errors and load distribution under loads show validity of the method, which contribute to design of modified tooth surfaces and dynamic analysis for high-performance planetary gears.

摘要: 根据行星齿轮功率分流传动的特点, 提出多个齿轮接触的齿面加载接触分析方法。考虑了安装误差条件下的齿面准确几何形态, 提出行星齿轮齿面几何接触分析(TCA)方法并获得外(内)各齿轮副的相对齿面间隙; 通过一次有限元柔度系数计算获得各齿轮的柔度系数, 各外(内)齿轮辐接触点的法向柔度系数通过分别插值太阳轮和行星轮(行星轮和齿圈)齿面网格节点的柔度系数并叠加获得; 结合齿轮的几何分析与力学分析, 将多个齿轮副受力接触转化为求解齿面有限个离散接触点的力学平衡问题, 通过数学规划的方法求解非线性方程组得到加载后各齿轮副的齿面变形、啮合刚度、载荷分布、行星轮均载系数。多载荷传动误差和载荷分配进一步反映了行星传动啮合性能, 为高性能行星传动齿面的修形设计、动力学分析奠定了理论基础。

入藏号: CSCD:6571078

地址: Jiang Jinke, Changan University, Key Laboratory of Automotive Transportation Safety Techniques of Ministry of Transport, Xian, 710064.

Liu Hongmei, Changan University, Key Laboratory of Automotive Transportation Safety Techniques of Ministry of Transport, Xian, 710064.

Fang Zongde, School of Mechanical Engineering, Northwestern Polytechnical University, Xian, 710072.

地址: 蒋进科, 长安大学, 汽车运输安全保障技术交通行业重点实验室, 西安, 陕西 710064, 中国.

刘红梅, 长安大学, 汽车运输安全保障技术交通行业重点实验室, 西安, 陕西 710064, 中国.

方宗德, 西北工业大学机电学院, 西安, 陕西 710072, 中国.

电子邮件地址: jjk06@126.com; fauto@nwpu.edu.cn

电子邮件地址: jjk06@126.com; fauto@nwpu.edu.cn

使用次数 (最近 180 天): 0

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第 5 条, 共 37 条

作者: Zhang Xinfeng; Li Chuanyou; Xia Bake

作者: 张新锋; 李传友; 夏八科

标题: Lane Changing Trajectory Planning for Intelligent Vehicle Based on Steady Steering Characteristics

标题: 基于稳态转向特性的智能车辆换道轨迹规划

来源出版物: 汽车技术 期: 7 页: 13-18 出版年: 2019

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文献号: 1000-3703(2019)7<13:JYWTZX>2.0.TX;2-V

语言: Chinese

文献类型: Article

作者关键词: Intelligent vehicle; Lane changing; Trajectory planning; Steering characteristics; Safety distance model

作者关键词: 智能车辆; 换道; 轨迹规划; 转向特性; 安全距离模型

摘要: In order to improve the safety of the lane changing of intelligent vehicles on the expressway, this paper analyzes the steering characteristics of the vehicle at high speed and limited the maximum curvature of the lane changing trajectory curve to prevent the vehicle from slipping during the lane changing. The paper analyzes the influence of traffic vehicles on the safety of lane changing and uses the polynomial function for the lane changing trajectory planning, and uses vehicle lateral acceleration and lane changing time as the optimization variables of optimization function. A lane change model based on steady state steering characteristics and lane change safety distance is established. The trajectory of the lane change is simulated by MATLAB and CarSim software. The simulation results show that the lane changing trajectory can safely and smoothly realize the lane changing behavior of intelligent vehicles.

摘要: 为提高智能车辆在高速公路上的换道安全性,分析了车辆在高速状态下的转向特性并对换道轨迹曲线的最大曲率进行限制,以防止车辆在换道过程中出现侧滑现象,分析了交通车对换道安全性的影响,利用多项式函数进行换道轨迹规划,以车辆侧向加速度和换道时间为换道优化函数的优化变量,建立了基于稳态转向特性和换道安全距离的换道模型。利用 MATLAB 和 CarSim 软件对换道轨迹进行仿真分析,结果表明,该换道轨迹规划方法能够安全平稳地实现智能车辆的换道行为。

入藏号: CSCD:6535149

地址: Zhang Xinfeng, Chang'an University;;School of Automobile, Chang'an University, Key Laboratory of Automotive Transportation Safety Enhancement Technology of the Ministry of Communication;; Xi'an;;Xi'an, ;; 710064;;710064.

Li Chuanyou, Chang'an University;;School of Automobile, Chang'an University, Key Laboratory of Automotive Transportation Safety Enhancement Technology of the Ministry of Communication;; Xi'an;;Xi'an, ;; 710064;;710064.

Xia Bake, Chang'an University;;School of Automobile, Chang'an University, Key Laboratory of Automotive Transportation Safety Enhancement Technology of the Ministry of Communication;; Xi'an;;Xi'an, ;; 710064;;710064.

地址: 张新锋, 长安大学;;长安大学,汽车学院, 汽车运输安全保障技术交通行业重点实验室;;, 西安;;西安, ;; 710064;;710064.

李传友, 长安大学;;长安大学,汽车学院, 汽车运输安全保障技术交通行业重点实验室;;, 西安;;西安, ;; 710064;;710064.

夏八科, 长安大学;;长安大学,汽车学院, 汽车运输安全保障技术交通行业重点实验室;;, 西安;;西安, ;; 710064;;710064.

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第 6 条, 共 37 条

作者: Ma Bingshan; Hu Dawei; Chen Xiqiong; Hu Hui

作者: 马冰山; 胡大伟; 陈希琼; 胡卉

标题: An Optimization of Pure Electric Vehicle Routing Problem on Half-open Multi-distribution Center

标题: 半开放式的多配送中心纯电动车辆路径优化问题

来源出版物: 交通运输系统工程与信息 卷: 19 期: 6 页: 199-205 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: logistics engineering; half-open vehicle routing; ant colony algorithm; pure electric vehicle; multidistribution centers; joint services

作者关键词: 物流工程; 半开放式车辆路径; 蚁群算法; 纯电动车辆; 多配送中心; 联合服务

摘要: With the rapid development of e-commerce, more and more logistics enterprises adopt multidistribution center model to optimize vehicle distribution routes. The pure electric vehicle makes the traditional fuel distribution vehicles gradually replaced to improve the ecological environment. Combining the characteristics of multi-distribution center joint service mode and the driving characteristics of pure electric logistics vehicles, a half-open multi-distribution center pure electric vehicle routing problem with time windows is modeled, and an ant colony algorithm is designed to solve it. The comparative analysis of several instances shows that half-open multidistribution center's joint service can rationally utilize relevant logistics resources, improve vehicle routing and reduce logistics costs, but it needs to be joint with appropriate number and location of distribution centers to achieve the best cost-saving effect. Meanwhile it provides more potential charging points with lower price than single distribution center, so considering supplying electricity from distribution center can save logistics cost to some extent.

摘要: 电子商务促使越来越多的物流企业采用多配送中心模式优化车辆的配送路径,纯电动汽车逐渐替代了传统的燃油配送车辆,以改善生态环境.结合多配送中心联合服务模式的特点和纯电动物流车辆的行驶特征,构建带时间窗的半开放式多配送中心纯电动车辆路径优化模型,设计蚁群算法对其求解.算例对比分析结果表明:半开放式的多配送中心联合服务,能合理利用相关物流资源,改善车辆路径,降低物流费用,但需要寻找合适数量和位置的配送中心进行联合,才能达到节约成本的最佳效果;相比单配送中心,多配送中心联合服务提供了更多潜在的较低价格的充电点,在配送中心补充电量可在一定程度上节约物流成本.

入藏号: CSCD:6639019

地址: Ma Bingshan, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Hu Dawei, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Xiqiong, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Hu Hui, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 马冰山, 长安大学汽车学院, 西安, 陕西 710064, 中国.

胡大伟, 长安大学汽车学院, 西安, 陕西 710064, 中国.

陈希琼, 长安大学汽车学院, 西安, 陕西 710064, 中国.

胡卉, 长安大学汽车学院, 西安, 陕西 710064, 中国.

电子邮件地址: dwhu@chd.edu.cn

电子邮件地址: dwhu@chd.edu.cn

使用次数 (最近 180 天): 0

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第 7 条, 共 37 条

作者: Ma Jian; Zhang Dayu; Zhao Xuan; Zhang Kai

作者: 马建; 张大禹; 赵轩; 张凯

标题: State of Charge Estimation for Battery Based on Adaptively Random Weighted Cubature Kalman Filter

标题: 基于随机加权自适应容积卡尔曼的电池 SOC 估计

来源出版物: 中国公路学报 卷: 32 期: 11 页: 234-244 出版年: 2019

文献号: 1001-7372(2019)32:11<234:JYSJJQ>2.0.TX;2-V

来源出版物: China Journal of Highway and Transport 卷: 32 期: 11 页: 234-244 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: SOC; automotive engineering; SOC; cubature Kalman filter; lithium-ion battery; random weighted; singular value decomposition

作者关键词: 汽车工程; 容积卡尔曼; 锂离子电池; 随机加权; 奇异值分解

摘要: Accurate state of charge (SOC) estimations of lithium-ion batteries are crucial for breaking the bottleneck of electric vehicle development and promoting the commercialization of electric vehicles. This study conducted the following research on the SOC estimations of lithium-ion batteries: Aiming at the parameter identification problem of battery models, an online identification method for model parameters based on the recursive least squares method of forgetting

factor(FRLS)was proposed.The current and voltage data were measured online,and the model parameters were identified online and updated in real-time to realize an estimation of the dynamic characteristics of a battery.For the problem of noise sensitivity in cubature Kalman filtering,an adaptive cubature Kalman filter method based on random weighting(ARWCKF)was proposed.The random weighting factor was introduced to adaptively adjust the cubature point weight and predict the system noise,state vector,and observation vector,which restrained the disturbances of system noise on the state estimation and avoided the error caused by the fixed weight value of the cubature point.As Cholesky decomposition cannot be used due to the loss of positive definiteness of the state variance matrix in the cubature point calculation process,a cubature point calculation method based on singular value decomposition was proposed to overcome the problems of filtering accuracy caused by negative qualitative changes of the a priori covariance matrix.A comparison of different initial SOC under various working conditions and temperatures was performed to verify this approach.The results indicate that the online parameter identifications based on the recursive least squares method and ARWCKF filtering have adequate estimation accuracies and fast convergence ability.Furthermore,the voltage estimation error does not exceed 40 mV and the SOC estimation error does not exceed 1%.

摘要: 准确估计锂离子电池荷电状态(SOC)对于突破电动汽车发展瓶颈,推动电动汽车商业化至关重要。针对动力电池模型参数辨识问题,提出基于遗忘因子的递推最小二乘法(FRLS)的模型参数在线识别方法。实时测量动力电池电流和电压数据,在线辨识模型参数并实时更新,实时反映电池内部参数的变化过程,对电池动态特性进行实时模拟。针对容积卡尔曼(CKF)滤波过程中对噪声敏感的问题,提出一种基于随机加权思想的自适应容积卡尔曼滤波(ARWCKF)方法。相比于常规CKF容积点权值始终不变,通过引入随机加权因子,自适应调整容积点权值并对系统噪声、状态向量及观测向量进行预测,抑制系统噪声对状态估计的干扰,避免因容积点权重值固定所带来的误差。针对CKF算法在容积点计算过程中由于状态方差矩阵失去正定性导致的平方根分解无法使用的问题,提出基于奇异值分解的容积点计算方法,克服由于先验协方差矩阵负定性变化而导致的滤波精度下降等问题,并进行多种工况、温度下不同SOC初值的对比验证。结果表明:所提出的基于遗忘因子的递推最小二乘法的在线参数辨识及ARWCKF滤波方法具备良好的估计精度及收敛能力,最大电压估计误差不超过40 mV,SOC估计误差不超过1%。

入藏号: CSCD:6632853

地址: Ma Jian, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Dayu, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Xuan, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Kai, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 马建, 长安大学汽车学院, 西安, 陕西 710064, 中国.

张大禹, 长安大学汽车学院, 西安, 陕西 710064, 中国.

赵轩, 长安大学汽车学院, 西安, 陕西 710064, 中国.

张凯, 长安大学汽车学院, 西安, 陕西 710064, 中国.

电子邮件地址: majian@chd.edu.cn

电子邮件地址: majian@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Li Bin; Cao Yang; Yun Weiguo

作者: 李彬; 曹阳; 运伟国

标题: Optimizing of commercial vehicle cab suspension paraments by means of experiments

标题: 基于试验验证的商用车驾驶室悬置参数优化研究

来源出版物: 振动与冲击 卷: 38 期: 23 页: 134-138 出版年: 2019

文献号: 1000-3835(2019)38:23<134:JYSYYZ>2.0.TX;2-I

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文献号: 1000-3835(2019)38:23<134:JYSYYZ>2.0.TX;2-I

语言: Chinese

文献类型: Article

作者关键词: ADAMS; cab mounting system; test; rigid-flexible coupling model; DOE analysis; ADAMS

作者关键词: 驾驶室悬置系统; 试验; 刚柔耦合模型; DOE 分析

摘要: Aiming at the comfort problem of commercial vehicle cabs,the dynamic model of cab and its mounting system of a typical commercial vehicle was established by using ADAMS software, based on the rigid-flexible coupling multibody dynamics theory. The accuracy of the model was verified. The DOE optimization test was designed,the stiffness and damping of the cab mount are optimized by simulation analysis,and the test vehicle was improved according to the optimization parameters. Finally,the road test shows that the ride comfort of the optimized commercial vehicle is 9.6% higher than that before optimization,and the vibration isolation performance of the cab is improved.

摘要: 针对目前中国商用车驾驶室舒适性问题,以整车刚柔耦合多体动力学理论基础,采用 ADAMS 软件建立某典型商用车驾驶室及其悬置系统动力学模型,并对该模型进行了准确性验证。设计了 DOE 优化试验,经过仿真分析,对驾驶室悬置的刚度和阻尼进行优化,并对试验车辆按照优化参数进行改进。最后,通过道路试验表明,优化后的商用车行驶平顺性较优化前提升了 9.6%,改善了驾驶室的隔振性能。

入藏号: CSCD:6636290

地址: Li Bin, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Cao Yang, Transportation College,Jilin University, Changchun, Jilin 130012, China.

Yun Weiguo, Zhejiang Geely New Energy Commercial Vehicle Group Co.,LTD, Hangzhou, Zhejiang 310052, China.

地址: 李彬, 长安大学汽车学院, 西安, 陕西 710064, 中国.

曹阳, 吉林大学交通学院, 长春, 吉林 130012, 中国.

运伟国, 浙江吉利新能源商用车集团有限公司, 杭州, 浙江 310052, 中国.

使用次数 (最近 180 天): 0

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作者: Shi Xueying; Sun Zhicheng; Zhu Tong

作者: 史雪莹; 孙智诚; 朱彤

标题: Mesoscopic traffic flow simulation based on heterogeneous driving behaviors and collision

标题: 基于异质性驾驶行为与碰撞的中观交通流仿真

来源出版物: 中国安全科学学报 卷: 29 期: 9 页: 64-69 出版年: 2019

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来源出版物: China Safety Science Journal (CSSJ) 卷: 29 期: 9 页: 64-69 出版年: 2019

文献号: 1003-3033(2019)29:9<64:JYYZXJ>2.0.TX;2-I

语言: Chinese

文献类型: Article

作者关键词: NetLogo; heterogeneous driving behavior; collision accident; mesoscopic traffic flow; NetLogo; multi-agent system; traffic simulation

作者关键词: 异质性驾驶行为; 碰撞事故; 中观交通流; 多智能体系统; 交通仿真

摘要: To study heterogeneity of driving behaviors and its influence on traffic flow characteristics, firstly a questionnaire-based survey was conducted to investigate heterogeneous driving behaviors under influences of surrounding vehicles' speed, traffic flow density, number of stops, collision accidents and other factors. Then according to survey results, a meso-traffic flow model based on multi-agent system was established using NetLogo, and heterogeneous driving behaviors and collision factors were deployed to simulate evolution process of traffic flows. The results show that drivers would adjust driving speed to different degrees influenced by surrounding vehicles' speed, and their average driving speed is related to their own characteristics. Behaviors of changing lanes are determined by traffic flow density and number of stops, and heterogeneity of this behavior makes distribution of vehicles in each lane change in a tidal manner and therefore affects traffic flow stability. It is also found that collision accidents can reduce driving speed and cause traffic bottlenecks.

摘要: 为研究驾驶行为异质性及其对交通流特性的影响, 基于问卷的方法调查驾驶人受周围车辆车速、交通流密度、排队次数、碰撞事故等因素影响表现出的异质性驾驶行为; 结合调查结果, 利用 NetLogo 软件建立基于多智能体系统的中观交通流模型, 考虑异质性驾驶行为及碰撞因素, 仿真交通流的演化过程。研究表明: 驾驶人受周围车辆速度影响会不同程度地调整自身车速, 其平均车速与驾驶人特性有关; 交通流密度及排队停车次数决定驾驶人的换道行为,

换道行为异质性使各车道车辆分布呈潮汐式变化,影响交通流的稳定性;碰撞事故会降低驾驶人车速,导致交通瓶颈。

入藏号: CSCD:6629907

地址: Shi Xueying, School of Automobile,Chang'an University;;Key Laboratory of Automotive Transportation Safety Enhancement Technology,Ministry of Transport, ;;Key Laboratory of Automotive Transportation Safety Enhancement Technology,Ministry of Transport, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

Sun Zhicheng, School of Automobile,Chang'an University;;Key Laboratory of Automotive Transportation Safety Enhancement Technology,Ministry of Transport, ;;Key Laboratory of Automotive Transportation Safety Enhancement Technology,Ministry of Transport, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

Zhu Tong, School of Automobile,Chang'an University;;Key Laboratory of Automotive Transportation Safety Enhancement Technology,Ministry of Transport, ;;Key Laboratory of Automotive Transportation Safety Enhancement Technology,Ministry of Transport, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

地址: 史雪莹, 长安大学汽车学院;;汽车运输安全保障技术交通行业重点实验室, ;;汽车运输安全保障技术交通行业重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

孙智诚, 长安大学汽车学院;;汽车运输安全保障技术交通行业重点实验室, ;;汽车运输安全保障技术交通行业重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

朱彤, 长安大学汽车学院;;汽车运输安全保障技术交通行业重点实验室, ;;汽车运输安全保障技术交通行业重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

电子邮件地址: 1343156359@qq.com; zhutong@chd.edu.cn

电子邮件地址: 1343156359@qq.com; zhutong@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Zhang Shuo; Huang Rong; Yu Qiang

作者: 张硕; 黄榕; 余强

标题: An experimental study on evacuation characteristics and restrictive factors for passengers evacuating from a motorcoach

标题: 大型客车乘客疏散特性与制约因素试验研究

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语言: Chinese

文献类型: Article

作者关键词: motorcoach; evacuation characteristics; restrictive factors; evacuation time; movement parameters

作者关键词: 大型客车; 疏散特性; 制约因素; 疏散时间; 运动参数

摘要: In order to promote the formulation and improvement of safety regulations of motorcoaches and improve its safety design level,an evacuation experiment with 45 passengers aged 20-68 was conducted in six scenarios.Firstly,evacuation movement data of passengers were collected with an on-vehicle video system and then macroscopic evacuation performances of motorcoaches in different scenarios were compared to obtain key factors that affect evacuation efficiency by using variance analysis.Finally,key movement parameters of passengers in aisles in front of stairs were collected,and velocity-density relationship was constructed.The results show that evacuation takes the longest time (i.e.63 second) in a rear door opening scenario,and available exits,evacuation drill and door width have a significant influence on evacuation efficiency.Furthermore,average speeds of passengers on the front and rear stairs are (0.930.31)m/s and (0.900.31)m/s respectively.Velocity-density relationship curve is consistent with related researches in terms of values and trends.

摘要: 为促进大型客车安全法规的制定与完善,提高客车安全设计水平,招募45名20~68岁的乘客在6种场景下进行整车疏散试验。首先,通过车载录像系统采集乘客疏散运动数据,对比分析不同场景下大型客车的宏观疏散性能;然后,利用方差分析获取影响乘客疏散的关键因素;最后,提取踏步前通道区域的乘客关键运动参数,构建速度-密度关系图。结果表明:后门开启场景中,乘客的疏散时间最长,为63 s;可用出口、疏散演习和车门开度显著影响乘客疏散效率;前后门踏步处乘客的平均速度分别为(0.930.31)和(0.900.31)m/s;在数值和变化趋势方面,速度-密度关系曲线均与经典研究结果相一致。

入藏号: CSCD:6629926

地址: Zhang Shuo, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Huang Rong, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Yu Qiang, School of Automobile,Chang'an University;;Chang'an University, ;;Key Laboratory of Automotive Transportation Safety Technology,Ministry of Transport, Xi'an;;Xi'an, Shaanxi;;Shannxi 710064;;710064.

地址: 张硕, 长安大学汽车学院, 西安, 陕西 710064, 中国.

黄榕, 长安大学汽车学院, 西安, 陕西 710064, 中国.

余强, 长安大学汽车学院;;长安大学, ;;汽车运输安全保障技术交通行业重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

电子邮件地址: zhangshuo@chd.edu.cn

电子邮件地址: zhangshuo@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Zhao Xuan; Ye Yiming; Yu Man; Wei Jingdong

作者: 赵轩; 叶毅铭; 余曼; 魏敬东

标题: Research on yaw stability control of rear axle independent drive electric vehicle

标题: 后轮独立驱动电动汽车横摆稳定性控制研究

来源出版物: 南京理工大学学报. 自然科学版 卷: 43 期: 5 页: 622-631 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: rear axle independent driving electric vehicle; yaw stability; direct yaw moment control; sliding mode control

作者关键词: 后轮独立驱动电动汽车; 横摆稳定性; 直接横摆力矩控制; 滑模控制

摘要: In order to improve the yaw stability of the rear axle independent driving electric vehicle, a direct yaw moment control strategy is proposed in this paper, the yaw rate and the sideslip angle are taken as the control variables, and the driving force of the driving axle is used as the execution force. The direct yaw moment control strategy includes the yaw moment decision layer and the torque distribution layer. The upper layer of the control strategy is yaw moment decision layer, which uses the sliding mode control theory, and the lower layer is torque distribution layer which adopts the optimal control theory. For nonlinear systems, both control accuracy and response speed can be guaranteed. Based on the vehicle system dynamics, a simplified vehicle dynamics model including linear vehicle reference model and nonlinear vehicle computing model is established. The Matlab/Simulink-Carsim joint simulation platform is built, and the control strategy proposed in this paper is simulated and verified by the snake test condition and the double line shift test condition. The results show that the proposed control strategy can ensure the stability of the vehicle yaw and avoid the driving safety problem caused by the reduction of the longitudinal speed when the braking force is used as the yaw moment. Finally, the A&D5435 semi-physical simulation platform is used to build a pure electric vehicle hardware-in-the-loop test platform to verify the effect of the proposed control strategy.

摘要: 为提高后轮独立驱动电动汽车的横摆稳定性, 提出以车辆的横摆角速度和质心侧偏角为控制变量, 以驱动轮的驱动力为执行力, 包括横摆力矩决策层和转矩分配层两部分的直接横摆力矩控制策略。其中控制策略的上层运用滑模控制理论, 下层采用优化控制理论, 既能保证非线性系统的控制精度, 也能保证其响应速度。运用车辆系统动力学建立了包括线性车辆参考模型和非线性车辆计算模型的简化车辆动力学模型, 搭建了 Matlab/Simulink-Carsim 联合仿真平台, 利用蛇形试验工况和双移线试验工况对该文提出的控制策略进行了仿真验证。最后, 利用 A&D5435 半实物仿真平台搭建了纯电动汽车硬件在环试验平台, 验证了该文控制策略的控制效果。结果表明, 所提出的控制策略能够保证车辆横摆稳定性, 同时避免了以制动力作

为横摆力矩执行力时因纵向车速降低带来的行驶安全性问题。

入藏号: CSCD:6613148

地址: Zhao Xuan, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Ye Yiming, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Wei Jingdong, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Yu Man, School of Automobile, Chang'an University;; School of Vehicle Engineering, Xi'an Aeronautical University, ;; Xi'an;; Xi'an, ;; 710064;; 710077.

地址: 赵轩, 长安大学汽车学院, 西安, 陕西 710064, 中国.

叶毅铭, 长安大学汽车学院, 西安, 陕西 710064, 中国.

魏敬东, 长安大学汽车学院, 西安, 陕西 710064, 中国.

余曼, 长安大学汽车学院;; 西安航空学院车辆工程学院, ;; 西安;; 西安, 陕西;; 陕西 710064;; 710077, 中国.

电子邮件地址: zhaoxuan@chd.edu.cn

电子邮件地址: zhaoxuan@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Wang Xiaoyong; Luo Shen; Ren Jie; Zhu Tong

作者: 王晓勇; 罗珅; 任杰; 朱彤

标题: Research on interval time of traffic violations for bus drivers and its influencing factors

标题: 公交驾驶员违规间隔时间及影响因素研究

来源出版物: 中国安全科学学报 卷: 29 期: 6 页: 128-133 出版年: 2019

文献号: 1003-3033(2019)29:6<128:GJJSYH>2.0.TX;2-I

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语言: Chinese

文献类型: Article

作者关键词: bus drivers; interval time of violations; survival analysis; Cox regression; influencing factors

作者关键词: 公交驾驶员; 违规间隔时间; 生存分析; Cox 回归; 影响因素

摘要: In order to strengthen the management of bus drivers' violations of traffic rules, their time of violations and gender, driving age, education background and other personal characteristics data

were collected. The non-parametric analysis method and the Cox regression analysis method were used to study the differences in the interval time of different bus drivers'violations and factors affecting the drivers' interval time of violations based on survival analysis. The results show that 50% of bus drivers' interval time is greater than 65 days, that in terms of education level, drivers with junior high school background have the longest interval time of violations, that in terms of gender, the interval time of violations for female drivers is similar to that for male, that in terms of driving age, drivers with driving age greater than 20 years have the longest interval time of violations, and that factors that have a significant effect on the drivers' interval time of violations are education background and driving age, while gender have no significant effect on drivers' interval time of violation.

摘要: 为加强对公交驾驶员违规行为的管理,收集公交驾驶员违规时间数据和驾驶员性别、驾龄、学历等个人特征数据;基于生存分析模型,采用非参数分析方法和 Cox 回归分析方法,研究不同群体公交驾驶员违规间隔时间的差异以及影响驾驶员违规间隔时间的因素。结果表明:50%的公交驾驶员违规的间隔时间大于 65 天;公交驾驶员中,就文化程度而言,有初中文化程度的驾驶员违规间隔时间最长;就性别而言,女性驾驶员违规间隔时间与男性驾驶员相近;就驾龄而言,驾龄大于 20 年的驾驶员的违规间隔时间最长;对驾驶员违规间隔时间有显著性影响的因素是文化程度和驾龄,性别对驾驶员违规间隔时间没有显著性影响。

入藏号: CSCD:6593328

地址: Wang Xiaoyong, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Luo Shen, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Ren Jie, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhu Tong, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 王晓勇, 长安大学汽车学院, 西安, 陕西 710064, 中国.

罗珅, 长安大学汽车学院, 西安, 陕西 710064, 中国.

任杰, 长安大学汽车学院, 西安, 陕西 710064, 中国.

朱彤, 长安大学汽车学院, 西安, 陕西 710064, 中国.

电子邮件地址: 2017122122@chd.edu.cn

电子邮件地址: 2017122122@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Xu Ting; Jiang Ruisen; Li Hongqing; Li Qing; Chen Gang

作者: 徐婷; 姜瑞森; 李洪庆; 李青; 陈刚

标题: Layout Optimization of Rectangular Grid Road Multi-mode Bus Network

标题: 矩形网格道路多模式公交线网布局优化研究

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语言: Chinese

文献类型: Article

作者关键词: traffic and transportation engineering; public transit network layout; urban spatial shape; stop interval; multiobjective optimization; multi-mode transit

作者关键词: 交通运输工程; 公交线网布局; 城市空间形状; 站点间距; 多目标优化; 多模式公交

摘要: In order to solve a series of problems such as unreasonable coverage and high operation cost of public transportation network,two modes of public transport,namely,rapid transit and ground conventional transit were classified and discussed. Therefore,it was imperative to optimize the multi-mode bus network of urban road network. By analyzing the spatial shape of rectangular city and considering the structural characteristics of road network structure,a multi-objective optimization model of public traffic network was constructed,which aimed at minimizing the operation cost of public transport and the average travel time of residents. Taking the main urban area of Zhongshan city as the research object,the key parameters,such as travel time,transfer loss time and waiting time,were obtained based on the actual survey data. The proposed optimization model was solved by using MATLAB simulation software. Suggested values of horizontal and longitudinal distance between bus stops in Zhongshan City under different average travel distances of different residents were given. The study shows that through the model optimization,the average travel time of residents is reduced from 39 minutes to 36.5 minutes,which reduces by 6%,and the cost of bus operation is reduced by 12.7%. The proposed optimization model can provide reference and basis for the optimization of public transport network in rectangular road network cities.

摘要: 针对公交线网覆盖不合理、运行成本高等一系列问题,对快速公交与地面常规公交两种公共交通出行方式进行分类讨论,认为对城市道路网络多模式公交线网进行优化势在必行。通过对矩形城市空间形状进行分析,兼顾道路网络结构特征,构建了以公交运行成本最小、居民平均出行时间最少为优化目标的多目标公交线网优化模型;选取中山市主城区作为研究对象,结合实际调研数据得到乘车时间、换乘损失时间、候车时间等关键参数,运用 MATLAB 仿真软件对优化模型进行求解,给出不同居民平均出行距离下中山市公交站点的横向线路、纵向线路间距的建议值。研究表明:通过模型优化使得居民平均出行时间由 39 min 减少至 36.5 min,减少了 6%,公交运行成本降低了 12.7%;该优化模型可以为矩型道路网城市的公交线网优化提供参考与依据。

入藏号: CSCD:6595603

地址: Xu Ting, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Jiang Ruisen, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Li Hongqing, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Li Qing, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Gang, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 徐婷, 长安大学汽车学院, 西安, 陕西 710064, 中国.

姜瑞森, 长安大学汽车学院, 西安, 陕西 710064, 中国.

李洪庆, 长安大学汽车学院, 西安, 陕西 710064, 中国.

李青, 长安大学汽车学院, 西安, 陕西 710064, 中国.

陈刚, 长安大学汽车学院, 西安, 陕西 710064, 中国.

电子邮件地址: annabelxu@163.com

电子邮件地址: annabelxu@163.com

使用次数 (最近 180 天): 0

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作者: Li Yaohua; Yang Qidong; Qu Yafei; Shi Haohao; Meng Xiangzhen; Jiao Sen

作者: 李耀华; 杨启东; 曲亚飞; 师浩浩; 孟祥臻; 焦森

标题: Adaptive variable voltage vectors switching table in direct torque control for PMSM

标题: 自适应电压矢量 PMSM 直接转矩控制开关表

来源出版物: 电机与控制学报 卷: 23 期: 9 页: 75-83 出版年: 2019

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来源出版物: Electric Machines and Control 卷: 23 期: 9 页: 75-83 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: permanent magnet synchronous motor; direct torque control; switching table; zero voltage vector; switching times; dynamic response

作者关键词: 永磁同步电机; 直接转矩控制; 开关表; 零电压矢量; 开关次数; 动态响应

摘要: Aiming to use zero voltage vector properly in direct torque control (DTC) of permanent magnet synchronous motor (PMSM) system, effects of zero voltage vector on stator flux and torque were analyzed. As zero voltage vector decreases the amplitude of stator flux and torque slowly, it can be used in PMSM DTC system to decrease switching times. Based on effects of zero voltage vector and non-zero voltage vector on the system, a switching table to improve overall performance of system was proposed which selects different voltage vector adaptively according to state of the system. Simulation results show that the proposed switch table can meet the control requirements of the system. Compared with conventional switching table, torque ripples are reduced significantly under control of the proposed switching table. Switching times are reduced, therefore, switching losses are decreased. Compared with switching table using zero voltage vector, the proposed switching table can achieve better torque and stator flux's response.

摘要: 针对永磁同步电机(PMSM)直接转矩控制(DTC)合理利用零电压矢量的问题,分析了零电压矢量对磁链和转矩的作用。零电压矢量缓慢减小定子磁链幅值和转矩,可用于永磁同步

电机直接转矩控制系统,且可通过优化选择零电压矢量对应的开关状态来减小开关次数。基于零电压矢量和非零电压矢量对系统静、动状态下的不同影响,提出根据系统所处状态自适应选择不同的电压矢量来提高系统综合性能的开关表。仿真结果表明提出的开关表能满足永磁同步电机直接转矩控制系统控制需求。与传统直接转矩控制开关表相比,自适应电压矢量开关表能有效降低系统转矩脉动,降低系统开关次数,进而减小开关损耗。与含零电压矢量开关表相比,提升了系统动态响应。

入藏号: CSCD:6585764

地址: Li Yaohua, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Yang Qidong, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Qu Yafei, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Shi Haohao, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Meng Xiangzhen, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Jiao Sen, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 李耀华, 长安大学汽车学院, 西安, 陕西 710064, 中国.

杨启东, 长安大学汽车学院, 西安, 陕西 710064, 中国.

曲亚飞, 长安大学汽车学院, 西安, 陕西 710064, 中国.

师浩浩, 长安大学汽车学院, 西安, 陕西 710064, 中国.

孟祥臻, 长安大学汽车学院, 西安, 陕西 710064, 中国.

焦森, 长安大学汽车学院, 西安, 陕西 710064, 中国.

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作者: Shen Xiaoyan; Zhang Fan; Lyu Huitao; Yan Yan; Liu Haoxue

作者: 沈小燕; 张凡; 吕卉焘; 闫艳; 刘浩学

标题: Simulation study on deformation failure of liquid tank truck in rear-end collision

标题: 追尾碰撞下液罐车罐体变形失效仿真研究

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语言: Chinese

文献类型: Article

作者关键词: simulation model; finite element analysis; tank truck; rear-end collision; liquid

leakage

作者关键词: 仿真模型; 有限元分析; 液罐车; 追尾碰撞; 液体泄漏

摘要: In order to reduce the damage caused by the collision of tank trucks, the finite element models of passenger car and tank truck were established by the Hyper Mesh software. The LS-DYNA was introduced and the crash simulation model of two vehicles was established, and the deformation of tank structure in the process of car collision was calculated. The effects of different impact loads and liquid properties on the stress distribution, displacement, and damage deformation of the tank were analyzed. The validity of the model was verified and the tanker loading gasoline was taken as an example to carry out the calculation and analysis. The results show that the deformation of the tank increases with the increasing initial impact velocity under the same contact displacement, that at the same collision velocity, the deformation displacement is positively correlated with the contact displacement, that when the liquid-filling ratio is 0.9, the critical collision velocity of tank failure is 43 km/h, and that by using the simulation model, the liquid leakage rate and leakage amount after the failure of the tank can be obtained.

摘要: 为降低罐车追尾碰撞造成的危害, 运用 Hyper Mesh 软件建立客车和罐车的有限元模型, 并将该模型导入 LS-DYNA 程序, 构建追尾碰撞仿真模型; 计算 2 车碰撞过程中罐体结构变形量, 分析不同冲击载荷和液体属性对罐体碰撞的应力分布、位移变化以及损伤变形演变的影响, 验证该模型的科学性和有效性; 并以罐车装载汽油为例进行计算与分析。结果表明: 相同接触位移下, 初始撞击速度越大, 罐体变形量越大; 同一碰撞速度下, 变形位移量与接触位移呈正相关; 充装率为 0.9 时, 罐体破裂的临界碰撞速度为 43 km/h; 用该仿真模型能够得出罐体破裂失效后的液体泄漏速率和泄漏量等参数。

入藏号: CSCD:6568084

地址: Shen Xiaoyan, School of Automobile, Chang'an University;; Chang'an University, ;; Key Laboratory for Automotive Transportation Safety Enhancement Technology of Ministry of Communication, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710064;; 710064.

Liu Haoxue, School of Automobile, Chang'an University;; Chang'an University, ;; Key Laboratory for Automotive Transportation Safety Enhancement Technology of Ministry of Communication, Xi'an;; Xi'an, Shaanxi;; Shaanxi 710064;; 710064.

Zhang Fan, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Lyu Huitao, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Yan Yan, BYD Company Limited, Shenzhen, Guangdong 518118, China.

地址: 沈小燕, 长安大学汽车学院;; 长安大学, ;; 汽车运输安全保障技术交通行业重点实验室, 西安;; 西安, 陕西;; 陕西 710064;; 710064, 中国.

刘浩学, 长安大学汽车学院;; 长安大学, ;; 汽车运输安全保障技术交通行业重点实验室, 西安;; 西安, 陕西;; 陕西 710064;; 710064, 中国.

张凡, 长安大学汽车学院, 西安, 陕西 710064, 中国.

吕卉焘, 长安大学汽车学院, 西安, 陕西 710064, 中国.

闫艳, 比亚迪股份有限公司, 深圳, 广东 518118, 中国.

电子邮件地址: sxy719@chd.edu.cn

电子邮件地址: sxy719@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Zhang Fan; Lyu Huitao; Shen Xiaoyan; Liu Haoxue

作者: 张凡; 吕卉焘; 沈小燕; 刘浩学

标题: Study on takeaway deliverers' red light running behavior based on planned behavior theory

标题: 计划行为理论下外卖配送员闯红灯行为研究

来源出版物: 中国安全科学学报 卷: 29 期: 5 页: 1-6 出版年: 2019

文献号: 1003-3033(2019)29:5<1:JHXWLL>2.0.TX;2-B

来源出版物: China Safety Science Journal (CSSJ) 卷: 29 期: 5 页: 1-6 出版年: 2019

文献号: 1003-3033(2019)29:5<1:JHXWLL>2.0.TX;2-B

语言: Chinese

文献类型: Article

作者关键词: theory of planned behavior (TPB); takeaway deliverer; red light running (RLR) behavior; hierarchical regression; group regression

作者关键词: 计划行为理论(TPB); 外卖配送员; 闯红灯(RLR)行为; 分层回归; 分组回归

摘要: In order to improve urban road traffic safety, the RLR behaviors of takeaway deliverers were studied through a survey based on TPB. Firstly, t-test was conducted to determine the difference of the mean value of psychological variables among population with different characteristics. Then, the ability of TPB basic variables, extended variables and population variables to explain the intention of RLR behaviors was analyzed by using hierarchical regression and group regression based on population variables. The results show that among all variables only traffic environment has marked impact on takeaway deliverers with different education levels to run a red light. The population variance of all variables to explain RLR intention is 57.3%-69.6%, and attitude, descriptive norms, conformity tendency, traffic environment, educational background and working time are the significant influencing factors of RLR behaviors, among all of which attitude exerts the most obvious influence on behavior intention of running a red light.

摘要: 为提高城市道路交通安全水平,以计划行为理论(TPB)为框架,采用问卷调查的方法,研究外卖配送员闯红灯(RLR)行为。以 t 检验确定不同特征人群心理变量均值的差异性;采用分层回归和基于人口变量的分组回归方法,分析 TPB 基本变量、扩展变量及人口变量对闯红灯行为意图的解释能力。结果表明:对于不同教育程度的外卖配送员,在所有变量中,仅交通环境对其闯红灯行为意图具有显著影响;所有变量可解释闯红灯意图的总体方差为 57.3%~69.6%,态度、示范性规范、从众倾向、交通环境以及教育背景和从业时间是外卖配送员闯红灯行为意图的显著影响因素,其中,态度对闯红灯行为意图的影响最显著。

入藏号: CSCD:6562930

地址: Zhang Fan, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Lyu Huitao, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Shen Xiaoyan, School of Automobile, Chang'an University;;Chang'an University, ;;Key Laboratory for Automotive Transportation Safety Enhancement Technology of the Ministry of Communication, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

Liu Haoxue, School of Automobile, Chang'an University;;Chang'an University, ;;Key Laboratory for Automotive Transportation Safety Enhancement Technology of the Ministry of Communication, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

地址: 张凡, 长安大学汽车学院, 西安, 陕西 710064, 中国.

吕卉焘, 长安大学汽车学院, 西安, 陕西 710064, 中国.

沈小燕, 长安大学汽车学院;;长安大学, ;;汽车运输安全保障技术交通行业重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

刘浩学, 长安大学汽车学院;;长安大学, ;;汽车运输安全保障技术交通行业重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

电子邮件地址: 1435551970@qq.com; 492412488@qq.com

电子邮件地址: 1435551970@qq.com; 492412488@qq.com

使用次数 (最近 180 天): 0

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作者: Jiang Jinke; Fang Zongde; Liu Zhao

作者: 蒋进科; 方宗德; 刘钊

标题: Modification of tooth surface shaping of topological modified helical gears

标题: 拓扑修形斜齿轮齿面插齿修正

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文献类型: Article

作者关键词: helical gear shaping; topological modification; conical grinding wheel; high-order correction of tooth surface; tooth surface error

作者关键词: 插齿斜齿轮; 拓扑修形; 锥面砂轮; 齿面高阶校正; 齿面误差

摘要: A method based on a lengthwise-reciprocating point contact grinding shaping cutter by a cone grinding wheel was proposed to improve the accuracy and life of the shaping cutter and to finish topologically modified helical gears by shaping.First, a gear shaping profile model was

developed based on meshing theory and the kinematic relationship between grinding wheel and cutting tool. Then, corrections of a pressure angle, axial profile and generating motion for the grinding wheel were proposed to minimize twisted profile errors from the cutter on effective resharping depth. The radial position and the total stroke times for the cone grinding wheel were determined by equal roughness grinding method to improve the grinding efficiency. The helical gear shaping model with two degree of freedom was established, and actual object flank modification for gear was derived based on the surface error from shaped gear without modified gear shaping and the given target normal modification of the gear. Finally, with shaping cutter corrections parameters (pressure angle, axis profile for grinding wheel and modified roll motion for generating a shaping cutter) and shaping process corrections parameters (rotation angle of shaped gear and center distance between shaping cutter and shaped gear), the sensitivity of these corrections parameters was derived based on the topographic normal deviation on the gear tooth flank. Besides, the corrections parameters were determined by minimizing the flank errors as a target.

摘要: 为了提高插齿刀精度和寿命并实现拓扑修形齿轮的加工, 提出锥面砂轮轴向冲程点接触刃磨插齿刀及拓扑修形斜齿轮齿面插齿修正方法. 首先根据啮合原理和磨削过程中砂轮和刀具之间的运动关系, 建立插齿刀切削刃方程; 然后通过修正砂轮齿形角、轴向廓形及展成运动, 使重磨深度内切削刃误差最小. 此外为提高刃磨效率, 通过等粗糙度磨齿法, 确定砂轮每次冲程的齿面径向位置及冲程总次数. 根据切削刃方程, 建立2自由度插齿模型; 结合插齿齿面误差和给定的目标法向修形面, 推导工件的实际插齿目标拓扑修形面, 建立基于插齿刀刃形修正参数(砂轮压力角、轴向廓形及展成运动)和插齿运动修正参数(工件转角及插齿中心距)的齿面误差敏感性分析修正模型. 通过优化算法求解各参数, 实现了拓扑修形齿面插齿修正.

入藏号: CSCD:6564404

地址: Jiang Jinke, School of Automotive, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Zhao, School of Automotive, Chang'an University, Xi'an, Shaanxi 710064, China.

Fang Zongde, School of Mechanical Engineering, Northwestern Polytechnical University, Xi'an, Shaanxi 710072, China.

地址: 蒋进科, 长安大学汽车学院, 西安, 陕西 710064, 中国.

刘钊, 长安大学汽车学院, 西安, 陕西 710064, 中国.

方宗德, 西北工业大学机电学院, 西安, 陕西 710072, 中国.

电子邮件地址: jjk06@126.com

电子邮件地址: jjk06@126.com

使用次数 (最近 180 天): 1

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作者: Xu Ting; Zhang Xiang; Zhang Yakun; Wang Jian

作者: 徐婷; 张香; 张亚坤; 王健

标题: Truck driver safety tendency classification based on the AdaBoost algorithm

标题: 基于 AdaBoost 算法的货车驾驶人安全倾向性分类

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语言: Chinese

文献类型: Article

作者关键词: safety ergonomics; driving behavior; OBD data; K-means clustering; AdaBoost algorithm; mean filtering

作者关键词: 安全人体学; 驾驶行为; OBD 数据; K-means 聚类; AdaBoost 算法; 均值滤波

摘要: This paper is mainly to explore the differences or gaps of the different types of truck drivers in their driving behavior by classifying and managing different types of truck drivers from the chosen 39 truck drivers in the natural driving state so as to gain their vehicle driving data by driving the OBD (On-Board Diagnostics) vehicles. For such a goal, the data concerned on the said 39 truck drivers has been filtered via the mean filtering method by eliminating the external environment influential factors to be caused by the road bumps and engine shake. But, the parameters, such as the maximum speed, the maximum lateral and longitudinal acceleration, the maximalized relative ratio of the vehicle speeds to the engine speed have actually been set up and controlled as their safety driving tendency evaluation indexes. On the other hand, K-means algorithms has been taken to cluster the said 39 truck drivers' driving data by dividing them into aggressive and conservative ones. Furthermore, the t test proves that there indeed exist significant differences on the mean parameters we have chosen, and their difference in the mean parameters tends to be statistically conspicuous. And, then, their driving safety tendency has been confirmed and determined by the AdaBoost algorithm of the classification model. And, in so doing, the results of K-means algorithms have been worked out to classify the said truck drivers as the sampling labels of the AdaBoost algorithm. In addition, the sampling data from the above truck drivers have been set up as the training set (26 samples) and the testing set (13 samples) of the AdaBoost algorithm, correspondingly and respectively. The data validation classification results demonstrate that the average level of the truck drivers' safety tendency classification model based on AdaBoost algorithm has been worked out at about 98.74%, which can help to distinguish effectively the aggressive truck drivers from the rather conservative ones. And, then, the classification results of the drivers of the aggressive type prove to be prone to high-speed driving, overtaking, sudden acceleration, sudden deceleration, and unexpected braking speed and so on, and the conservative ones, on the contrary, are generally preferring to express stronger or more patient self-control driving with greater stability and reveal more disciplinary to the traffic rules. Therefore, different personalities and qualifications can be detected and categorized to evaluate the drivers as to their vehicle control and operation characteristic styles in the testing groups.

摘要: 为了研究货车驾驶人驾驶行为的差异性,对不同货车驾驶人实行分类管理。通过车载 OBD 设备获取 39 位货车驾驶人在自然驾驶状态下的车辆行驶数据,采用均值滤波方法对数

据进行平滑滤波处理,以消除车辆行驶过程中由于路面颠簸、发动机抖动等外界环境对数据的影响。选择最高车速、横向加速度峰值、行车方向加速度峰值、车速与发动机转速的最大相对比值作为货车驾驶人安全倾向性评价指标。在对数据进行 K-means 聚类分析的基础上,应用 AdaBoost 算法建立货车驾驶人安全倾向性分类模型,将货车驾驶人分为激进型驾驶人或保守型驾驶人。数据验证分类结果表明,基于 AdaBoost 算法的货车驾驶人安全倾向性分类模型的平均准确率可以达到 98.74%,可有效区分激进型货车驾驶人及保守型货车驾驶人。

入藏号: CSCD:6559648

地址: Xu Ting, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Xiang, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Yakun, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Jian, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 徐婷, 长安大学汽车学院, 西安, 陕西 710064, 中国.

张香, 长安大学汽车学院, 西安, 陕西 710064, 中国.

张亚坤, 长安大学汽车学院, 西安, 陕西 710064, 中国.

王健, 长安大学汽车学院, 西安, 陕西 710064, 中国.

电子邮件地址: annabelxu@163.com

电子邮件地址: annabelxu@163.com

使用次数 (最近 180 天): 0

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作者: Liu Xiaodong; Ma Jian; He Yilin; Zhang Yixi; Zhang Kai

作者: 刘晓东; 马建; 贺伊琳; 张一西; 张凯

标题: Influence of Drivetrain Topology Configuration with AMT on Comprehensive Performance of Pure Electric Bus

标题: AMT 驱动构型对纯电动客车综合性能影响研究

来源出版物: 中国公路学报 卷: 32 期: 7 页: 172-181 出版年: 2019

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作者关键词: automotive engineering; drivetrain configuration; pure electric bus; dynamic performance; economic performance

作者关键词: 汽车工程; 驱动构型; 纯电动客车; 动力性; 经济性

摘要: In order to study the influence of drivetrain configuration with an automatic mechanical transmission(AMT)on the comprehensive performance of a pure electric bus,a 12 m direct drive pure electric city bus was taken,equipped with a three-speed AMT and rematched the drive motor.Based on the NSGA-II multi-objective optimization algorithm,the gearbox transmission ratio was optimized for the purpose of minimizing the acceleration time of 0 to 50 km·h⁻¹ and the energy consumption of China's typical urban cycles(normal roads and throughways).Then,the two-parameter dynamic and economic gearshift schedules were formulated based on vehicle velocity and accelerator pedal opening.Finally,driving energy consumption and braking energy recovery simulations were conducted with different gear shift schedules in normal roads and throughways for China's typical urban cycles.Meanwhile,the dynamic performance was analyzed through the maximum gradeability and acceleration time.From comparison with the direct-drive pure electric bus,it can be shown that when the bus is equipped with an AMT,the maximum gradeability increases from 20.07% to 20.3%,the peak torque of the drive motor decreases by 68.4%,and the acceleration time of 0 to 50 km·h⁻¹ rises from 14.19 s to 18.69 s.Although the dynamic performance of the vehicle can meet the design requirements,the acceleration time increased by 31.7%.At the same time,the driving energy consumption decreased but the capacity of the braking energy recovery weakens.Both are affected by the vehicle driving cycles and AMT shift schedules.When driving on normal roads,the driving energy savings can reach 1.55% and 0.55% for 100 kilometers,compared with 4.78% and 3.72% on throughways,using the economic and dynamic gear shift schedule,respectively.However,the braking energy recovery decreased by 1.35% and 1.53% on normal roads and 1.53% and 5.1% on throughways.Thus, the comprehensive energy consumption for 100 kilometers will decrease by -0.12% and 1.62% on normal roads compared with 5.63% and 3.35% on throughways when using the dynamic and economic gear shift schedules,respectively.Therefore,it is necessary to comprehensively consider the influence of vehicle design requirements,driving conditions,and shift schedules when adopting the AMT drivetrain configuration to an electric bus.

摘要: 为研究自动机械式变速器(AMT)驱动构型对纯电动客车综合性能的影响,以 12m 电机直驱纯电动城市客车为研究对象,装备 3 挡 AMT 并对驱动电机重新选型,利用 NSGA-II 多目标优化算法以 0~50km·h⁻¹ 加速时间最短和中国典型城市工况(普通道路和快速道路)下行行驶能耗最低为目标对变速箱传动比进行优化,并制定基于车速和加速踏板开度的双参数动力性与经济性换挡规律,在中国典型城市工况不同道路下,采用 2 种换挡规律对整车驱动能耗与制动能量回收进行仿真,并利用最大爬坡度及加速时间对整车动力性能进行分析。研究结果表明:与原电机直驱构型下整车性能相比,AMT 驱动构型在将驱动电机峰值扭矩降低 68.4% 后,最大爬坡度从 20.07% 提高到 20.3%,0~50km·h⁻¹ 加速时间从 14.19s 增加到 18.69s,整车动力性虽满足要求,但加速时间增加了 31.7%;其驱动能耗有所降低,但制动能量回收能力有所减弱,且二者都受行驶工况和换挡规律的影响,普通道路行驶时,经济性和动力性换挡规律百公里驱动能耗分别降低了 1.55% 和 0.55%,百公里制动能量回收分别减少了 1.35% 和 1.53%,百公里综合能耗分别降低了 -0.12% 和 1.62%,快速道路行驶时,经济性和动力性换挡规律百公里驱动能耗分别降低 4.78% 和 3.72%,百公里制动能量回收分别减少了 1.53% 和 5.1%,百公里综合能耗分别降低了 5.63% 和 3.35%。可见,纯电动客车采用 AMT 驱动构型时,需综合考虑车辆设计要求及行驶工况与换挡规律的影响。

入藏号: CSCD:6554146

地址: Liu Xiaodong, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Ma Jian, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

He Yilin, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Yixi, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Kai, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 刘晓东, 长安大学汽车学院, 西安, 陕西 710064, 中国.

马建, 长安大学汽车学院, 西安, 陕西 710064, 中国.

贺伊琳, 长安大学汽车学院, 西安, 陕西 710064, 中国.

张一西, 长安大学汽车学院, 西安, 陕西 710064, 中国.

张凯, 长安大学汽车学院, 西安, 陕西 710064, 中国.

电子邮件地址: 15020616886@126.com; majian@chd.edu.cn

电子邮件地址: 15020616886@126.com; majian@chd.edu.cn

使用次数 (最近 180 天): 0

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引用的参考文献数: 24

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作者: Shi Peilong; Yu Qiang; Zhao Xuan; Yuan Xiaolei; Liu Pan

作者: 史培龙; 余强; 赵轩; 袁晓磊; 刘攀

标题: Risk State Identification of Pneumatic Braking System for Heavy Duty Truck

标题: 重型载货汽车气压制动系统危险状态识别

来源出版物: 中国公路学报 卷: 32 期: 7 页: 182-190 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: automotive engineering; pneumatic braking system; Markov model; heavy-duty
truck; state identification

作者关键词: 汽车工程; 气压制动系统; 马尔可夫模型; 重型载货汽车; 状态识别

摘要: To resolve the problem that potential factors easily to ignore for pneumatic braking system
cause serious traffic accidents,including pipeline breakdown,mechanical faults,or thermal
recession,a method was developed for identifying the risks of pneumatic braking systems based on
principal component analysis(PCA)dimensionality reduction and a Markov model.For the
dual-circuit pneumatic brake system of a three-axle heavy duty truck,in order to consider the

structural complexity and obvious time-series characteristics during the braking process,brake pedal operation,establish system pressure,and achieve vehicle deceleration,the system state was first identified by characteristic value using PCA dimension reduction.Then,a double-layer hidden Markov model with driver braking intention and braking system response was used to recognize the system state.Affected by driver's habits,the recognizability of braking pedal action moment was low.In this paper,Mixture Gauss Clustering Method was used to extract the data of braking holding stage to build the braking intention recognition model and system response recognition model.The system state was represented by matching degree between the two models.Finally,braking tests were performed to train the identification of the mode and validate the accuracy of the model online.The test results show that the identification method based on PCA dimensionality reduction and Markov model can identify the status of the braking system accurately and effectively in the normal state.The PCA dimensionality reduction method can also identify the dangerous state promptly and effectively when brake line breakdown and pressure reduction occur.

摘要: 针对重型载货汽车因气压制动系统发生管路破裂、机械故障或热衰退导致制动效能下降且不易察觉从而引发严重交通事故的问题,提出基于主成分分析降维(PCA 降维)和马尔可夫模型的气压制动系统危险状态识别方法。考虑到三轴载货汽车双回路制动系统的结构复杂性以及制动过程制动踏板动作、系统压力建立和实现车辆减速具有明显的时序性特点,首先采用 PCA 降维的方法对系统状态进行辨识;然后运用驾驶人制动意图与制动系统响应的双层隐形马尔可夫模型对系统状态进行识别。受驾驶人习惯影响制动踏板作用瞬间辨识度低,采用混合高斯聚类法提取不同制动意图时制动保持阶段数据建立制动意图识别模型和系统响应识别模型,通过二者匹配程度判定系统状态。最后,分别依据实车试验数据对模型进行离线训练和在线辨识验证。试验结果表明:系统正常状态下,基于 PCA 降维和马尔可夫模型相结合的识别方法能够准确、有效地识别制动系统状态;制动管路断开压力降低状态下,PCA 降维方法能够及时有效识别其危险状态。

入藏号: CSCD:6554147

地址: Shi Peilong, School of Automobile,Chang'an University;;Chang'an University, ;;Key Laboratory of Automotive Transportation Safety Techniques of Ministry of Transport, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

Yu Qiang, School of Automobile,Chang'an University;;Chang'an University, ;;Key Laboratory of Automotive Transportation Safety Techniques of Ministry of Transport, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

Zhao Xuan, School of Automobile,Chang'an University;;Chang'an University, ;;Key Laboratory of Automotive Transportation Safety Techniques of Ministry of Transport, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

Yuan Xiaolei, School of Automobile,Chang'an University;;Chang'an University, ;;Key Laboratory of Automotive Transportation Safety Techniques of Ministry of Transport, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

Liu Pan, School of Automobile,Chang'an University;;Chang'an University, ;;Key Laboratory of Automotive Transportation Safety Techniques of Ministry of Transport, Xi'an;;Xi'an, Shaanxi;;Shaanxi 710064;;710064.

地址: 史培龙, 长安大学汽车学院;;长安大学, ;;汽车运输安全保障技术交通行业重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

余强, 长安大学汽车学院;;长安大学, ;;汽车运输安全保障技术交通行业重点实验室, 西安;;

西安, 陕西;;陕西 710064;;710064, 中国.

赵轩, 长安大学汽车学院;;长安大学, ;;汽车运输安全保障技术交通行业重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

袁晓磊, 长安大学汽车学院;;长安大学, ;;汽车运输安全保障技术交通行业重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

刘攀, 长安大学汽车学院;;长安大学, ;;汽车运输安全保障技术交通行业重点实验室, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

电子邮件地址: peilongshi@chd.edu.cn

电子邮件地址: peilongshi@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

引用的参考文献数: 16

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作者: Chen Yisong; Zhao Junwei; Liu Yongtao

作者: 陈轶嵩; 赵俊玮; 刘永涛

标题: Development Strategy of Shared Mobility for Smart Cities in the Future

标题: 面向未来智慧城市的汽车共享出行发展战略

来源出版物: 中国工程科学 卷: 21 期: 3 页: 114-121 出版年: 2019

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文献类型: Article

作者关键词: smart city; shared mobility; development mode; path analysis; ecology conception

作者关键词: 智慧城市; 共享出行; 发展模式; 路径分析; 生态构想

摘要: This paper first analyzes the development environment, trends, and opportunities for shared mobility, and elaborates the symbiotic relationship between shared mobility and smart city. The typical development mode and practical experiences of shared mobility in China are summarized and analyzed. Then, new concepts for shared mobility development are expounded from three dimensions of new technology, new demand, and new model. On this basis, five typical paths for the innovative development of shared mobility in China are summarized and proposed. Finally, the concept of shared mobility ecology in future smart cities in China is conceived.

摘要: 本文分析了当前汽车共享出行的发展环境、发展趋势与发展机遇,梳理了汽车共享出行与智慧城市之间的共生关系。对我国汽车共享出行的典型发展模式进行分析、实践经验进行

总结,从新技术、新需求以及新模式三个维度阐述了汽车共享出行发展的新理念。在此基础上,提出了我国汽车共享出行创新发展的五种典型路径,基于发展路径对我国未来智慧城市汽车共享出行生态进行了构想。

入藏号: CSCD:6538687

地址: Chen Yisong, School of Automobile, Changan University, Xian, 710064.

Zhao Junwei, School of Automobile, Changan University, Xian, 710064.

Liu Yongtao, School of Automobile, Changan University, Xian, 710064.

地址: 陈轶嵩, 长安大学汽车学院, 西安, 陕西 710064, 中国.

赵俊玮, 长安大学汽车学院, 西安, 陕西 710064, 中国.

刘永涛, 长安大学汽车学院, 西安, 陕西 710064, 中国.

电子邮件地址: chenysisong_1988@163.com

电子邮件地址: chenysisong_1988@163.com

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Tan Zihu; Gong Xianwu; Liu Fengyun; Gao Qi; Zhao Xuan

作者: 谭子胡; 龚贤武; 刘峰云; 高齐; 赵轩

标题: Estimation of vehicle parameters under steering and braking condition

标题: 弯道制动工况下车辆参数估计

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语言: Chinese

文献类型: Article

作者关键词: braking and steering condition; lateral force; UKF; relaxation length

作者关键词: 参数估计; 车辆; 弯道制动工况; 无迹卡尔曼滤波器; 松弛长度

摘要: **【Objective】** In order to estimate the state parameters of the vehicle under braking and steering condition and to observe the influence of the relaxation length on the lateral force, a state parameter estimation model based on the Unscented Kalman filter(UKF) is proposed. **【Method】** The model considers the effect of driving/braking forces of driving wheels on vehicle stability, and regards the relaxation length as estimated parameter to adjust the accuracy of lateral force estimation. Finally, the model is validated by the co-simulation of Carsim and Matlab/Simulink under the typical running conditions. **【Result】** The estimation of the longitudinal velocity of the

center of mass,the yaw rate,the lateral force of wheels are same as the reference,reached 100%,but the error of lateral velocity of the center of mass is large. 【Conclusion】 It is suggested that the designed model can effectively estimate the state parameters of the vehicle under steering and braking conditions.

摘要: 【目的】为了准确估计车辆在弯道制动工况下的状态参数,观察松弛长度对车轮侧向力的影响,提出了一种基于无迹卡尔曼滤波器(UKF)的状态参数估计模型. 【方法】该模型考虑了单个车轮驱/制动力对车辆稳定性的影响,将松弛长度作估计量来调节侧向力的估算精度. 选择典型工况,应用 Carsim 与 Matlab/Simulink 联合仿真对模型进行验证. 【结果】仿真表明,该模型估计的质心纵向速度、横摆率、车轮侧向力与参考数据 100%拟合,质心侧向速度误差较大. 【结论】该模型能有效地估计弯道制动工况下的车辆状态参数.

入藏号: CSCD:6537591

地址: Tan Zihu, College of Automobile,Chang'an University;;Great wall Motor Co Ltd, ;; Xi'an;;Baoding, ;; 710064;;071000.

Gong Xianwu, College of Electronic Control,Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Fengyun, College of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Gao Qi, College of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Xuan, College of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 谭子胡, 长安大学汽车学院;;长城汽车股份有限公司, ;; 西安;;保定, 陕西;;河北 710064;;071000, 中国.

龚贤武, 长安大学电控学院, 西安, 陕西 710064, 中国.

刘峰云, 长安大学汽车学院, 西安, 陕西 710064, 中国.

高齐, 长安大学汽车学院, 西安, 陕西 710064, 中国.

赵轩, 长安大学汽车学院, 西安, 陕西 710064, 中国.

电子邮件地址: purplelake2011@163.com

电子邮件地址: purplelake2011@163.com

使用次数 (最近 180 天): 0

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作者: Shi Peilong; Wang Zhixin; Yu Qiang; Zhao Xuan

作者: 史培龙; 王志新; 余强; 赵轩

标题: Driving performance of heavy duty truck in plateau area

标题: 重型载货汽车高原区行驶特性试验

来源出版物: 甘肃农业大学学报 卷: 54 期: 3 页: 193-201 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: Heavy duty truck; plateau area; driving characteristic

作者关键词: 重型载货汽车; 高原区; 行驶特性

摘要: **【Objective】** To solve the problem that the power decrease of diesel engine in plateau area, this paper chooses 5 altitude gradients of Xining(2 300 m), Gonghe(2 890 m), Xinghai(3 638m), Yushu(4 188m) and Madoi(4 545m) to take engine full load acceleration and engine braking tests. **【Method】** Based on the theory of vehicle dynamics, the engine external characteristics and engine braking characteristic curves are obtained by the method of quadratic fitting, and the model between engine driving torque, braking torque and altitude are established to evaluate the driving characteristics of heavy trucks in plateau area. **【Result】** The engine output power decreases by 15.65%, 20.87%, 26.53%, 29.33% and 33.21%, and the engine output braking torque decreases by 30.20%, 44.68%, 47.69%, 49.69% and 51.00% at 2 300, 2 890, 3 638, 4 188 and 4 545 m altitudes. **【Conclusion】** The results suggest that the model errors between engine driving torque and braking torque and altitude are within (+5%) and (+3%), which can accurately reflect the engine characteristics and engine braking characteristics at different altitudes, and can be used to evaluate the driving characteristics of heavy trucks in plateau areas.

摘要: **【目的】** 针对高原区重型载货汽车因大气状态变化出现功率下降导致动力不足的问题, 本研究选择了西宁(2 300 m)、共和(2 890 m)、兴海(3 638m)、玉树(4 188m)和玛多(4 545m) 5个海拔梯度地区进行发动机全负荷加速和制动试验研究。**【方法】** 基于汽车系统动力学理论, 运用二次拟合的方法获得了发动机外特性和制动特性曲线, 从而建立了发动机输出驱动扭矩和制动扭矩与海拔之间的模型, 并用于评价重型载货汽车高原区行驶的特性。**【结果】** 同台架试验相比, 海拔 2 300、2 890、3 638、4 188、4 545m 发动机输出功率分别下降了 15.65%、20.87%、26.53%、29.33%、33.21%, 发动机制动时输出制动扭矩分别下降了 30.20%、44.68%、47.69%、49.69%、51.00%。**【结论】** 建立发动机输出驱动扭矩和制动扭矩与海拔之间的模型误差分别在 5%、3% 以内, 能够准确的反映不同海拔高度的发动机外特性和制动特性, 可用于评价重型载货汽车高原区行驶特性。

入藏号: CSCD:6537593

地址: Shi Peilong, College of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Yu Qiang, College of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Xuan, College of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Zhixin, Gansu Vocational and Technical College of Communications, Lanzhou, Gansu 730070, China.

地址: 史培龙, 长安大学汽车学院, 西安, 陕西 710064, 中国.

余强, 长安大学汽车学院, 西安, 陕西 710064, 中国.

赵轩, 长安大学汽车学院, 西安, 陕西 710064, 中国.

王志新, 甘肃交通职业技术学院, 兰州, 甘肃 730070, 中国.

电子邮件地址: peilongshi@chd.edu.cn

电子邮件地址: peilongshi@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Ji Peng; Geng Limin; Wang Yanjuan; Chen Yang; Xu Bojian; Bi Leichao; Li Yan

作者: 吉鹏; 耿莉敏; 王燕娟; 陈阳; 徐博健; 毕磊超; 李妍

标题: Simulation analysis of combustion and emission characteristics of biodiesel/n-butanol blends based on AVL-FIRE

标题: 基于 AVL-FIRE 的生物柴油/正丁醇混合燃料燃烧与排放特性仿真分析

来源出版物: 甘肃农业大学学报 卷: 54 期: 3 页: 202-209 出版年: 2019

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语言: Chinese

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作者关键词: diesel engine; biodiesel; n-butanol; combustion characteristic; emission performance; analog simulation

作者关键词: 柴油机; 生物柴油; 正丁醇; 燃烧特性; 排放特性; 模拟仿真

摘要: **【Objective】** To study the combustion and emission characteristics of biodiesel-n-butanol blended fuel. **【Method】** Based on AVL-FIRE combustion simulation software, the in-cylinder pressure, temperature distribution, NO_x and soot emissions of three different fuels of BD100, BD90N10 and BD70N30 were analyzed. **【Results】** When the engine operating at 1400r/min and large load conditions with a certain amount of circulating fuel injection, with the increase of n-butanol blending ratio, the maximum pressure in the cylinder decreased, but the peak value appeared around 7°C. The temperature in the cylinder decreased slightly. Due to the large latent heat of vaporization of n-butanol, the temperature of the gas mixture in the cylinder was decreased. Therefore, with the increase of the n-butanol blending ratio, the NO_x emission of the mixed fuel decreased. The high oxygen content of n-butanol enables the mixed fuel of soot emissions reduced. **【Conclusion】** With the increase of n-butanol blending ratio, the maximum burst pressure in the cylinder decreases; the temperature in the cylinder decreases slightly.

摘要: **【目的】** 研究生物柴油-正丁醇混合燃料的燃烧与排放特性。 **【方法】** 基于 AVL-FIRE 燃烧仿真软件对 BD100、BD90N10、BD70N30 3 种不同掺混比的生物柴油-正丁醇混合燃料进行缸内燃烧仿真与分析, 对比 3 种不同燃料的缸内压力, 温度分布, NO_x 和 soot 排放。 **【结果】** 在发动机 1400r/min, 小负荷工况下运行且循环喷油量一定时, 随着混合燃料中正丁醇掺混比的增大, 缸内最大爆发压力减小, 但峰值都出现在 7°C 附近; 缸内温度略有降低。由于正丁醇汽化潜热大, 导致缸内混合气温度降低, 因此随着正丁醇掺混比的增大, 混合燃料的氮氧化物

排放降低;正丁醇的高含氧量能够使混合燃料的碳烟排放降低.【结论】随着正丁醇掺混比的增大,缸内最大爆发压力减小;缸内温度略有降低.

入藏号: CSCD:6537594

地址: Ji Peng, College of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Geng Limin, College of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Yanjuan, College of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Yang, College of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Xu Bojian, College of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Bi Leichao, College of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Yan, Shijiazhuang Tiedao University, Shijiazhuang, Hebei 050043, China.

地址: 吉鹏, 长安大学汽车学院, 西安, 陕西 710064, 中国.

耿莉敏, 长安大学汽车学院, 西安, 陕西 710064, 中国.

王燕娟, 长安大学汽车学院, 西安, 陕西 710064, 中国.

陈阳, 长安大学汽车学院, 西安, 陕西 710064, 中国.

徐博健, 长安大学汽车学院, 西安, 陕西 710064, 中国.

毕磊超, 长安大学汽车学院, 西安, 陕西 710064, 中国.

李妍, 石家庄铁道大学, 石家庄, 河北 050043, 中国.

电子邮件地址: 413821656@qq.com; genglimin@chd.edu.cn

电子邮件地址: 413821656@qq.com; genglimin@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Li Bo; Zheng Qin; Ning Lijin; Han Jian; Zhu Tong

作者: 李博; 郑琴; 宁立进; 韩健; 朱彤

标题: Bionic optimization of design process based on the design-process gene

标题: 基于设计过程基因的设计过程仿生优化

来源出版物: 机械设计 卷: 36 期: 6 页: 53-63 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: design process gene; gene engineering; knowledge; bionic optimization; reuse

作者关键词: 设计过程基因; 基因工程; 知识; 仿生优化; 重用

摘要: Aimed at the analogy between the design process of product and the evolution process of

organism,both the principle of genetic variation and the method of gene engineering are introduced to the design-process optimization,and a method for the bionic optimization of design process based on the design-process gene is proposed.The design-process gene is configured with the knowledge-based element,and its definition,structure and features are analyzed.Based on the concept of basic element in Extenics,the element model of the design-process gene is set up.Besides,the concept of the design-process genome and its organizational structure are put forward and analyzed.The reference model of the bionic optimization of design process is established,according to the design categories.The expansibility of basic element is used for the recombination and variation of the design-process gene.The feasibility and rationality of this method are verified by an application example of the bionic optimization of design process for a certain type of aircraft.

摘要: 从产品设计过程与生物遗传进化过程的相似性出发,引入生物遗传变异原理和基因优化重组方法研究设计过程优化,提出一种通过优化重组设计过程基因进行设计过程仿生优化的方法。以设计过程知识为基本单元构造设计过程基因,分析其内涵、结构和特征,引入可拓论的基元建模方法建立设计过程基因的基元模型,提出并分析设计过程基因组的概念及其组织结构;在划分设计类型的基础上建立了产品设计过程仿生优化过程参考模型;利用基元的可扩性实现设计过程基因重组与变异。通过某型号飞机设计过程仿生优化方法应用实例,验证了所提方法的可行性和合理性。

入藏号: CSCD:6537017

地址: Li Bo, Automobile School,Changan University, Xian, 710064.

Zheng Qin, Automobile School,Changan University, Xian, 710064.

Ning Lijin, Automobile School,Changan University, Xian, 710064.

Zhu Tong, Automobile School,Changan University, Xian, 710064.

Han Jian, Xian Aerospace Huayang Mechanical & Electrical Equipment Co.,Ltd., Xian, 710100.

地址: 李博, 长安大学汽车学院, 西安, 陕西 710064, 中国.

郑琴, 长安大学汽车学院, 西安, 陕西 710064, 中国.

宁立进, 长安大学汽车学院, 西安, 陕西 710064, 中国.

朱彤, 长安大学汽车学院, 西安, 陕西 710064, 中国.

韩健, 西安航天华阳机电装备有限公司, 西安, 陕西 710100, 中国.

电子邮件地址: qinyecha@chd.edu.cn

电子邮件地址: qinyecha@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Guo Jingang; Dong Haoxuan

作者: 郭金刚; 董昊轩

标题: Optimal Matching of Powertrain System of Four In-wheel-motor Actuated Electric Vehicle

标题: 四轮毂电机驱动电动汽车动力系统优化匹配

来源出版物: 公路交通科技 卷: 36 期: 7 页: 150-158 出版年: 2019

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文献类型: Article

作者关键词: automotive engineering; parameter matching; co-simulation; electric vehicle; regenerative braking; in-wheel-motor

作者关键词: 汽车工程; 参数匹配; 联合仿真; 电动汽车; 再生制动; 轮毂电机

摘要: In order to study the relationship between the matching of motor power in different axles and the amount of energy recovery for four in-wheel-motor actuated electric vehicles, the energy recovery effects of different matching schemes are compared and analyzed by combining theoretical analysis with simulation. According to the requirements in the relative standards, the power performance parameters are determined. The required rated/peak powers of the vehicle, the rated/peak speed of the motor are calculated, and the redistribution model of the power that the vehicle required is built. According to the model, the required power of the vehicle is distributed in a certain proportion between the front and the rear axles, and the required power of each axle is distributed equally between the left and right wheels. By analyzing the braking dynamics of the vehicle, a recommended scheme of powertrain matching to the front and the rear axles is put forward according to ideal braking force distribution strategy for the front and rear axles. The co-simulation model of the subject electric vehicle based on MATLAB/Simulink and CarSim is built. The optimal matching schemes of hub motor on the front and rear axles are obtained by stratified sampling. The differences of brake recovery energy in different distribution schemes under the conditions of braking strengths of 0.1, 0.2 and 0.3, typical driving cycles of New European Driving Cycle (NEDC), China City Driving Cycle (CCDC) and New York City Cycle (NYCC) using ideal braking force distribution strategy are studied respectively. The optimal matching of front/rear axle hub motors is obtained, which verified the power performance of the optimal scheme. The theory and simulation results show that when the power distribution ratio of the in-wheel-motors on the front and rear axles equals to the static vertical load on the front and rear axles, the braking energy recovery is superior to other matching scheme.

摘要: 为了研究四轮毂电机驱动电动汽车电机功率在各轴之间的匹配与回收能量多少之间的关系,采用理论分析和仿真相结合的方法,对不同匹配方案下的能量回收效果进行了对比分析。基于相关标准要求,确定了整车和动力性参数,计算整车额定功率、峰值需求功率和轮毂电机额定转速、峰值转速等,并建立了整车需求功率的二次再分模型。该模型对整车需求功率先在前/后轴之间按一定比例分配,再将各轴需求功率在左右车轮间平均分配。通过对整车制动动力学的分析,对前/后轴制动力按照理想制动力分配策略的情况,提出了电机功率在各轴之间匹配的推荐方案。基于 Matlab/Simulink 和 CarSim 软件搭建四轮毂电机驱动电动汽车联合仿真模型,采用分层取样得到多个前/后轴轮毂电机功率分配方案,研究在理想制动力分配策略下,制动强度分别为 0.1, 0.2 和 0.3, 以及新欧洲运行循环(NEDC)、中国城市乘用车工

况(CCDC)和纽约城市运行循环(NYCC) 3 种典型循环工况下不同分配方案时制动回收能量的差异,得到前/后轴轮毂电机功率最优匹配,并对最优方案动力性进行了验证。理论和仿真结果表明:当前/后轴轮毂电机功率分配比与前/后轴静态垂直载荷比相近时,电动汽车将获得最好的能量回收效果。

入藏号: CSCD:6530652

地址: Guo Jingang, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Dong Haoxuan, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 郭金刚, 长安大学汽车学院, 西安, 陕西 710064, 中国.

董昊轩, 长安大学汽车学院, 西安, 陕西 710064, 中国.

电子邮件地址: guojg@chd.edu.cn

电子邮件地址: guojg@chd.edu.cn

使用次数 (最近 180 天): 1

使用次数 (2013 年至今): 1

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作者: Zhao Junwei; Hua Jun; Liu Yongtao; Wei Lang

作者: 赵俊玮; 华珺; 刘永涛; 魏朗

标题: Simulation test study on stress response ability of drivers under different warning modes

标题: 不同警告方式下驾驶人应激反应能力模拟试验研究

来源出版物: 中国安全生产科学技术 卷: 15 期: 6 页: 162-167 出版年: 2019

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作者关键词: traffic safety; driver assistance system; warning mode; stress response ability; simulation test

作者关键词: 交通安全; 驾驶辅助系统; 警告方式; 应激反应能力; 模拟试验

摘要: In order to study the influence of different warning modes by the advanced driver assistance system on the stress response ability of drivers under the road emergency scenes, by using the self-developed test software for the stress response ability of drivers, taking the computer simulation and driving simulator as the test platforms and the actual driving videos as the test scenes, the stress response ability of drivers under different warning modes were analyzed by selecting the operation accuracy and reaction time as the test indexes. The results showed that the visual warning could effectively shorten the stress response time. The visual warning played a

dominant role in the visual-auditory combination warning, and the auditory warning played an auxiliary role. In the real video test environment, the operation effect of driving simulator test was better than that of computer simulation test.

摘要: 为研究在道路突发危险场景下先进驾驶辅助系统的不同警告方式对驾驶人应激反应能力的影响,利用自主开发的驾驶人应激反应能力测试软件,以计算机模拟与驾驶模拟器为试验平台,以实际驾驶视频为试验场景,选取操作准确率和反应时间为测试指标,分析不同警告方式下驾驶人的应激反应能力.研究表明:视觉警告可有效缩短应激反应时间;视听觉组合警告中,视觉警告占主导作用,听觉警告起辅助作用;在真实场景视频试验环境下,驾驶模拟器模拟试验的操作效果优于计算机模拟试验.

入藏号: CSCD:6527228

地址: Zhao Junwei, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Hua Jun, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Yongtao, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Wei Lang, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 赵俊玮, 长安大学汽车学院, 西安, 陕西 710064, 中国.

华珺, 长安大学汽车学院, 西安, 陕西 710064, 中国.

刘永涛, 长安大学汽车学院, 西安, 陕西 710064, 中国.

魏朗, 长安大学汽车学院, 西安, 陕西 710064, 中国.

使用次数 (最近 180 天): 0

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作者: Li Yaohua; Li Zhongyu; Gou Qizhi; Ren Tianyuan; Shao Pandeng; Liu Peng

作者: 李耀华; 李忠玉; 苟琦智; 任田园; 邵攀登; 刘鹏

标题: Driving Cycle Construction of Urban Bus Line Based on Clustering Analysis

标题: 基于聚类分析的城市公交线路工况构建

来源出版物: 重庆交通大学学报. 自然科学版 卷: 38 期: 1 页: 83-88,96 出版年: 2019

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文献类型: Article

作者关键词: traffic engineering; city bus; line selection; sampling judgment; cluster analysis; driving circle construction

作者关键词: 交通工程; 城市客车; 线路筛选; 采样量判断; 聚类分析; 工况构建

摘要: For the construction of driving cycle of Xi'an bus line, the line intensity was used to select the sampled bus line and a comprehensive stability index of the samples was proposed to judge whether the sampling data were saturated. Based on the method of clustering analysis, the driving cycle of Xi'an bus line was constructed. The validity of the construction condition was verified by the average error and V-A probability 2-D distribution matrix similarity. The test data indicate that the average error is only 7.3% between the sampling data and the constructed cycle and the similarity coefficient of the V-A probability distribution matrix of both is 0.9957, which shows that the error caused by the clustering method is small and accords with the actual driving condition.

摘要: 针对西安市城市公交线路工况构建,提出了采用线路强度来筛选采样线路的方法和根据样本综合稳定度指标来判定工况数据采样量饱和的判据,并基于聚类分析法构建了西安市某城市公交线路工况,通过平均误差和 V-A 概率二维分布矩阵相似度验证了构建工况的有效性。试验数据表明:采样数据与构建工况之间平均误差为 7.3%,两者的 V-A 分布概率矩阵的相似系数为 0.9957,表明采用聚类法构建得出的工况误差较小,符合实际行驶情况。

入藏号: CSCD:6521599

地址: Li Yaohua, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Zhongyu, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Gou Qizhi, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Ren Tianyuan, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Shao Pandeng, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Peng, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 李耀华, 长安大学汽车学院, 西安, 陕西 710064, 中国.

李忠玉, 长安大学汽车学院, 西安, 陕西 710064, 中国.

苟琦智, 长安大学汽车学院, 西安, 陕西 710064, 中国.

任田园, 长安大学汽车学院, 西安, 陕西 710064, 中国.

邵攀登, 长安大学汽车学院, 西安, 陕西 710064, 中国.

刘鹏, 长安大学汽车学院, 西安, 陕西 710064, 中国.

电子邮件地址: nuaaliyaohua@126.com; lzyjsxz0623@163.com

电子邮件地址: nuaaliyaohua@126.com; lzyjsxz0623@163.com

使用次数 (最近 180 天): 0

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作者: Jiang Jinke; Fang Zongde; Liu Zhao

作者: 蒋进科; 方宗德; 刘钊

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标题: Ease-off 拓扑修形准双曲面齿轮齿面多目标优化设计方法

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作者关键词: hypoid gear; ease-off topological modification; tooth flash temperature; meshing efficiency; loaded transmission error; loaded tooth contact analysis

作者关键词: 准双曲面齿轮; ease-off 拓扑修形; 齿面闪温; 啮合效率; 承载传动误差; 承载接触分析

摘要: A design approach of multi-objective tooth optimization for hypoid gears with ease-off topological modification is proposed to improve comprehensive meshing performances of automobile drive axle. Firstly, the modified pinion is represented by a sum of two vector functions that determine the conjugate tooth of gear and the pinion normal ease-off surfaces, respectively, and are expressed by both predesigned transmission error function and tooth profile modification curves. Secondly, based on tooth contact analysis (TCA), loaded tooth contact analysis (LTCA) and the latest friction theory of gear, the bearing deformations, sliding velocity, distribution of loads and local friction coefficient of the discrete points on contact line of gears are obtained, and the instantaneous meshing efficiency and Block flash temperature are further determined. Thirdly, the best ease-off surfaces are obtained by solving a multi-objective optimization problem with minimal amplitude of loaded transmission error (ALTE), minimal instantaneous flash temperature and maximal average meshing efficiency. Moreover, the distribution of sliding velocity, the radius of curvature on tooth, and the influences of contact ratio on meshing performances are explored. Numerical results show that the best ease-off modification has enough parabola transmission errors at the meshing start and the meshing end, which can effectively reduce the sensitivity of installation error and ALTE. In addition, profile modification and small inclination of contact path contribute to a greater contact ratio, and the loads at top and root concentrate near the pitch line, while the sliding speed near the pitch line is smaller, as a result the meshing efficiency increases and the flash temperature decreases. However, when the tooth surface mismatch is too large, the loads and friction power consumption will increase, and the meshing efficiency will decrease.

摘要: 为了提高汽车驱动桥综合传动性能,提出基于 ease-off 拓扑修形准双曲面齿轮齿面多目标优化设计方法。预置传动误差参数及抛物线修形参数设计小轮法向 ease-off 曲面,小轮修形齿面表示为大轮的共轭齿面叠加 ease-off 曲面。结合齿面接触分析(TCA)、齿面承载接触分析(LTCA)方法及齿轮摩擦理论最新进展,得到接触线离散点的滑动速度、啮合承载变形、载荷分布及局部摩擦系数,进而确定齿面瞬时啮合效率和 Block 闪温。以承载传动误差幅值(ALTE)最小、齿面闪温最小和平均啮合效率最大进行多目标优化,获得最佳修形齿面,并分析齿面滑动速度与综合曲率半径的变化及重合度对啮合性能的影响。算例表明:最优 ease-off 修形齿面在啮入、啮出端有足够的抛物线传动误差,可有效减小 ALTE 并降低安装误差的敏感性;在整个齿高方向有一定的齿廓修形且接触迹线角较小时,齿轮副则有较大重合度,且齿

顶、齿根载荷向节线附近集中,而节线附近的滑动速度较小,导致接触线平均摩擦系数下降,因此,啮合效率增加,齿面闪温下降;齿面适配量过大时,接触线载荷增加,摩擦功耗增大,啮合效率减小。

入藏号: CSCD:6507282

地址: Jiang Jinke, School of Automotive,Changan University;;Changan University, ;;Key Laboratory of Automotive Transportation Safety Techniques of Ministry of Transport, Xian;;Xian, ;; 710064;;710064.

Liu Zhao, School of Automotive,Changan University;;Changan University, ;;Key Laboratory of Automotive Transportation Safety Techniques of Ministry of Transport, Xian;;Xian, ;; 710064;;710064.

Fang Zongde, School of Mechanical Engineering,Northwestern Polytechnical University, Xian, 710072.

地址: 蒋进科, 长安大学汽车学院;;长安大学, ;;汽车运输安全保障技术交通行业重点实验室, 西安;;西安, ;; 710064;;710064.

刘钊, 长安大学汽车学院;;长安大学, ;;汽车运输安全保障技术交通行业重点实验室, 西安;;西安, ;; 710064;;710064.

方宗德, 西北工业大学机电学院, 西安, 陕西 710072, 中国.

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作者: Xu Ting; Zhao Lei; Zhang Min; Li Min; Liu Jianbei

作者: 徐婷; 赵磊; 张敏; 李敏; 刘建蓓

标题: Critical length determination for long and longitudinal slope of expressway based on performance of heavy duty vehicles

标题: 基于重载车辆性能的高速公路长大纵坡临界坡长确定

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作者关键词: 交通工程; 交通安全; 临界坡长; 车速曲线; 比功率; 重载车辆

摘要: Aimed at the unreasonable combination of different lengths and grades of slopes of expressway in mountainous areas have led to an increase in traffic accidents on long and steep slopes. A model was designed to explore the relationship between the heavy-vehicle speed characteristics and slope length after analyzing the speed and stress distribution in moving uphill and downhill taking F3000 heavy-haul vehicle produced which by Shaanxi automobile company as an example. The reasonable critical slope length was determined by simulating the relationship between the speed of heavy vehicles with different specific power and the slope length during uphill and downhill. The research scenario was assumed that the slope of the expressway was 1% to 6%, the initial speed of uphill was 80 km/h and the final speed range was 50 km/h, and the initial speed of downhill was 0 km/h and the final speed was 80 km/h. The relationship between the slope and the speed was calculated through MATLAB simulations. The results show that when going uphill, if the initial speed is 80 km/h, the stable speed is 45 to 61 km/h. When the slope is constant, the higher the specific power of the heavy vehicle, the faster is the decrease in the speed, and the larger the stable speed, the longer is the equilibrium slope required to achieve stable speed. In the downhill process, when the slope is constant, the higher the specific power of the heavy vehicle, the greater the speed increase, the higher is the increase in speed, and further, the greater the steady operation speed, the shorter is the equilibrium slope length to reach the final driving speed. It is not necessary to set a climbing lane when the grade is 1% to 3%. When the slope is greater than 3%, the speed decreases fast for lower specific power of vehicles with a poor climbing performance. It is therefore required to set up a climbing lane or other safety facilities to increase road safety. When heavy vehicles run in the 4%, 5%, and 6% slope range, the thresholds for setting escape lanes are 5.5, 4, 3 km, respectively. The results can provide guidelines for the rational design of mountain highway alignment and road safety protection, as well as the designing of climbing lane and escape lane in order to improve the driving safety of heavy vehicles on the mountain expressway.

摘要: 针对由山区高速公路纵坡坡度和坡长组合设置不合理,导致长大纵坡路段交通事故频发的问题,通过分析重型车辆上下坡运行速度特性及受力情况,以陕汽生产的 F3000 重载汽车为例,通过理论推导构建重型车辆公路纵坡爬坡及下坡车速与坡长理论模型,模拟不同比功率重型车辆上、下坡运行速度与坡长的变化关系,并确定高速公路合理的上下坡临界坡长。研究中假设工况为高速公路坡度 1%~6%,上坡车辆最高初速度和最低末速分别为 80、50 km/h,下坡最低初速度和最高末速度为 0、80 km/h。使用 MATLAB 模拟计算其坡度与车速的变化规律。研究结果表明:上坡过程中,以 80 km/h 的初速度为例,稳定车速为 45~61 km/h;当坡度一定时,比功率越大的车型速度降低的越快,稳定行驶速度越大,达到稳定行驶车速的平衡坡长越长。下坡过程中,当坡度一定时比功率越大的车型,车速增大越多,稳定行驶速度越大,达到稳定行驶车速的平衡坡长就越短。在坡度为 1%~3%时,无须设置爬坡车道;当坡度大于 3%时,比功率较低的车型,爬坡性能较差,车速下降较快,需要设置爬坡车道。重型车辆在 4%、5%、6%的坡度行驶时,设置避险车道的坡长阈值分别为 5.5、4、3 km。研究成果可为山区公路线形的合理设计、道路的安全防护以及爬坡车道与避险车道的设置提供理论依据,从而提高山区高速公路重型车辆的行车安全。

入藏号: CSCD:6501820

地址: Xu Ting, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Lei, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Min, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Min, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Jianbei, CCCC First Highway Consultants Co., LTD., Xi'an, Shaanxi 710075, China.

地址: 徐婷, 长安大学汽车学院, 西安, 陕西 710064, 中国.

赵磊, 长安大学汽车学院, 西安, 陕西 710064, 中国.

张敏, 长安大学汽车学院, 西安, 陕西 710064, 中国.

李敏, 长安大学汽车学院, 西安, 陕西 710064, 中国.

刘建蓓, 中交第一公路勘察设计研究院有限公司, 西安, 陕西 710075, 中国.

电子邮件地址: annabelxu@163.com; 648577896@qq.com

电子邮件地址: annabelxu@163.com; 648577896@qq.com

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作者: Zhao Boxuan; Gao Jianmin; Fu Yingbin; Zhao Jiao

作者: 赵博选; 高建民; 付颖斌; 赵姣

标题: A multi-strategy integration Pareto artificial bee colony algorithm for flexible job shop scheduling problems

标题: 求解柔性作业车间调度问题的多策略融合 Pareto 人工蜂群算法

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作者关键词: flexible job shop scheduling; multi-objective Pareto optimization; artificial bee colony algorithm; critical path; multi-strategy integration

作者关键词: 柔性作业车间调度; 多目标 Pareto 优化; 人工蜂群算法; 关键路径; 多策略融合

摘要: To remedy the deficiency of the single algorithm in optimality and diversity when solving the multi-objective flexible job shop scheduling problem, we proposed a multi-strategy integration Pareto artificial bee colony algorithm (MSIPABC). First, this algorithm employs the hybrid heuristic strategy to initialize the food source colony to obtain the initiation colony with higher quality. Then the employed foragers use multiple local search operations to explore new food sources around the current food source. The onlookers use the tournament rules to select the superior food sources and perform crossover operation and the critical-path-based neighborhood

search to further enhance the optimization search of the algorithm. At last, the scouts reconstruct the repetitive solutions, ensuring the diversity of the food source colony. The algorithm adapts multiple search strategies, realizes the autonomous and cooperative search of artificial swarm and hits a balance between global search and local search. The proposed algorithm is proved to be superior both in solution quality and diversity.

摘要: 为克服单一算法在求解多目标柔性作业车间调度问题时最优性和多样性方面的缺陷,提出了一种多策略融合的 Pareto 人工蜂群算法(multi-strategy integration Pareto artificial bee colony algorithm, MSIPABC). 算法在初始化阶段采用混合启发式策略产生质量较高的初始化种群; 雇佣蜂采用多种探索操作实现蜂群自主邻域搜索; 观察蜂选择较优食物源执行交叉操作, 实现蜂群协作搜索, 扩大搜索范围, 并执行柔性作业车间关键路径相关局部搜索操作, 进一步加强蜂群寻优能力; 最后侦查蜂对种群重复解进行多样性重构. 多种搜索策略的融合使算法不仅实现了人工蜂群的自主与协同搜索, 而且达到了全局探索与局部寻优的平衡. 通过验证, 所提算法在求解质量和获取基准算例 Pareto 最优解数目方面具有优势.

入藏号: CSCD:6495591

地址: Zhao Boxuan, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Fu Yingbin, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Jiao, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Gao Jianmin, School of Mechanical Engineering, Xi'an Jiaotong University, Xi'an, Shaanxi 710049, China.

地址: 赵博选, 长安大学汽车学院, 西安, 陕西 710064, 中国.

付颖斌, 长安大学汽车学院, 西安, 陕西 710064, 中国.

赵姣, 长安大学汽车学院, 西安, 陕西 710064, 中国.

高建民, 西安交通大学机械工程学院, 西安, 陕西 710049, 中国.

电子邮件地址: zbx170005@chd.edu.cn

电子邮件地址: zbx170005@chd.edu.cn

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作者: Chen Yisong; Ding Zhensen; Wang Wenjun; Liu Jiahui

作者: 陈轶嵩; 丁振森; 王文君; 刘佳慧

标题: Life-cycle Assessment and Scenario Simulation of Four Hydrogen Production Schemes for Hydrogen Fuel Cell Vehicles

标题: 氢燃料电池汽车不同制氢方案的全生命周期评价及情景模拟研究

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作者关键词: automobile engineering; hydrogen fuel cell; life cycle assessment; Toyota Mirai vehicle; fuel cycle; hydrogen production

作者关键词: 汽车工程; 氢燃料电池; 生命周期评价; 丰田 Mirai 汽车; 燃料循环; 制氢

摘要: The current industrial consensus is that the development of hydrogen fuel cell vehicles will be an important direction in the future of new-energy vehicles. Therefore, the impact of four hydrogen production schemes for hydrogen fuel cell vehicles with regard to the resources, energy, and environment was evaluated in this study. For this, a mathematical model was established to evaluate the fuel cycle of hydrogen fuel cell vehicles and the life cycle of the four schemes. Toyota Mirai, which currently represents the most advanced level of hydrogen fuel cell vehicles, was considered as the evaluation object, and the basic database of Gabi software was utilized to evaluate its life cycle. Simultaneously, the life cycle energy consumption and emissions of the following four hydrogen production schemes were quantitatively calculated: catalytic reforming of methane, catalytic cracking of methanol, water electrolysis, and ammonia cracking. Finally, considering the power structure as the key factor, a scenario simulation was conducted on the water electrolysis scheme, and it was compared with the other three schemes. The evaluation results show that the water electrolysis scheme has the greatest influence on mineral resource consumption, fossil energy consumption, and environmental impact. Catalytic cracking of methanol has the lowest mineral resource and fossil energy consumptions, which are only 2% and 3% those of the electrolytic water method, respectively. The environmental impact of methane catalytic reforming is the lowest, which is only 1.6% that of the electrolysis scheme. Scenario simulation results show that the water electrolysis scheme has the most significant environmental impact among the four hydrogen production schemes when the coal-electricity ratio is reduced to 41.6%. However, the environmental impact is minimal under the condition of single clean energy generation. Based on China's resource endowment, it is impossible to realize hydroelectric power generation in an all-round manner. Therefore, breakthroughs to improve the energy efficiency and to develop key technologies for water electrolysis are necessary to transform it into a feasible scheme for large-scale hydrogen production in the future.

摘要: 氢燃料电池汽车作为新能源汽车领域未来的重要方向已成为行业共识,为评估氢燃料电池汽车不同制氢方案对资源、能源和环境的影响,构建氢燃料电池汽车燃料循环以及4种制氢方案的全生命周期评价数学模型,选取代表世界先进水平的丰田 Mirai 燃料电池汽车作为评价对象,应用 GaBi 软件的基础数据库对其进行全生命周期评价,同时对甲烷催化重整法、甲醇催化裂解法、电解水法和氨裂解法4种制氢方案的全生命周期能耗、排放进行量化计算。最后,以电力结构作为关键因素对当前最常用的电解水法进行情景模拟并与其他3种方案进行对比分析。评价计算结果表明:电解水法制氢的矿产资源消耗、化石能源消耗和环境影响均最高;甲醇催化裂解法制氢的矿产资源消耗和化石能源消耗均为最低,仅分别为电解水法的2%和3%;甲烷催化重整法制氢的环境影响最低,仅为电解水法的1.6%。情景模拟结果表明:电解水法的环境影响在煤电比例降低到41.6%的情况下仍然在4种制氢方案中最大,然而在水力单-清洁能源发电的极限情况下环境影响最小,但基于中国的资源禀赋,全面实现水力发

电并不可行。因此,须从提升电解水法的能源利用效率、改进关键技术等方面有所突破才能使其成为未来大规模制氢的可行方案。

入藏号: CSCD:6490486

地址: Chen Yisong, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Ding Zhensen, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Jiahui, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Wenjun, Shanxi Transportation Research Institute, Taiyuan, Shanxi 030006, China.

地址: 陈轶嵩, 长安大学汽车学院, 西安, 陕西 710064, 中国.

丁振森, 长安大学汽车学院, 西安, 陕西 710064, 中国.

刘佳慧, 长安大学汽车学院, 西安, 陕西 710064, 中国.

王文君, 山西省交通科学研究院, 太原, 山西 030006, 中国.

电子邮件地址: chenysisong_1988@163.com

电子邮件地址: chenysisong_1988@163.com

使用次数 (最近 180 天): 2

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作者: Yan Shengyu; Xiao Runmou; Zhao Jun; Wang Cong

作者: 闫晟煜; 肖润谋; 赵峻; 王聪

标题: Calculation Method of the Proportion of Heat Dissipated Through Engine Cooling System for Engine Retarder

标题: 发动机缓速器经发动机冷却系统散热比例的计算方法

来源出版物: 汽车工程 卷: 41 期: 4 页: 381-387 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: heavy truck; long downhill driving; engine retarder; heat balance

作者关键词: 重型货车; 长下坡; 发动机缓速器; 热平衡

摘要: In order to reasonably assign the limited heat dissipated power of the engine cooling system, a thermal balance calculation model of engine retarder is built, a measuring method for the heat dissipation power of engine retarder through cooling system is proposed, and the power balances in two different states (engine driving vehicle running and vehicle coasting with engine

retarder braking) are compared. The rolling resistance coefficient and aerodynamic resistance coefficient are determined by field test and hence the braking force characteristics of engine retarder is obtained. Through the road tests on G312 national road and G5 highway, the effectiveness of the heat balance calculation model is validated. The results show that the thermal balance model adopted can simply calculation procedure, and the main channel of heat dissipation of engine retarder is engine cooling system, whose power proportion of heat dissipation for engine retarder is closely related to the gear ratio of transmission, the temperature difference between the inlet and outlet of radiator, vehicle speed and braking force.

摘要: 为合理分配有限的发动机冷却系统散热功率,建立了发动机缓速器的热平衡计算模型,提出了发动机缓速器通过冷却系统散热功率的测试方法,对比了发动机驱动车辆行驶和车辆滑行制动两种状态下的功率平衡。通过场地试验确定了滚动阻力系数和空气阻力系数,从而获得了发动机缓速器的制动力特性。通过在 G312 国道和 G5 高速公路上的道路试验,验证了热平衡计算模型的有效性。结果表明:采用的散热比例模型可简化运算过程;冷却系统是发动机缓速器散热的主要途径,发动机缓速器通过冷却系统散热的功率比例与变速器传动比、散热器出入水口温差值、车速和整车制动力密切相关。

入藏号: CSCD:6482253

地址: Yan Shengyu, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Xiao Runmou, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Cong, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Jun, Shanxi Automobile Group Co., Ltd., Xi'an, Shaanxi 710043, China.

地址: 闫晟煜, 长安大学汽车学院, 西安, 陕西 710064, 中国.

肖润谋, 长安大学汽车学院, 西安, 陕西 710064, 中国.

王聪, 长安大学汽车学院, 西安, 陕西 710064, 中国.

赵峻, 陕西汽车集团有限责任公司, 西安, 陕西 710043, 中国.

电子邮件地址: leo9574@163.com

电子邮件地址: leo9574@163.com

使用次数 (最近 180 天): 0

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第 34 条, 共 37 条

作者: Li Yaohua; Feng Qianlong; Zhang Yangsen; Nan Youfei; Ou Pengfei

作者: 李耀华; 冯乾隆; 张洋森; 南友飞; 欧鹏飞

标题: A Simulation Study on Power Assisting Characteristics of Full Range Vehicle Mass EPS System for Commercial Vehicles

标题: 商用车全车质量 EPS 系统助力特性仿真分析

来源出版物: 汽车工程 卷: 41 期: 4 页: 432-439 出版年: 2019

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文献类型: Article

作者关键词: full range vehicle mass assisting characteristics; EPS system; control strategy; co-simulation

作者关键词: 全车质量助力特性; EPS 系统; 控制策略; 联合仿真

摘要: In order to improve the steering performance of commercial vehicles with big change of load,the electric power steering (EPS) system with full range vehicle mass power assisting characteristics is proposed.Its assisting characteristics and control strategy are studied.Through co-simulation of TruckSim and Simulink,the influence of full range vehicle mass EPS system,traditional single mass EPS system and EPS-free system on vehicle performance are compared.Simulation results show that the EPS system with full range vehicle mass assisting characteristics can provide better steering lightness and handling stability for commercial vehicles.It can reduce the impact of vehicle mass on the steering performance,so as to bring drivers clearer sense of road.

摘要: 为提高载荷变化较大的工况下商用车的转向性能,本文中提出了一种商用车全车质量助力特性电动助力转向系统(electric power steering,EPS),对其助力特性和控制策略进行了研究,并通过 TruckSim 与 Simulink 联合仿真,对比了全车质量助力特性 EPS 系统、单一车质量助力特性 EPS 系统和无 EPS 系统的性能。结果表明:全车质量助力特性 EPS 系统可使商用车具有良好的转向轻便性,改善了操纵稳定性,并且减小了车质量变化对转向性能的影响,从而使驾驶员获得更清晰的路感。

入藏号: CSCD:6482260

地址: Li Yaohua, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Feng Qianlong, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Yangsen, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Nan Youfei, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

Ou Pengfei, School of Automobile,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 李耀华, 长安大学汽车学院, 西安, 陕西 710064, 中国.

冯乾隆, 长安大学汽车学院, 西安, 陕西 710064, 中国.

张洋森, 长安大学汽车学院, 西安, 陕西 710064, 中国.

南友飞, 长安大学汽车学院, 西安, 陕西 710064, 中国.

欧鹏飞, 长安大学汽车学院, 西安, 陕西 710064, 中国.

电子邮件地址: nuaaliyaohua@126.com

电子邮件地址: nuaaliyaohua@126.com

使用次数 (最近 180 天): 0

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作者: Fu Rui; Zhang Yali; Yuan Wei

作者: 付锐; 张雅丽; 袁伟

标题: Progress and Prospect in Research on Eco-driving

标题: 生态驾驶研究现状及展望

来源出版物: 中国公路学报 卷: 32 期: 3 页: 1-12 出版年: 2019

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文献类型: Review

作者关键词: traffic engineering; eco-driving; review; energy-saving; control strategy; driver; training

作者关键词: 交通工程; 生态驾驶; 综述; 节能减排; 控制策略; 驾驶人; 培训

摘要: To clarify the progress in research on eco-driving in China and abroad, advances in ecodriving were reviewed including its impact factors, control strategies, effects, and implications. The following impact factors on eco-driving were introduced: driver personality, external stimulus information, road and traffic conditions, vehicle characteristics, and driving parameters. Further, an optimized control strategy for eco-driving was introduced, and its effects were analyzed. Finally, the implications of eco-driving were summarized, including static and dynamic eco-driving training methods, eco-driving assistance systems, and ecological intelligent transportation. The analysis of the research indicated that eco-driving can reduce fuel consumption by approximately 30% and reduce pollutant emissions by 20%-30%, without changing the structure of the vehicle. In addition, further research is required to establish the theoretical foundations of eco-driving strategies, and to develop an ecological driving assistance system that is suitable for China both quantitatively and visually. Finally, it will be necessary to strengthen the promotion of eco-driving and incorporate it into the driving test training system, so as to comprehensively save energy and reduce emissions in China.

摘要: 为了明确国内外生态驾驶的研究进展,对生态驾驶影响因素、生态驾驶控制策略、生态驾驶实施效果及生态驾驶应用等方面的研究进行综述,介绍驾驶人个性特征、外界刺激信息、道路状况及交通条件、车辆自身特征、行驶参数等生态驾驶的影响因素,归纳生态驾驶的优化控制策略,分析了实施生态驾驶的效果,总结静态、动态的生态驾驶培训方法,生态驾驶辅助设备,生态型智能交通等方面的生态驾驶应用。对文献的梳理和分析表明:生态驾驶无需改变车辆结构便可以减少 30%左右的燃油消耗,降低 20%~30%的污染物排放;有必要深入研究理论型生态驾驶策略,以定量的、形象化的方式研究适合中国实际情况的生态驾驶辅助系统;需加强生态驾驶的推广,将其纳入驾考培训体系之中,从而全面促进中国驾驶人的节能减排能力。

入藏号: CSCD:6462817

地址: Fu Rui, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Yali, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Yuan Wei, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 付锐, 长安大学汽车学院, 西安, 陕西 710064, 中国.

张雅丽, 长安大学汽车学院, 西安, 陕西 710064, 中国.

袁伟, 长安大学汽车学院, 西安, 陕西 710064, 中国.

电子邮件地址: furui@chd.edu.cn; zyl_ldh@163.com

电子邮件地址: furui@chd.edu.cn; zyl_ldh@163.com

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作者: Liu Pan; Yu Qiang; Wang Wenjun; Zhao Xuan

作者: 刘攀; 余强; 王文君; 赵轩

标题: Determination of Truck Escape Ramp Parameters in Tire-particle Simulation Using the Discrete Element Method

标题: 基于轮胎-颗粒流动力学模型的避险车道参数匹配方案研究

来源出版物: 中国公路学报 卷: 32 期: 2 页: 165-173 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: traffic engineering; tire-particle model; discrete element method; truck escape ramp; tire model; truck arrester bed

作者关键词: 交通工程; 轮胎-颗粒流模型; 离散元法; 避险车道; 轮胎模型; 制动床

摘要: In this study, we determine the parameters of the truck escape ramp. The tire model and truck escape ramp model were established based on the discrete element theory and method. Using the self-designed tire performance testing system, the truck tire vertical stress under different frequencies and amplitudes was tested, and the tire model parameters were simulated and verified. By means of the calibration method, the angle of response was measured and the friction coefficient was verified. Based on the established tire and truck escape ramp model, the vehicle test procedure was simulated with data on the vehicle length, velocity, and tire speed being recorded. To verify the deceleration effect of arrester beds, the vehicle test was conducted on an actual arrester bed located on the S308 line in the Gansu province, China. The results verified the feasibility and

effectiveness of the simulation method. Based on the constructed model, simulations of the vehicle test under different arrester bed depths and particle sizes were conducted. The results indicate that the discrete element method can accurately simulate the interaction of the tire with the truck escape ramp. The implication is that the truck escape ramp design is both effective and economical. Coupled with the simulation results, the parameters of the arrester bed's depth, length, and materials were designed. With regards to particle consolidation, the arrester bed's depth is recommended to be greater than 80 cm. For a truck travelling at a speed of $90 \text{ km} \cdot \text{h}^{-1}$, the simulation and vehicle test results recommend the length of the truck arrester ramp to be greater than 130 m. The test results also reveal that gravel particles with diameters ranging between 1 cm and 3 cm on a smooth surface are the optimal choice of material for the arrester bed.

摘要: 为了优化山区公路避险车道参数设计方案, 基于离散元基本理论与方法, 建立轮胎与避险车道集料颗粒流模型。利用自主研发的轮胎性能测试系统对货车轮胎垂直特性进行了室内台架试验研究, 通过检测不同输入条件下的响应, 标定了轮胎颗粒流模型细观参数。采用漏斗法测量了避险车道集料休止角, 结合离散元颗粒流仿真方法, 对集料颗粒流模型表面摩擦因数进行了标定。基于所建立的轮胎与避险车道的集料颗粒流模型, 仿真分析了轮胎在避险车道中的行驶过程, 模拟了车辆在运行过程中的行驶距离、行驶速度与轮胎转速的变化趋势。在甘肃 S308 省道 K209+400 处避险车道进行了实车道路试验, 试验结果验证了该仿真方法的正确性。通过所建立的轮胎-颗粒流模型对比分析了不同铺设厚度, 不同集料大小下的仿真结果。综合考虑减速效果和施工成本, 确立了避险车道铺设厚度、铺设长度、颗粒材料等设计技术参数。研究结果表明: 离散元法能够很好地模拟车辆在避险车道中的行驶过程; 考虑到颗粒固结等因素, 建议避险车道铺设厚度不小于 0.8 m; 针对行驶速度大于 $90 \text{ km} \cdot \text{h}^{-1}$ 的载货汽车, 避险车道设计长度建议大于 130 m; 避险车道集料方面, 建议选用粒径为 1~3 cm 且圆度较高的砾石作为路床材料。

入藏号: CSCD:6444630

地址: Liu Pan, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Yu Qiang, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Xuan, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Wenjun, Shanxi Transportation Research Institute, Taiyuan, Shanxi 030006, China.

地址: 刘攀, 长安大学汽车学院, 西安, 陕西 710064, 中国.

余强, 长安大学汽车学院, 西安, 陕西 710064, 中国.

赵轩, 长安大学汽车学院, 西安, 陕西 710064, 中国.

王文君, 山西省交通科学研究院, 太原, 山西 030006, 中国.

电子邮件地址: 1019412103@qq.com; qiangyu@chd.edu.cn

电子邮件地址: 1019412103@qq.com; qiangyu@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Yuan Wei; Jiang Zhengmin; Guo Yingshi

作者: 袁伟; 蒋拯民; 郭应时

标题: Research on Vehicle Active Collision Avoidance System Based on the Coordinated Actions of Braking and Steering

标题: 制动与转向协调动作的车辆避撞控制研究

来源出版物: 中国公路学报 卷: 32 期: 1 页: 173-181 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: automotive engineering; collision avoidance decision-making; simulation test; motion control; intelligent vehicle; active safety

作者关键词: 汽车工程; 避撞决策; 仿真试验; 运动控制; 智能车辆; 主动安全

摘要: The existing strategy of vehicle collision avoidance separates steering and braking operations from each other. To compensate for the deficiency, we proposed an active collision avoidance system that integrates both steering and braking operation in this paper. Firstly, this paper gives the lane change reference path using a fifth polynomial function. Based on this theoretical analysis, the steering critical distance and lane change safety constraints were obtained. Secondly, considering the influence of the road adhesion coefficient and the system delay, the critical braking distance was deduced, based on the braking process. The safe driving range is divided by the warning index and T-1 TC, and the thresholds of the steady follow/constant speed cruise area were calibrated by actual driving data. Subsequently, the safety benefits of the two collision avoidance methods were provided by comparing the critical steering/braking distances. Finally, the Simulink/CarSim co-simulation model was constructed, and the collision avoidance simulation test under different initial conditions was conducted. The test results demonstrate that steering operation is still applicable when the braking distance is insufficient. When the ego vehicle approaches the stationary lead vehicle at a high speed, the ego vehicle can smoothly take a steering lane change action, while the typical ACC system has a relative distance of 0.76m at 2.5s. Therefore, the collision has already occurred. When the longitudinal distance between the ego and lead vehicles cannot meet the lane change safety constraints, the active collision avoidance system adopts an emergency braking control strategy with the maximum deceleration being nearly $-0.8g$, and the actual minimum vehicle clearance was 5.1m. Through the coordinated actions of steering and braking, the collision avoidance potential of the vehicle is significantly exerted. In addition, the combination of the warning index and T-1 TC can better realize the conversion of different control modes, while ensuring the safety of driving and mitigating the driving tension caused by excessive braking.

摘要: 为了弥补现有汽车避撞控制策略以及碰撞风险评价指标单一的不足,提出转向和制动协调的主动避撞控制系统。首先规划了五次多项式换道路径,在对其理论分析的基础上得到

转向临界避撞距离和与目标车道车辆的安全距离约束。其次,考虑道路附着系数和系统延迟的影响,基于制动过程给出制动临界避撞距离,并以纵向行驶安全系数 ξ 和碰撞时间倒数 T-1 TC 划分安全行驶区域,利用驾驶人实车跟车数据标定稳态跟随/定速巡航区域的阈值。随后,通过转向/制动临界避撞距离的对比给出 2 种避撞方式的安全收益范围。最后搭建 Simulink/CarSim 联合仿真模型,并对其进行不同初始条件下的避撞仿真试验。研究表明:转向操作在制动距离不足时仍是有效的;当主车高速近距离接近静止前车时,主车可以顺利采取转向换道动作,而常规 ACC 系统在 2.5s 处的车间相对距离为-0.76m,事实上已经发生了碰撞;当相邻车道前车与主车纵向间距不满足换道安全距离约束时,避撞控制系统进入紧急制动模式,最大制动减速度达到-0.8g(g 为重力加速度),实际最小车间距为 5.1m;通过转向和制动的协调动作,充分发挥了车辆的避撞潜力; ξ 和 T-1 TC 指标的融合,可以更好地评估碰撞风险并实现不同控制模式的转换,在保证行车安全的同时可避免过分制动给乘客造成的紧张感。

入藏号: CSCD:6432994

地址: Yuan Wei, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Jiang Zhengmin, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

Guo Yingshi, School of Automobile, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 袁伟, 长安大学汽车学院, 西安, 陕西 710064, 中国.

蒋拯民, 长安大学汽车学院, 西安, 陕西 710064, 中国.

郭应时, 长安大学汽车学院, 西安, 陕西 710064, 中国.

电子邮件地址: yuanwei@chd.edu.cn; guoys@chd.edu.cn

电子邮件地址: yuanwei@chd.edu.cn; guoys@chd.edu.cn

使用次数 (最近 180 天): 1

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作者: Zhao Xiangmo; Wang Wenwei; Wang Runmin; Xu Zhigang

作者: 赵祥模; 王文威; 王润民; 徐志刚

标题: Turn following system of intelligent vehicle-in-loop test bench

标题: 智能汽车整车在环测试台转向随动系统

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作者关键词: automobile engineering; intelligent vehicle test; vehicle-in-loop test; drum platform; steering servo; fuzzy PI control; position loop feedforward control

作者关键词: 汽车工程; 智能汽车测试; 整车在环测试; 转鼓平台; 转向随动; 模糊 PI 控制; 位置环前馈控制

摘要: In order to solve the problem that the traditional drum platform can't measure the steering angle of intelligent vehicle and can't be used to test the changing track scene of intelligent vehicle. A steering servo system with servo motor system as the control object was proposed, and the influence of the control strategy based on distance sensor on the angle following was studied. Firstly, the intelligent vehicle was placed on the steering platform of the steering follow-up system, and the tire steering drives the steering platform to realize the angle acquisition of the tested intelligent vehicle. Secondly, a pair of laser sensors were installed on the left and right steering platforms to collect the angle difference as the position input of the control system. Then, a two-input and two-output fuzzy controller was established based on the input angular difference, and the change rate of angular difference and the position pulse control parameter PI, so as to improve the accuracy and stability of steering servo system positioning. Finally, the parameters were adjusted according to the data collected by sensors and simulation experiments to realize the optimal control of the fuzzy controller. In the experiment, the vehicle-mounted computer of the tested intelligent vehicle controls the steering wheel to rotate at different angular speeds. The steering wheel angle and the steering servo system angle was recorded respectively by the CAN bus of the vehicle and the upper computer program of the test bench. The results show that when the steering wheel of the tested intelligent car is tested at different angular speeds, the test results of the bench can be kept in a fixed interval without obvious changes, which can provide reliable parameter support for the steering performance test of the intelligent car. There is no significant relationship between the delay of steering servo system and the steering wheel angle speed of the tested intelligent car, and the delay of steering servo system is about 235.5 ms.

摘要: 针对传统的转鼓平台无法测量智能汽车轮胎转角,且不能用于智能汽车变道场景测试等问题,提出以伺服电机系统为控制对象的转向随动系统,研究基于距离传感器的控制策略对于转角跟随的影响。首先,将被测智能汽车置于转向随动系统的转向台上,轮胎转向带动转向台转动,实现被测智能汽车的转向角采集;其次,在左右转向台上分别安装一对激光传感器,采集转角差作为控制系统的误差输入;然后,将输入的转角差、转角差变化率与单片机控制位置脉冲的比例积分控制参数(PI)建立两输入、两输出的模糊控制关系,以提高转向随动系统定位的准确性和稳定性;最后,根据传感器采集的数据和仿真试验数据调整参数,实现模糊控制器的优化控制。试验时,被测智能汽车的车载电脑控制方向盘以不同角速度转动,车辆控制器局域网(CAN)总线与测试台上位机程序分别记录方向盘转角和转向随动系统转角。研究结果表明:当被测智能汽车方向盘以不同角速度进行测试时,台架的测试结果能够保持在固定区间且没有明显变化,能为智能汽车的转向性能测试提供可靠参数支持;转向随动系统的延时与被测智能汽车方向盘转角速度没有显著关系,转向随动系统的延时约为 235.5 ms。

入藏号: CSCD:6633960

地址: Zhao Xiangmo, Chang'an University;;Ministry of Transport of the People's Republic of China Close-course Self-driving Test Base,Chang'an University;;Chang'an University, Shaanxi Auto Networking and Intelligent Vehicle Testing Technology Engineering Research Center;;;The Joint Laboratory for Internet of Vehicles,Ministry of Education-China Mobile Communications Corporation, Xi'an;;Xi'an;;Xi'an, Shaanxi;;Shaanxi;;Shaanxi 710064;;710064;;710064.

Wang Wenwei, Chang'an University;;Ministry of Transport of the People's Republic of China Close-course Self-driving Test Base,Chang'an University;;Chang'an University, Shaanxi Auto Networking and Intelligent Vehicle Testing Technology Engineering Research Center;;;The Joint Laboratory for Internet of Vehicles,Ministry of Education-China Mobile Communications Corporation, Xi'an;;Xi'an;;Xi'an, Shaanxi;;Shaanxi;;Shaanxi 710064;;710064;;710064.

Wang Runmin, Chang'an University;;Ministry of Transport of the People's Republic of China Close-course Self-driving Test Base,Chang'an University;;Chang'an University, Shaanxi Auto Networking and Intelligent Vehicle Testing Technology Engineering Research Center;;;The Joint Laboratory for Internet of Vehicles,Ministry of Education-China Mobile Communications Corporation, Xi'an;;Xi'an;;Xi'an, Shaanxi;;Shaanxi;;Shaanxi 710064;;710064;;710064.

Xu Zhigang, Chang'an University;;Ministry of Transport of the People's Republic of China Close-course Self-driving Test Base,Chang'an University;;Chang'an University, Shaanxi Auto Networking and Intelligent Vehicle Testing Technology Engineering Research Center;;;The Joint Laboratory for Internet of Vehicles,Ministry of Education-China Mobile Communications Corporation, Xi'an;;Xi'an;;Xi'an, Shaanxi;;Shaanxi;;Shaanxi 710064;;710064;;710064.

地址: 赵祥模, 长安大学;;长安大学交通运输部认定自动驾驶封闭场地测试基地;;长安大学, 陕西省车联网与智能汽车测试技术工程研究中心;;;车联网教育部-中国移动联合实验室, 西安;;西安;;西安, 陕西;;陕西;;陕西 710064;;710064;;710064, 中国.

王文威, 长安大学;;长安大学交通运输部认定自动驾驶封闭场地测试基地;;长安大学, 陕西省车联网与智能汽车测试技术工程研究中心;;;车联网教育部-中国移动联合实验室, 西安;;西安;;西安, 陕西;;陕西;;陕西 710064;;710064;;710064, 中国.

王润民, 长安大学;;长安大学交通运输部认定自动驾驶封闭场地测试基地;;长安大学, 陕西省车联网与智能汽车测试技术工程研究中心;;;车联网教育部-中国移动联合实验室, 西安;;西安;;西安, 陕西;;陕西;;陕西 710064;;710064;;710064, 中国.

徐志刚, 长安大学;;长安大学交通运输部认定自动驾驶封闭场地测试基地;;长安大学, 陕西省车联网与智能汽车测试技术工程研究中心;;;车联网教育部-中国移动联合实验室, 西安;;西安;;西安, 陕西;;陕西;;陕西 710064;;710064;;710064, 中国.

电子邮件地址: xmzhao@chd.edu.cn

电子邮件地址: xmzhao@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Xu Zhigang; Li Jinlong; Zhao Xiangmo; Li Li; Wang Zhongren; Tong Xing; Tian Bin; Hou Jun; Wang Guiping; Zhang Qian

作者: 徐志刚; 李金龙; 赵祥模; 李立; 王忠仁; 童星; 田彬; 侯俊; 汪贵平; 张骞

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作者关键词: traffic engineering; intelligent road; review; intelligent transportation system; road infrastructure; parallel intelligent road; vehicle-infrastructure cooperation

作者关键词: 交通工程; 智能公路; 综述; 智能交通系统; 道路基础设施; 平行智能公路; 车路协同

摘要: Based on the technical framework of automated highway systems (AHSs),the influence of different driving factors such as primary application,communications technology, green energy technology,and automated driving technology,the evolution of concepts, development of technology,and future changes in intelligent roads(IRs)were reviewed in this paper.According to the current development trend in information technology,the concept and technical framework of IRs have been extended and expanded on the basis of studies on AHSs. The direction of evolution of the IR system in the future,and its system architecture,which consists of a management layer,network layer,and application layer,were presented. Meanwhile,focusing on the current popular technologies and the development direction of science and technology in the future,the status of research on emerging technologies driving the rapid development of IRs were summarized,such as ubiquitous wireless communication,high-precision positioning and navigation,vehicle platoon control,wireless charging,road intelligent materials, road active safety control technology,vehicle-to-road information interaction for Mobility-as-a- Service,intelligent decision planning technology combined with infrastructure,etc.Based on the development characteristics of these eight key technologies,some recommendations on the application and promotion of IR technology in the future are presented.Meanwhile,the influence and impact of emerging technologies such as vehicle-integrated integration,intelligence parallel systems,artificial intelligence,and traffic information security on the future development of IR were analyzed.Finally,this paper systematically predicted the commercialization promotion route of IR technologies,and that the application of IR will further reduce the cost of technologies and equipment in autonomous driving,providing a safer,more stable and efficient traffic environment for autonomous driving in the future.The research results of this paper have significance as reference for current and future technology research and development of IR and engineering applications of IR.

摘要: 借鉴美国自动公路系统(Automated Highway Systems,AHS)技术框架,系统回顾了初级应用、通信技术、绿色能源技术、自动驾驶技术等不同因素驱动下智能公路的概念演化、技术发展和未来变革。根据当前信息技术的发展趋势,在 AHS 的研究基础上延伸和扩展了智能公路的概念和技术框架,提出了未来智能公路系统的演化方向以及包含信息管理层、网络通信层和感应控制层的智能公路体系架构。同时,瞄准当前主流技术和未来科技发展方向,总结了泛在无线通信、高精度定位与导航、车辆队列控制、无线充电、道路智能材料、道路主动

安全控制、面向出行即服务的车路信息交互、基于基础设施的智能决策规划等驱动智能公路快速发展的新兴技术研究现状,并基于这 8 项关键技术的自身发展特点,提出了未来智能公路技术应用和推广的建议措施;分析了车路协同一体化、智能平行系统、人工智能、交通信息安全、自动驾驶等新兴技术将对未来智能公路发展带来的冲击和影响;系统性地预测了智能公路技术的商业化推广路线以及未来智能公路的应用将进一步降低自动驾驶的技术设备成本,为自动驾驶提供了一个更安全、更稳定和高效的交通环境。研究成果将对当前和未来智能公路的技术研发和工程应用具有一定指导意义。

入藏号: CSCD:6567789

地址: Xu Zhigang, The Joint Laboratory for Internet of Vehicles, Ministry of Education-China Mobile Communications Corporation, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Jinlong, The Joint Laboratory for Internet of Vehicles, Ministry of Education-China Mobile Communications Corporation, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Xiangmo, The Joint Laboratory for Internet of Vehicles, Ministry of Education-China Mobile Communications Corporation, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Li, The Joint Laboratory for Internet of Vehicles, Ministry of Education-China Mobile Communications Corporation, Chang'an University, Xi'an, Shaanxi 710064, China.

Tian Bin, The Joint Laboratory for Internet of Vehicles, Ministry of Education-China Mobile Communications Corporation, Chang'an University, Xi'an, Shaanxi 710064, China.

Hou Jun, The Joint Laboratory for Internet of Vehicles, Ministry of Education-China Mobile Communications Corporation, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Zhongren, California Department of Transportation, California, 95833, USA.

Tong Xing, Qilu Transportation Information Group Co., Ltd., Jinan, Shandong 250102, China.

Wang Guiping, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Qian, Neusoft Corporation, State Key Laboratory of Software Architecture State Key New Technology, Shenyang, Liaoning 110179, China.

地址: 徐志刚, 长安大学车联网教育部-中国移动联合实验室, 西安, 陕西 710064, 中国.

李金龙, 长安大学车联网教育部-中国移动联合实验室, 西安, 陕西 710064, 中国.

赵祥模, 长安大学车联网教育部-中国移动联合实验室, 西安, 陕西 710064, 中国.

李立, 长安大学车联网教育部-中国移动联合实验室, 西安, 陕西 710064, 中国.

田彬, 长安大学车联网教育部-中国移动联合实验室, 西安, 陕西 710064, 中国.

侯俊, 长安大学车联网教育部-中国移动联合实验室, 西安, 陕西 710064, 中国.

王忠仁, 加利福尼亚交通厅, 加利福尼亚, 95833.

童星, 齐鲁交通信息集团有限公司, 济南, 山东 250102, 中国.

汪贵平, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

张骞, 东软集团, 软件架构新技术国家重点实验室, 沈阳, 辽宁 110179, 中国.

电子邮件地址: xuzhigang@chd.edu.cn; xmzhao@chd.edu.cn

电子邮件地址: xuzhigang@chd.edu.cn; xmzhao@chd.edu.cn

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作者: Wang Runmin; Deng Xiaofeng; Xu Zhigang; Zhao Xiangmo

作者: 王润民; 邓晓峰; 徐志刚; 赵祥模

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标题: 车联网仿真测试评价技术研究综述

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作者关键词: Intelligent and connected vehicles; Internet of vehicles(IoV); testing and evaluation; traffic simulation; network simulation; metrics

作者关键词: 智能网联汽车; 车联网; 测试评价; 交通仿真; 网络仿真; 评价指标

摘要: Large-scale deployment of IoV and its extensive application in the field of intelligent connected vehicle require comprehensive and in-depth testing and evaluation of their performance and functionality. However, testing and evaluation in real environments presents high cost and difficult problems. Therefore, simulation has currently become a mainstream testing tool. This paper first summarized the mainstream network simulators and traffic simulators, classified the existing IoV simulation platforms, studied and comparatively analyzed typical IoV platforms, and then summarized vehicle mobility models, channel propagation models and driver behaviors that affect the simulation performance of IoV based on the application characteristics. It summarized the typical metrics of the functions and performance tests of IoV from the network simulation indicators and relevant indicators for the application of IoV. Finally, it discussed the developing trend of the simulation test of IoVs.

摘要: 车联网的大规模部署及其在智能网联汽车领域的广泛应用前需要对其性能及功能进行全面、深入的测试评价,其中通过仿真技术对其进行评价分析是当前的主流测试评价手段。从车联网研究及应用过程中的测试评价需求出发,总结了主流的网络仿真器和交通仿真器,对现有车联网仿真平台进行了分类,研究并对比分析了典型的车联网仿真平台;针对车联网的应用特性,研究并归纳了影响车联网仿真性能的车辆移动模型、信道传播模型及驾驶员行为等;从网络仿真指标、车联网应用相关指标归纳了车联网功能及性能测试的典型评价指标;最后探讨了车联网仿真测试的发展方向。

入藏号: CSCD:6549433

地址: Wang Runmin, Chang'an University, Joint Laboratory for Internet of Vehicles of Ministry of Education & China Mobile Communications Corporation, Xi'an, Shaanxi 710064, China.

Deng Xiaofeng, Chang'an University, Joint Laboratory for Internet of Vehicles of Ministry of Education & China Mobile Communications Corporation, Xi'an, Shaanxi 710064, China.

Xu Zhigang, Chang'an University, Joint Laboratory for Internet of Vehicles of Ministry of Education & China Mobile Communications Corporation, Xi'an, Shaanxi 710064, China.

Zhao Xiangmo, Chang'an University, Joint Laboratory for Internet of Vehicles of Ministry of Education & China Mobile Communications Corporation, Xi'an, Shaanxi 710064, China.

地址: 王润民, 长安大学, 车联网教育部-中国移动联合实验室, 西安, 陕西 710064, 中国.

邓晓峰, 长安大学, 车联网教育部-中国移动联合实验室, 西安, 陕西 710064, 中国.

徐志刚, 长安大学, 车联网教育部-中国移动联合实验室, 西安, 陕西 710064, 中国.

赵祥模, 长安大学, 车联网教育部-中国移动联合实验室, 西安, 陕西 710064, 中国.

电子邮件地址: (rmwchd@qq.com)

电子邮件地址: (rmwchd@qq.com)

使用次数 (最近 180 天): 1

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第 4 条, 共 37 条

作者: Li Yuchong; Yan Zhaofan; Yan Guoping

作者: 李雨冲; 闫昭帆; 严国萍

标题: An edge-based 2-channel convolutional neural network and its visualization

标题: 基于边缘的双路卷积神经网络及其可视化

来源出版物: 计算机工程与科学 卷: 41 期: 10 页: 1837-1845 出版年: 2019

文献号: 1007-130X(2019)41:10<1837:JYBYDS>2.0.TX;2-M

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文献号: 1007-130X(2019)41:10<1837:JYBYDS>2.0.TX;2-M

语言: Chinese

文献类型: Article

作者关键词: image pattern recognition; 2-channel convolutional neural network; small-scale complex image; neural network visualization

作者关键词: 图像模式识别; 双路卷积神经网络; 小尺度复杂图像; 神经网络可视化

摘要: In order to improve the recognition accuracy of small-scale complex images, an edge channel is added into LeNet-5 convolutional neural network to process the edge information. By combining the different features generated by two channels to construct a classifier, a 2-channel convolutional neural network is proposed to identify small-scale complex data sets. Classification results on ten types of product data show that the accuracy of the 2-channel convolutional neural network is much higher than that of the traditional network. Finally, the neural network

visualization algorithm is adopted to visualize and analyze the 2-channel convolutional neural network.

摘要: 为提高小尺度复杂图像识别准确率,通过对 LeNet-5 卷积神经网络并入一个新通道,让其处理与边缘有关的信息。结合两种通道产生的不同特征构造分类器,提出一种基于边缘的双路卷积神经网络,对小尺度复杂数据集进行识别。在包含 10 类产品数据上分类的结果表明,双路卷积神经网络的识别准确率远高于传统网络。最后通过神经网络可视化算法对双路卷积神经网络进行了可视化分析。

入藏号: CSCD:6668438

地址: Li Yuchong, School of Information Engineering,Changan University, Xian, 710064.

Yan Zhaofan, School of Information Engineering,Changan University, Xian, 710064.

Yan Guoping, School of Information Engineering,Changan University, Xian, 710064.

地址: 李雨冲, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

闫昭帆, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

严国萍, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: 506424073@qq.com; 846179149@qq.com; 1823213844@qq.com

电子邮件地址: 506424073@qq.com; 846179149@qq.com; 1823213844@qq.com

使用次数 (最近 180 天): 0

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第 5 条, 共 37 条

作者: Wang Jing; Liu Yan; Yu Chunlei; Wang Mi; Liu Xiangyang

作者: 王静; 刘艳; 余春雷; 王秘; 刘向阳

标题: Construction of Group Repairable Codes for Non-Uniform Fault Protection

标题: 非均匀故障保护的分组修复码构造

来源出版物: 北京邮电大学学报 卷: 42 期: 5 页: 75-82 出版年: 2019

文献号: 1007-5321(2019)42:5<75:FJYGZB>2.0.TX;2-H

来源出版物: Journal of Beijing University of Posts Telecommunications 卷: 42 期: 5

页: 75-82 出版年: 2019

文献号: 1007-5321(2019)42:5<75:FJYGZB>2.0.TX;2-H

语言: Chinese

文献类型: Article

作者关键词: distributed storage system; non-uniform fault protection; group repairable codes; file reliability

作者关键词: 分布式存储系统; 非均匀故障保护; 分组修复码; 文件可靠性

摘要: Considering that there are files with different heat in actual distributed storage systems,a class of group repairable codes based on non-uniform fault protection (GRC-NFP) is proposed.

GRCNFP provides higher protection for hot files and nodes with high fault probability, and reduces the disk I/O overhead for repairing multiple failed nodes. Specifically, after hot and cold grouping, the fault probabilities of data blocks are represented and sorted by that of the stored target nodes. Data blocks are stored into multiple data groups with increasing lengths, and group encoded blocks are further generated. Performance analysis and actual system deployment showed that GRC-NFP had higher fault tolerance and lower repair locality under less storage overhead compared with Reed-Solomon codes and group repairable codes. Moreover, the hot files can be protected more effectively by adopting GRCNFP. The fewer coding and fault repair time under system deployment further proved the feasibility of GRC-NFP.

摘要: 考虑到实际分布式存储系统中存在热度不同的文件,构造了一种基于非均匀故障保护的分组修复码(GRCNFP),可对热文件和高故障概率节点提供更高等级保护,并降低多故障节点修复的磁盘读取开销.在文件冷热分组后,用所存目标节点故障概率表征数据块故障概率,并排序,存入长度依次递增的多个数据分组,并生成组编码块.性能分析和实际系统部署结果表明,与里德-所罗门码和分组修复码相比,GRC-NFP可在存储开销较小的条件下拥有较高的容错能力和较低的修复局部性,并且使热文件能够受到更有效地保护.系统部署下较少的编码和故障修复时间进一步证明了 GRC-NFP 的可行性.

入藏号: CSCD:6649222

地址: Wang Jing, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Yan, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Yu Chunlei, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Mi, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Xiangyang, College of Information and Communication, National University of Defense Technology, Xi'an, Shaanxi 710106, China.

地址: 王静, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

刘艳, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

余春雷, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王秘, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

刘向阳, 国防科技大学信息通信学院, 西安, 陕西 710106, 中国.

电子邮件地址: jingwang@chd.edu.cn

电子邮件地址: jingwang@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

引用的参考文献数: 16

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第 6 条, 共 37 条

作者: Chen Yan; Ge Lingpo; Song Huansheng

作者: 陈艳; 葛凌波; 宋焕生

标题: Real-time monitoring of asphalt mixture mixing process

标题: 沥青混合料拌和过程实时监控

来源出版物: 交通运输工程学报 卷: 19 期: 6 页: 27-36 出版年: 2019

文献号: 1671-1637(2019)19:6<27:LQHHLB>2.0.TX;2-2

来源出版物: Journal of Traffic and Transportation Engineering 卷: 19 期: 6 页: 27-36

出版年: 2019

文献号: 1671-1637(2019)19:6<27:LQHHLB>2.0.TX;2-2

语言: Chinese

文献类型: Article

作者关键词: pavement engineering; asphalt mixture; template matching recognition; multimodal; mixing quality; real-time monitoring

作者关键词: 路面工程; 沥青混合料; 模板匹配识别; 多模态; 拌和质量; 实时监控

摘要: To control the mixing quality and mixing state of asphalt mixture during the road construction process, a method based on the template matching recognition algorithm in a nonintrusive manner was proposed to extract the asphalt mixture principal component data, such as aggregate, powder, asphalt quality data, mixing time, and temperature in real-time. Based on the identified asphalt mixture data information, the time sequence logic relationship between data acquisition and transmission was established. The WEB monitoring center visually displayed the key information such as the asphalt mixture ratio error, gradation error, mixing time, and temperature. The multimodal information fusion strategy was used to evaluate the asphalt mixture's mixing quality. Based on the prior knowledge of asphalt mixture type during the construction process, the dynamic change of mixture data was analyzed, and the type of asphalt mixture produced in real-time was automatically identified without the manual intervention. The running and screening statuses of mixing equipment were determined by the established model distribution of aggregate data and the mixing time. The historical data were queried across time and the construction cost was assessed according to the stored real-time received data. Research result shows that the time for collecting the character data of asphalt mixture is 4.9ms by using the template matching recognition algorithm, and the recognition accuracy rate is up to 100%. It meets the time interval requirement that the mixing data collection of asphalt mixture during the construction is less than 0.02s. The continuous detection, automatic identification, real-time tracking and visual monitoring on asphalt mixture data during the construction process are realized. The real-time warning is realized when the quality of asphalt mixture is unqualified or the mixing equipment fails. It provides a basis for the comprehensive evaluation of mixing process and the real-time control of mixing quality for asphalt mixture. 4tabs, 11figs, 33refs.

摘要: 为控制道路施工过程中沥青混合料的拌和质量与拌和状态, 提出一种以非介入方式利用模板匹配识别算法实时提取骨料、粉料、沥青质量数据、拌和时间及温度等沥青混合料主成分数据信息的方法, 根据识别到的沥青混合料数据信息建立了数据采集与传输的时序逻辑关系; 在 WEB 监控中心下可视化显示了沥青混合料配合比误差、级配误差、拌和时间及温度等关键信息, 并利用这些多模态信息融合策略评价了沥青混合料的拌和质量; 根据施工过程中沥青混合料类型的先验知识分析了混合料数据的动态变化, 在无人工干预的情况下自动识别了实时生产的沥青混合料类型; 建立了骨料数据的模型分布, 并结合拌和时间判断拌和设备的

运行和筛分状态;存储实时接收到的数据,实现了沥青混合料历史数据跨时间查询和成本评判。研究表明:利用模板匹配识别算法采集沥青混合料字符数据时间为 4.9ms,识别准确率达 100%,满足了施工中沥青混合料拌和数据采集时间间隔小于 0.02s 的要求,实现了施工过程中沥青混合料数据的连续检测、自动识别、实时跟踪和可视化监控;当沥青混合料质量不合格或拌和设备出现故障时可实时预警,为综合评价沥青混合料拌和过程与实时掌控沥青混合料拌和质量提供了依据。

入藏号: CSCD:6643515

地址: Chen Yan, School of Information Engineering, Chang'an University;; School of Foreign Studies, Chang'an University, ;; Xi'an;; Xi'an, Shaanxi;; Shaanxi 710064;; 710064.

Ge Lingpo, Sinohydro Bureau 7Co., Ltd., Chengdu, Sichuan 610213, China.

Song Huansheng, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 陈艳, 长安大学信息工程学院;; 长安大学外国语学院, ;; 西安;; 西安, 陕西;; 陕西 710064;; 710064, 中国.

葛凌波, 中国水利水电第七工程局有限公司, 成都, 四川 610213, 中国.

宋焕生, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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第 7 条, 共 37 条

作者: Ming Yang; He Baokang

作者: 明洋; 何宝康

标题: Attribute revocation and verifiable outsourcing supported multi-authority attribute-based encryption scheme

标题: 支持属性撤销的可验证外包的多授权属性加密方案

来源出版物: 计算机应用 卷: 39 期: 12 页: 3556-3562 出版年: 2019

文献号: 1001-9081(2019)39:12<3556:ZCSXCX>2.0.TX;2-U

来源出版物: Journal of Computer Applications 卷: 39 期: 12 页: 3556-3562 出版年: 2019

文献号: 1001-9081(2019)39:12<3556:ZCSXCX>2.0.TX;2-U

语言: Chinese

文献类型: Article

作者关键词: cloud storage; multi-authority; verifiable outsourcing; attribute revocation; policy hiding

作者关键词: 云存储; 多授权; 可验证外包; 属性撤销; 策略隐藏

摘要: Focusing on the large decryption overhead of the data user and the lack of effective attribute revocation of the Multi-Authority Attribute-Based Encryption(MA-ABE)access control scheme in cloud storage,an attribute revocation and verifiable outsourcing supported multi-authority attribute-based encryption scheme was proposed. Firstly,the data user 's decryption overhead was markedly reduced and the integrity of the data was verified by using verifiable outsourcing technology. Then,the bilinear mapping was used to protect the access policy,preventing the identity of the data owner from leaking. Finally,the version key of each attribute was used to realize the immediate attribute revocation. The security analysis shows that the proposed scheme is safe under the decisional q -bilinear Diffie-Hellman exponent assumption in the standard model,achieves forward security and is able to resist collusion attack. The performance analysis shows that the proposed scheme has great advantages in terms of functionality and computational cost. Therefore,this scheme is more suitable for multi-authority attribute-based encryption environment in cloud storage.

摘要: 针对云存储中基于多授权属性加密(MA-ABE)访问控制方案存在数据使用者解密开销大,同时缺乏有效属性撤销的问题,提出了一种支持属性撤销的可验证外包的多授权属性加密方案。首先,利用可验证外包技术,降低数据使用者的解密开销,同时验证数据的完整性。然后,利用双线性映射保护访问策略,防止数据拥有者身份泄露。最后,利用每个属性的版本密钥实现立即的属性撤销。安全性分析表明所提方案在标准模型中判定性的 q 双线性Diffie-Hellman指数假设下是安全的,同时满足了前向安全性和抗合谋攻击。性能分析表明所提方案在功能性和计算开销两方面都具有较好的优势,因此所提方案更适用于云存储下多授权属性加密环境。

入藏号: CSCD:6632877

地址: Ming Yang, School of Information Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

He Baokang, School of Information Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 明洋, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

何宝康, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: yangming@chd.edc.cn

电子邮件地址: yangming@chd.edc.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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第 8 条, 共 37 条

作者: Ji Yi; Shi Xin; Zhao Xiangmo

作者: 纪艺; 史昕; 赵祥模

标题: Car-following model for intelligent connected vehicles based on multiple headway information fusion

标题: 基于多前车信息融合的智能网联车辆跟驰模型

来源出版物: 计算机应用 卷: 39 期: 12 页: 3685-3690 出版年: 2019

文献号: 1001-9081(2019)39:12<3685:JYDQCX>2.0.TX;2-7

来源出版物: Journal of Computer Applications 卷: 39 期: 12 页: 3685-3690 出版年: 2019

文献号: 1001-9081(2019)39:12<3685:JYDQCX>2.0.TX;2-7

语言: Chinese

文献类型: Article

作者关键词: traffic flow; car-following model; stability analysis; optimal velocity; acceleration

作者关键词: 交通流; 跟驰模型; 稳定性分析; 最优速度; 加速度

摘要: In order to further enhance the stability of traffic flow, based on the classical Optimal Velocity Changes with Memory(OVCM) model, a novel car-following model for intelligent connected vehicles based on Multiple Headway Optimal Velocity and Acceleration(MHOVA) was proposed. Firstly, the optimal velocity change of k leading cars was introduced with the weight γ , as well as the acceleration of the nearest leading car was considered with the weight ω . Then, the critical stability conditions of traffic flow were obtained based on the proposed model and by the linear stability analysis. Finally, the numerical simulations and analyses were carried out on the parameters such as velocity and headway of the fleet with disturbance by Matlab. Simulation results show that, in the simulation of the starting and stopping processes of the fleet, the proposed model reduces the time to obtain the stable state of the fleet compared to OVCM does, in the simulation of a disturbance to the fleet on the annular road, if both ω and k are of rationality, the proposed model can perform the less fluctuations in terms of velocity and headway, compared with the Full Velocity Difference(FVD) model, OVCM and the Multiple Headway Optimal Velocity(MHOV) model. Especially when ω is 0.3 and k is 5, the minimum upward and downward fluctuations of vehicle velocity can be 0.67% and 0.47% respectively. Consequently, the proposed model can better absorb traffic disturbance and enhance the driving stability of fleet.

摘要: 为了进一步提高交通流的稳定性,在经典基于驾驶员记忆的最优速度(OVCM)模型的基础上,提出了一种基于多前车最优速度与紧邻加速度(MHOVA)的智能网联车辆跟驰模型。首先,引入 k 辆前车的的速度变化量与紧邻前车的加速度改进 OVCM 模型,并分别以参数 γ 和 ω 表示其权重;然后,结合改进模型利用线性稳定性分析获得交通流的临界稳定条件;最后,利用 Matlab 对车队施加扰动后的速度和车头距等参数进行数值模拟与分析。仿真结果表明:在车队启动和停止过程的仿真中,所提模型比 OVCM 模型使得车队整体达到稳定状态的时间更短;在环形道路上车队施加扰动的仿真中,所提模型相比于全速度差(FVD)模型、OVCM 和多前车最优速度(MHOV)模型,在合理加速度敏感系数 ω 和前车数 k 约束下的速度和车头距波动幅度相对较小,尤其当 ω 为 0.3 且 k 为 5 时车辆速度的向上和向下波动率最小可达 0.67% 和 0.47%,表明改进模型能较好地吸收交通扰动和增强车队行驶稳定性。

入藏号: CSCD:6632896

地址: Ji Yi, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Shi Xin, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.
Zhao Xiangmo, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 纪艺, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

史昕, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

赵祥模, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: 314109371@qq.com

电子邮件地址: 314109371@qq.com

使用次数 (最近 180 天): 0

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作者: Wang Qinglong; Qiao Rui; Fan Na; Duan Zongtao

作者: 王青龙; 乔瑞; 樊娜; 段宗涛

标题: An efficient conditional anonymity authentication scheme for VANETs

标题: 一种面向车联网的高效条件匿名认证方案

来源出版物: 北京交通大学学报. 自然科学版 卷: 43 期: 5 页: 80-86 出版年: 2019

文献号: 1673-0291(2019)43:5<80:YZMXCL>2.0.TX;2-T

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语言: Chinese

文献类型: Article

作者关键词: anonymous certificate; authentication; traceability; impersonation attack

作者关键词: 车联网; 匿名证书; 认证; 可追踪性; 假冒攻击

摘要: According to the traditional anonymous certificate schemes which are based on Public Key Infrastructure(PKI), anonymous certificates in the proposed scheme do need to be updated, this paper proposes an efficient anonymous certificate distribution mechanism for Vehicle Ad Hoc Networks(VANETs). A vehicle obtains a temporary anonymous certificate from the nearby Road Side Unit(RSU), and uses the certificate to broadcast messages. and vehicles also need not to check the Certificate Revocation List(CRL) which is time-consuming when authenticating messages, which significantly improves the authentication efficiency. The proposed scheme satisfies anonymity, unlinkability, traceability, revocation and message integrity. Security analysis shows it can resist forgery attack, impersonation attack and replay attack. Moreover, in comparison

with existed similar schemes,it can also resist RSU linkage-attack.The experimental results show that the proposed scheme is computationally efficient and practicable.

摘要: 针对传统基于公钥基础设施(Public Key Infrastructure,PKI)的匿名证书方案需要更新的问题,提出一种车联网匿名证书分发机制,车辆从途经的路侧单元(Road Side Unit,RSU)获得临时匿名证书,并利用该证书进行消息广播.因而不存在复杂的证书管理问题,并且车辆在认证消息时也不需要耗时的证书撤销列表(Certificate Revocation List,CRL)检查,显著提高了认证效率.安全分析表明本文方案满足匿名性、不可关联性、可追踪性、撤销性及消息完整性,能够抵抗伪造攻击、假冒攻击和重放攻击,特别是与已有类似方案相比较,能够抵抗 RSU 的关联攻击.实验结果显示本文方案具有较高的计算效率,具有实际应用价值.

入藏号: CSCD:6618597

地址: Wang Qinglong, School of Information Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Qiao Rui, School of Information Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Fan Na, School of Information Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Duan Zongtao, School of Information Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 王青龙, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

乔瑞, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

樊娜, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

段宗涛, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: qlwang@chd.edu.cn; ztduan@chd.edu.cn

电子邮件地址: qlwang@chd.edu.cn; ztduan@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Ren Shuai; He Yuan; Liu Yunong; Xu Zhenchao; Zhang Tao; Wang Zhen; Mu Dejun

作者: 任帅; 贺媛; 柳雨农; 徐振超; 张弢; 王震; 慕德俊

标题: Zero-low-frequency information hiding algorithm based on local BRISK feature

标题: 基于尺度不变局部特征的零低频信息隐藏算法

来源出版物: 计算机应用研究 卷: 36 期: 11 页: 3365-3368 出版年: 2019

文献号: 1001-3695(2019)36:11<3365:JYCDBB>2.0.TX;2-N

来源出版物: Application Research of Computers 卷: 36 期: 11 页: 3365-3368 出版年: 2019

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作者关键词: zero-low-frequency information hiding; BRISK feature; CL multi-wavelet transform; anti-analysis ability

作者关键词: 零低频信息隐藏; BRISK 特征; CL 多小波变换; 抗分析性

摘要: Aiming at inferior anti-analysis of current information hiding algorithm, this paper proposed a zero-low-frequency information hiding algorithm based on local BRISK (binary robust invariant scalable keypoints) feature. First, it carried out first-order CL multi-wavelet transform for carrier image. Then it extracted BRISK feature points in the low-frequency LL₂ to generate an image feature matrix. Second, it used zig-zag scrambling and logistic chaos scrambling for the secret image to decorrelate. Then, it associated the image feature with the encrypted information to form an association sequence by comparing feature values. Last, it would embed association sequence into lower three bits of high-frequency HL₂ and HH₂. The association information constructed by eigenmatrix of high energy region and encrypted information of two times was hidden in the high frequency region, which was beneficial to the robustness and anti-analysis of algorithm. Under the analysis of high-order statistics on 200 pictures, the maximum detection rate was less than 7.516%, which indicates that the proposed algorithm has good anti-analysis ability.

摘要: 针对目前信息隐藏算法抵抗隐写分析能力弱的问题, 提出一种基于尺度不变 (BRISK) 局部特征的零低频信息隐藏算法。首先, 对载体图像进行一阶 CL 多小波变换, 在低频 LL₂ 中提取 BRISK 特征点生成图像特征矩阵; 其次, 利用 zig-zag 和 Logistic 混沌置乱对秘密信息进行去相关性处理; 再次, 将图像特征与加密信息通过对比特征值形成关联序列; 最后, 将关联序列嵌入到高频 HL₂、HH₂ 的低 3 位。算法将高能量区域的特征矩阵与两次加密信息所构建的关联信息隐藏于高频区域, 有利于算法的鲁棒性和抗分析性。在高阶统计量对 200 幅图片的分析测试下, 最大检出率低于 7.516%, 表明所提算法具有良好的抗分析性。

入藏号: CSCD:6616488

地址: Ren Shuai, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

He Yuan, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Xu Zhenchao, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Zhen, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Yunong, School of Electronic & Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Tao, School of Electronic & Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Mu Dejun, College of Automation, Northwestern Polytechnical University, Xi'an, Shaanxi 710072, China.

地址: 任帅, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

贺媛, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

徐振超, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王震, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

柳雨农, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

张弢, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

慕德俊, 西北工业大学自动化学院, 西安, 陕西 710072, 中国.

电子邮件地址: zt904@foxmail.com

电子邮件地址: zt904@foxmail.com

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Wang Wei; Zhang Chaoyang; Tang Xinyao; Song Huansheng; Cui Hua

作者: 王伟; 张朝阳; 唐心瑶; 宋焕生; 崔华

标题: Automatic Self-Calibration and Optimization Algorithm of Traffic Camera in Road Scene

标题: 道路场景下相机自动标定及优化算法

来源出版物: 计算机辅助设计与图形学学报 卷: 31 期: 11 页: 1955-1962 出版年: 2019

文献号: 1003-9775(2019)31:11<1955:DLCJXX>2.0.TX;2-P

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语言: Chinese

文献类型: Article

作者关键词: automatic calibration; vanishing point detection; nonlinear optimization; pan-tilt-zoom traffic camera

作者关键词: 自标定; 灭点检测; 非线性优化; 云台交通相机

摘要: Currently most of the traffic camera self-calibration algorithms are based on vanish point and geometry markers in road scene. However, for the detected multiple vanish points, there exist the unstable disadvantages and the ill-condition of approaches infinity. In addition, the acquired makers may not be accurate. So the practical application of traffic camera self-calibration is limited nowadays. To overcome the above problem, firstly, this paper builds a more stable self-calibration model with single vanish point based on the typical road scene; then acquires the calibration region and geometry markers dynamically, and get the optimal vanish point in diamond space; finally, use the redundant information in road scene to formulate non-linear constraints, and iterate the calibration parameters in the constraint space to get the optimal solutions. Therefore, calibration errors resulted from imprecise initial calibration conditions could be eliminated. The experiment was carried out in pan-tilt-zoom traffic camera monitoring curved road environment, where the camera angle and focal length were changed synchronously in real-time. The results show that the proposed method gets more than 95% accurate of calibration result in road scene, which is better than existing algorithms, especially it applies to the real time self-calibration of pan-tilt-zoom

traffic camera.

摘要: 当前交通相机的自标定算法大多基于灭点或道路中的几何标识进行标定,但多灭点的检测存在不稳定及趋于无穷的病态条件,标识先验条件获取不精确等因素,造成自标定算法的实际应用受限.为了改进上述问题,首先根据典型道路场景,建立较稳定的单灭点标定模型;然后动态获取道路中的可标定区域及其中的几何标识,并在钻石空间中求取最佳灭点;最后利用场景中的冗余信息构造非线性约束条件,对标定参数在约束空间中进行迭代求最优,以消除标定初始条件不精确造成的标定误差.在云台相机监控的实际弯曲道场景中进行实验,同时改变相机视角及焦距进行实时算法处理,结果表明,该算法在多交通场景下的标定准确率达 95%以上,优于现有算法,尤其适用于云台全方位交通相机的自标定.

入藏号: CSCD:6612859

地址: Wang Wei, School of Information Engineering,Changan University;;Anhui Science and Technology Information Industry Co.Ltd, ;; Xian;;Hefei, ;; 710064;;230088.

Zhang Chaoyang, School of Information Engineering,Changan University, Xian, 710064.

Tang Xinyao, School of Information Engineering,Changan University, Xian, 710064.

Song Huansheng, School of Information Engineering,Changan University, Xian, 710064.

Cui Hua, School of Information Engineering,Changan University, Xian, 710064.

地址: 王伟, 长安大学信息工程学院;;安徽科力信息产业有限责任公司, ;; 西安;;合肥, ;; 710064;;230088.

张朝阳, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

唐心瑶, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

宋焕生, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

崔华, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

使用次数 (最近 180 天): 1

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作者: Guo Haojie; Gao Tao; Cao Jiabin

作者: 郭号洁; 高涛; 曹佳新

标题: Parameter Measurement of Baffle Type ICFB Based on Cross-correlation Algorithm

标题: 基于互相关算法挡板式内循环流化床参数测量

来源出版物: 仪表技术与传感器 期: 6 页: 86-90 出版年: 2019

文献号: 1002-1841(2019)6<86:JYHXGS>2.0.TX;2-#

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文献类型: Article

作者关键词: gas solid two phase flow; fluidized bed; cross-correlation; flow velocity; mass flow

作者关键词: 气固两相流; 流化床; 互相关算法; 流速; 质量流量

摘要: A baffletype ICFB and a 3 electrode ECT system based on cross-correlation algorithm was designed to accurately measure the flow parameters of the baffletype ICFB. The method of AC excitation was used to complete the detection and signal processing of 2 groups of capacitance values. Based on flow velocity and concentration, the mass flow rate was calculated. Experimental analysis of the velocity of medium under several working conditions was conducted. Through the analysis of experimental data, the consistency verification, the comparison of gas velocity and particle velocity, and the calculation of relevant parameters were completed, and the change of dynamic parameters in the bed was accurately detected, providing another effective way for the dynamic change research in the baffle type ICFB.

摘要: 为了实现挡板式内循环流化床参数的准确检测,设计并制作了一个挡板式内循环流化床模型和一套基于互相关算法的3电极ECT系统。采用交流激励的方法,完成2组电容值的检测及信号处理。再根据速度与浓度计算获取质量流量,在给定的几种工况下对介质流速进行实验分析,通过实验数据分析完成了一致性的验证、气体流速与颗粒流速的对比、相关参数的计算,准确地检测到床内动态参数的变化,为挡板式内循环流化床内动态变化研究提供又一有效途径。

入藏号: CSCD:6606390

地址: Guo Haojie, School of information engineering, Chang'an University, Xi'an, Shaanxi 710021, China.

Gao Tao, School of information engineering, Chang'an University, Xi'an, Shaanxi 710021, China.

Cao Jiaxin, Business School of Xi'an International Studies University, Xi'an, Shaanxi 710021, China.

地址: 郭号洁, 长安大学信息工程学院, 西安, 陕西 710021, 中国.

高涛, 长安大学信息工程学院, 西安, 陕西 710021, 中国.

曹佳新, 西安外国语大学工商管理学院, 西安, 陕西 710021, 中国.

电子邮件地址: whytczx123@163.com; gtnwpu@126.com

电子邮件地址: whytczx123@163.com; gtnwpu@126.com

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Ma Junyan; Zhang Ying; Li Yi; Wang Jin; Zhang Te

作者: 马峻岩; 张颖; 李易; 王瑾; 张特

标题: HA2: Hierarchical Anomaly Analysis Technology for IoT Sensing Device Firmware

标题: HA2:层次化的物联网感知设备固件异常分析技术

来源出版物: 计算机工程与应用 卷: 55 期: 22 页: 60-68,179 出版年: 2019

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作者关键词: IoT device firmware; One-Class Support Vector Machine(OCSVM); hypothesis testing; hierarchical; anomaly analysis

作者关键词: 物联网设备固件; 一分类支持向量机(OCSVM); 假设检验; 层次化; 异常分析

摘要: The bottom layer of the Internet of Things(IoT) usually contains a large number of sensing terminals, which are the foundation of IoT application and services. However, due to the limitation on resources such as computing, storage and transmission bandwidth, it is very limited to be available when the sensing device firmware program runs. As a result, when these devices are abnormal, relevant personnel often lack sufficient means to analyze them. To solve the above problem, a Hierarchical Anomaly Analysis(HA2) technology for IoT sensing device firmware is proposed. The method is based on the static structure and dynamic track characteristics of the IoT sensor node program. With the help of OCSVM and statistical inference methods, it can realize the anomaly detection at three levels, including interval, task and function, and generate the corresponding anomaly analysis report. Experiments show that compared with the existing methods, the proposed method has less storage and operation cost in collecting the characteristics of anomaly analysis. At the same time, the analysis of defects in open source database shows that the analysis report of HA2 can greatly reduce the scope of anomaly analysis and provide effective help for users to analyze and fix the anomalies.

摘要: 物联网底层一般包含大量的感知终端,这些设备是物联网应用与服务的基础。然而,由于在计算、存储、传输带宽等资源上的限制,感知设备固件程序运行时可获得状态非常有限,一旦这些设备出现异常,相关人员往往缺乏足够的手段对其开展分析。针对这一问题,提出一种层次化的物联网感知设备固件异常分析技术(Hierarchical Anomaly Analysis,HA2)。该方法以物联网感知节点程序静态结构及动态运行轨迹特征为基础,借助一分类支持向量机和统计推断方法,可以实现区间、任务和函数三个层次的异常检测,并生成相应的异常分析报告。实验表明该方法与现有方法相比,在收集异常分析特征方面具有较小的存储及运行开销。开源代码库中的缺陷实例分析表明,与现有方法相比HA2的层次化异常分析报告可以大大缩小异常分析范围,为用户分析、修复异常提供有效帮助。

入藏号: CSCD:6603627

地址: Ma Junyan, School of Information and Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Ying, School of Information and Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Li Yi, School of Information and Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Jin, School of Information and Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Te, School of Information and Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 马峻岩, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

张颖, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

李易, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王瑾, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

张特, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: majy@chd.edu.cn

电子邮件地址: majy@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Song Qingsong; Wang Xingli; Zhang Chao; Chen Yu; Song Huansheng; Khattak Asad Jan

作者: 宋青松; 王兴莉; 张超; 陈禹; 宋焕生; Khattak Asad Jan

标题: A Residual SSD Model Based on Window Size Clustering for Traffic Sign Detection

标题: 用于交通标志检测的窗口大小聚类残差 SSD 模型

来源出版物: 湖南大学学报. 自然科学版 卷: 46 期: 10 页: 133-140 出版年: 2019

文献号: 1674-2974(2019)46:10<133:YYJTBZ>2.0.TX;2-S

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语言: Chinese

文献类型: Article

作者关键词: traffic sign detection; deep learning; Single Shot MultiBox Detector(SSD); K-mean; clustering

作者关键词: 交通标志检测; 深度学习; 单拍多盒探测器(SSD); K-均值; 聚类

摘要: Single Shot MultiBox Detector (SSD) is generally considered to be suitable for solving small target detection in images. However, its performance on feature extraction and detection efficiency is still required to be improved. A clustering residual SSD model is proposed in this paper. On one hand, in order to improve the feature extraction quality, the basic network VGG16 which consists of the original SSD model is replaced with a deeper residual network ResNet50. On the other hand, in order to improve the detection efficiency, K-means algorithm other than the blind search mechanism used in the original SSD model is exploited to find and determine the assignments of the sizes of default windows. For German traffic sign detection dataset, it obtains 97.1% mAP in detection accuracy and 0.07 s per image in detection efficiency. For Chinese traffic

sign dataset,it obtains 89.7% mAP in detection accuracy and 0.08 s per image in detection efficiency.Compared with the original SSD model,the proposed model obtains the improved detection performance.

摘要: SSD 通常被认为适合于求解小目标图像检测问题,但在特征表征和检测效率两方面还存在改进空间.提出一种聚类残差 SSD 模型,一方面将原始 SSD 模型中的 VGG16 基础网络替换为更深的 ResNet50 残差网络,以改善特征表征能力.另一方面采用 K-均值聚类算法取代盲目搜索机制,确定 SSD 中默认窗口的大小,以改善检测效率.针对德国交通标志检测数据集,模型获得了 97.1% mAP 和每幅图像 0.07 s 的检测速度.针对中国交通标志数据集,模型获得 89.7% mAP 和每幅图像 0.08 s 的检测速度.与原始 SSD 模型比较,本文所提模型的检测性能得到改善.

入藏号: CSCD:6600344

地址: Khattak Asad Jan, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

Song Qingsong, School of Information Engineering,Changan University, Xian, 710064.

Wang Xingli, School of Information Engineering,Changan University, Xian, 710064.

Zhang Chao, School of Information Engineering,Changan University, Xian, 710064.

Chen Yu, School of Information Engineering,Changan University, Xian, 710064.

Song Huansheng, School of Information Engineering,Changan University, Xian, 710064.

Khattak Asad Jan, School of Information Engineering,Changan University, Xian, 710064.

地址: 宋青松, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王兴莉, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

张超, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

陈禹, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

宋焕生, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: 2016224007@chd.edu.cn

电子邮件地址: 2016224007@chd.edu.cn

使用次数 (最近 180 天): 1

使用次数 (2013 年至今): 1

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作者: Liu Jiahong; Li Baolu; Yang Lan; Qiu Shuobing; Li Yue

作者: 刘家宏; 李宝路; 杨澜; 邱硕冰; 李玥

标题: GPS/WiFi Indoor and Outdoor Fusion Positioning Method Based on Grey Prediction Model

标题: 基于灰色预测模型的 GPS/WiFi 室内外融合定位方法

来源出版物: 计算机工程 卷: 45 期: 9 页: 264-269 出版年: 2019

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来源出版物: Computer Engineering 卷: 45 期: 9 页: 264-269 出版年: 2019

文献号: 1000-3428(2019)45:9<264:JYHSYC>2.0.TX;2-D

语言: Chinese

文献类型: Article

作者关键词: GPS outdoor positioning; WiFi indoor positioning; seamless positioning; grey prediction model; geometric fusion

作者关键词: GPS 室外定位; WiFi 室内定位; 无缝定位; 灰色预测模型; 几何融合

摘要: Aiming at the problems of repeated switching of positioning mode and low positioning accuracy of indoor and outdoor GPS/WiFi signal interleaving area, a fusion positioning method based on grey prediction model is proposed. The GM(1,1) model is constructed to obtain the objects grey prediction trajectory under the current positioning mode. The precise positioning is realized by using geometric method to deeply fusion the predicted trajectory with the positioning information in the positioning mode to be switched. When the fusion between the predicted trajectory and positioning information fails, the number of satellite signals will be used to decide whether to switch the location mode. Experimental results show that compared with the GPS-based and WiFi-based positioning method, the proposed method has better positioning precision and robustness.

摘要: 针对室内外 GPS/WiFi 信号交织区定位模式反复切换、定位精度低的问题,提出一种基于灰色预测模型的融合定位方法。通过构造 GM(1,1)模型得到当前定位模式下物体的灰色预测轨迹,利用几何方式将预测轨迹与待切换定位模式下的定位信息进行深度融合,实现精准定位。当预测轨迹与定位信息几何融合失败时,根据 GPS 接收卫星信号的数量判断是否切换定位模式。实验结果表明,与基于 GPS 和基于 WiFi 的定位方法相比,该方法具有较高的定位精度与较强的鲁棒性。

入藏号: CSCD:6571445

地址: Liu Jiahong, School of Information Engineering, Changan University, Xian, 710064.

Li Baolu, School of Information Engineering, Changan University, Xian, 710064.

Yang Lan, School of Information Engineering, Changan University, Xian, 710064.

Qiu Shuobing, School of Information Engineering, Changan University, Xian, 710064.

Li Yue, School of Information Engineering, Changan University, Xian, 710064.

地址: 刘家宏, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

李宝路, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

杨澜, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

邱硕冰, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

李玥, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: halsey_j@126.com

电子邮件地址: halsey_j@126.com

使用次数 (最近 180 天): 1

使用次数 (2013 年至今): 1

引用的参考文献数: 25

在中国科学引文数据库中的被引频次: 0

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作者: Ma Junyan; Zhang Te; Wang Jin

作者: 马峻岩; 张特; 王瑾

标题: Task Transition Probability Based Anomaly Detection Method for Sensor Nodes

标题: 基于任务转移概率的感知节点异常运行状态检测方法

来源出版物: 北京邮电大学学报 卷: 42 期: 3 页: 37-42 出版年: 2019

文献号: 1007-5321(2019)42:3<37:JYRWZY>2.0.TX;2-M

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作者关键词: wireless sensor network; anomaly of sensor node; transition probability matrix; node state feature

作者关键词: 无线传感器网络; 感知节点异常; 转移概率矩阵; 节点状态特征

摘要: The anomaly detection of sensor nodes is a great challenge to wireless sensor networks. A feature based on task transition probability is therefore proposed to model running states of sensor nodes, and the feature can be further used for anomaly detection. Task transition probability based anomaly detection (T2PAD) analyzes states of sensor nodes based on the one-step transition probability of running tasks within the nodes, and then performs anomaly detection by comparing similarities between transition probability vectors. T2PAD can identify tasks that caused the anomaly and narrow down the scope of problematic code, which provides clues to deal with the anomaly. Case studies on defects from a sensor network open source project are carried out to verify the effectiveness of T2PAD.

摘要: 针对无线传感器网络中感知节点异常状态检测困难问题,提出了一种基于感知节点任务转移概率的节点状态特征描述方式,利用该特征判断感知节点的运行状态,实现节点异常检测.基于任务转移概率的异常检测方法(T2PAD),根据感知节点运行任务的一步转移概率特征,对节点的运行状态进行分析,通过对转移概率向量相似性进行异常检测,识别出导致异常的任务,缩小并定位异常范围,为修正异常提供依据.传感器网络开源代码库中的缺陷实例验证了T2PAD对于异常检测的有效性.

入藏号: CSCD:6559358

地址: Ma Junyan, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Te, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Jin, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 马峻岩, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

张特, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王瑾, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: majy@chd.edu.cn

电子邮件地址: majy@chd.edu.cn

使用次数 (最近 180 天): 0
使用次数 (2013 年至今): 0
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作者: Song Huanhuan; Hui Fei; Jing Shoucai; Guo Lanying; Ma Junyan

作者: 宋欢欢; 惠飞; 景首才; 郭兰英; 马峻岩

标题: Improved RetinaNet Model for Vehicle Target Detection

标题: 改进的 RetinaNet 模型的车辆目标检测

来源出版物: 计算机工程与应用 卷: 55 期: 13 页: 225-230 出版年: 2019

文献号: 1002-8331(2019)55:13<225:GJDRMX>2.0.TX;2-3

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作者关键词: deep learning; traffic scenes; vehicle detection; deep residual network

作者关键词: 深度学习; 交通场景; 车辆检测; 深度残差网络

摘要: At present, in the field of intelligent transportation, vehicle target detection has become a research hotspot by using deep learning method. As traditional machine learning method is easily affected by external factors such as illumination, angle and image quality, and the cumbersome detection steps, current one-stage target detection models and two-stage target detection models are analyzed, and vehicle target detection method is proposed by on one-stage target detection model and is named RetinaNet, which uses deep residual network to acquire image features autonomously, integrates MobileNet network structure to accelerate the model and transforms the target detection problem in complex traffic scenarios into the three-category problem of vehicle type. KITTI data set is adopted to train and actual scenes images are applied to test. Experimental results show that the proposed method improves the MAP value by 2.2 percentage points in comparison with original RetinaNet model.

摘要: 目前,在智能交通领域使用深度学习方法进行车辆目标检测已成为研究热点。针对传统机器学习方法的性能易受光照、角度、图像质量等外界因素影响,检测步骤繁琐等问题,通过对当下经典的一阶目标检测模型和二阶目标检测模型进行分析,提出了一种基于改进的一阶目标检测模型 RetinaNet 的车辆目标检测方法,使用深度残差网络自主获取图像特征,融合 MobileNet 网络结构进行模型加速,把复杂交通场景下的目标检测问题转化为车辆类型的三分类问题,利用 KITTI 数据集进行训练,并使用实际场景中的图像进行测试。实验结果表明,改进的 RetinaNet 模型在保证检测时间的情况下,相比原 RetinaNet 模型 MAP 值提高了 2.2 个百分点。

入藏号: CSCD:6554397

地址: Song Huanhuan, School of Information and Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Hui Fei, School of Information and Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Jing Shoucai, School of Information and Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Guo Lanying, School of Information and Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Ma Junyan, School of Information and Engineering, Changan University, Xi'an, Shaanxi 710064, China.

地址: 宋欢欢, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

惠飞, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

景首才, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

郭兰英, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

马峻岩, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: 1819018568@qq.com

电子邮件地址: 1819018568@qq.com

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

引用的参考文献数: 20

在中国科学引文数据库中的被引频次: 1

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作者: Li Chan; Song Huansheng; Wu Feifan; Wang Wei; Wang Xuan

作者: 李婵; 宋焕生; 武非凡; 王伟; 王璇

标题: Auto-calibration of the PTZ camera on the highway

标题: 高速公路云台相机的自动标定

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文献号: 1006-8961(2019)24:8<1391:GSGLYT>2.0.TX;2-5

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作者关键词: lane line model; vanishing point; auto-calibration; highway; pan-tilt-zoom (PTZ) camera

作者关键词: 车道线模型; 消失点; 自动标定; 高速公路; 云台相机

摘要: Objective In the field of image processing, camera calibration is used to determine the relationship between the 3D geometric position of a point in space and the corresponding point in an image. Camera calibration mainly aims to obtain the camera's intrinsic, extrinsic, and distortion parameters. The intrinsic and extrinsic parameters of the camera can be used to calculate vehicle speed and spatial location, and detect and recognize traffic events, among others. Recently, pan-tilt-zoom (PTZ) cameras have been playing an important role in highway monitoring systems due to their wide field of view and high flexibility. The image obtained by the PTZ camera is changed as the focal length and angles of the PTZ camera change with demand, which makes obtaining the camera parameters difficult. Therefore, research on the autocalibration method of the PTZ camera has an important application value in the highway intelligent monitoring system. The calibration of the PTZ camera is mainly based on vanishing points. A set of parallel lines in space intersect on a point in the image through the perspective transformation of the camera. The intersection point is the vanishing point. Three vanishing points that are orthogonal to each other can be formed in the 3D space. According to the number of vanishing points, the calibration method is divided into two categories: based on double (VVH, VVW, VVL) and single vanishing point (VWH, VLH, VWL). V denotes a vanishing point, W denotes the distance between the two-lane lines on the road, L denotes the length of the lane line on the road, and H denotes the height of the camera. Method The PTZ camera has two characteristics: the roll angle is zero, and the principal point is at the center of the image. Therefore, the camera model can be reasonably simplified based on the above characteristics. Determining the focal length, the pan angle, the tilt angle, and the height of the camera is necessary to obtain the intrinsic and extrinsic parameters of the camera. In an actual highway scene, the height of the camera is known. This study proposes a PTZ camera autocalibration method based on two vanishing point constraints and lane line model constraint, which belongs to the VVH method. First, the SSD algorithm is used to detect the vehicle objects, and the optical flow method is used to track the vehicle objects to obtain the object trajectory set. Given that the road is partially curved, each trajectory needs to be processed to obtain a trajectory set that conforms to the linear features. The linear trajectories in the trajectory set are voted in the cascaded Hough transform space to obtain a longitudinal vanishing point. Second, in the actual highway scene, the vehicle object is relatively small in the image because of the high camera height. Therefore, the general method of obtaining a second vanishing point by detecting the edge of the vehicle is not applicable in the scene. No other parallel lines can be used in the scene to directly obtain the second vanishing point. Therefore, taking the physical metric of the lane line model as the constraint, the enumeration strategy is used to obtain the estimated value of the horizontal vanishing point. Finally, an accurate calculation of the calibration parameters of the PTZ camera is achieved under the condition of known camera height. Result The proposed autocalibration of the PTZ camera is performed in different scenes of multiple highways in Zhejiang Province. Videos corresponding to these scenes have standard and high definitions.

摘要: 目的云台相机因监控视野广、灵活度高,在高速公路监控系统中发挥出重要的作用,但因云台相机焦距与角度不定时地随监控需求变化,对利用云台相机的图像信息获取真实世界准确的物理信息造成一定困难,因此进行云台相机非现场自动标定方法的研究对高速公路监控系统的应用具有重要价值。方法本文提出了一种基于消失点约束与车道线模型约束的云台相机自动标定方法,以建立高速公路监控系统的图像信息与真实世界物理信息之间准确描述关系。首先,利用车辆目标运动轨迹的级联霍夫变换投票实现纵向消失点的准确估计,其次以车道线模型物理度量量为约束,并采用枚举策略获取横向消失点的准确估计,最终在已知相机高

度的条件下实现高速公路云台相机标定参数的准确计算。结果将本文方法在不同的场景下进行实验,得到在不同的距离下的平均误差分别为 4.63%、4.74%、4.81%、4.65%,均小于 5%。结论对多组高速公路监控场景的测试实验结果表明,本文提出的云台相机自动标定方法对高速公路监控场景的物理测量误差能够满足应用需求,与参考方法相比较而言具有较大的优势和一定的应用价值,得到的相机内外参数可用于计算车辆速度与空间位置等。

入藏号: CSCD:6550956

地址: Li Chan, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Song Huansheng, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wu Feifan, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Wei, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Xuan, School of Computer and Control Engineering, Yantai University, Yantai, Shandong 264005, China.

地址: 李婵, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

宋焕生, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

武非凡, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王伟, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王璇, 烟台大学计算机与控制工程学院, 烟台, 山东 264005, 中国.

电子邮件地址: lichan1116@163.com; 1192750414@qq.com; 1043064759@qq.com; 879322584@qq.com; 410060376@qq.com

电子邮件地址: lichan1116@163.com; 1192750414@qq.com; 1043064759@qq.com; 879322584@qq.com; 410060376@qq.com

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作者: Li Xiaochi; Xu Zhigang; Chen Ting; Zhao Xiangmo

作者: 李骁驰; 徐志刚; 陈婷; 赵祥模

标题: Heterogeneous vehicular network selection method considering network congestion and system fairness

标题: 考虑网络拥堵与系统公平的车载异构网络选择方法

来源出版物: 交通运输工程学报 卷: 19 期: 3 页: 178-190 出版年: 2019

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作者关键词: transportation information engineering; connected vehicle; two-layer game; heterogeneous vehicular network; dedicated short-range communication; multiple criteria decision making

作者关键词: 交通信息工程; 车联网; 双层博弈; 车载异构网络; 专用短程通信; 多准则决策

摘要: The bounded rationality characteristic of evolutionary game was used to implement the network selection, and the network resource of heterogeneous vehicular network system was evenly distributed. The fairness of the system was guaranteed by optimizing evolutionary game with two-layer game while some of the vehicles can transmit message in extreme congestion. The network simulation scene combined with dedicated short-range communication (DSRC), long-term evolution, and wireless local area network was designed, and the traditional method based on multiple criteria decision making, the network selection method based on evolutionary game, and the network selection method based on two-layer game were compared. Simulation result shows that the large scale ping-pong effects of dynamic network environment in heterogeneous vehicular network switching was firstly solved by using the heterogeneous vehicular network selection method based on evolutionary game and two-layer game. The two-layer game can suppress congestion and provide system fairness. The network selection method based on two-layer game can drive the heterogeneous network system to achieve the stability of network system state in 2-3 switching cycles. In the preset dynamic network evaluation condition and the general scene with 80 terminals, the terminal average network evaluation index of two-layer game is 19.5% higher than that of evolutionary game, and it provides reliable services for three kinds of network cooperation. In the extreme congestion scenario with 190 terminals, the terminals are reasonably distributed and share the DSRC network resources. The terminal average network evaluation index of two-layer game is 10.3% higher than that of evolutionary game, and the evaluation index of two-layer game DSRC network is 2.18 times of evolutionary game. Therefore, the basic safety messages broadcast, system fairness and basic connected vehicle service can be ensured. 18 figs, 31 refs.

摘要: 利用演化博弈的有限理智特性执行网络选择, 以实现车载异构网络系统中网络资源的均衡分配; 利用双层博弈对演化博弈方法进行优化, 保证极端拥堵中部分车辆消息传输的同时, 维持系统公平; 设计了专用短程通信、长期演进和无线局域网融合的车载异构网络仿真场景, 对比了基于多准则决策的传统方法、基于演化博弈的网络选择方法和基于双层博弈的网络选择方法。仿真结果表明: 采用基于演化博弈和双层博弈的车载异构网络选择方法首次解决了动态网络环境中车载异构网络切换时出现的大规模乒乓效应, 利用双层博弈能够实现拥堵抑制和系统公平; 采用基于双层博弈的网络选择方法能够驱动异构网络系统在 2~3 个切换周期内实现网络系统状态的稳定; 在预设的动态网络评价条件下与 80 个终端的一般场景中, 双层博弈终端平均网络评价指标高于演化博弈 19.5%, 为 3 种网络协同工作提供可靠服务; 在 190 个终端极端拥堵场景中, 终端合理分配, 共享专用短程通信网络资源, 双层博弈终端平均网络评价指标高于演化博弈 10.3%, 双层博弈专用短程通信网络评价指标为演化博弈的 2.18 倍, 可

以保证车联网基本安全信息的广播、系统的公平并维系基本车联网服务。

入藏号: CSCD:6532736

地址: Li Xiaochi, School of Information Engineering,Changan University, Xian, Shaanxi 710064, China.

Xu Zhigang, School of Information Engineering,Changan University, Xian, Shaanxi 710064, China.

Chen Ting, School of Information Engineering,Changan University, Xian, Shaanxi 710064, China.

Zhao Xiangmo, School of Information Engineering,Changan University, Xian, Shaanxi 710064, China.

地址: 李骁驰, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

徐志刚, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

陈婷, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

赵祥模, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: xcli@chd.edu.cn; xmzhao@chd.edu.cn

电子邮件地址: xcli@chd.edu.cn; xmzhao@chd.edu.cn

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作者: Liu Youquan; Zhang Cairong; Ma Lei; Shi Jian; Sun Zhao; Chen Yanyun

作者: 柳有权; 张彩荣; 马雷; 石剑; 孙昭; 陈彦云

标题: Structure-Based Real-Time Image Stippling

标题: 一种基于图像结构特征的实时点画生成算法

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作者关键词: stippling; stylization; image processing; non-photorealistic rendering

作者关键词: 点画; 风格化; 图像处理; 非真实感绘制

摘要: Stippling is a classical art technique that uses small dots to simulate varying degrees of solidity or shading and show its artistry. Generating stippling from image is one of the targets of image stylization and non-photorealistic rendering. In this paper, we propose a structure-based real-time image stippling algorithm. A pre-computed incremental Voronoi sequence is employed

to generate sample points for stippling. To improve the quality on the edge and detail regions, we introduced input image and its corresponding image structure information to guide the radius and tone of the stipples. Experiments show that the stippling generated by pro-posed method is superior to the state-of-the-arts in visual and numerical error (SSIM). Our proposed algorithm can achieve real-time performance and apply to high frame rate scenes.

摘要: 点画是一种经典的艺术技巧,其用点的形式模拟图像中色调的明暗变化,表现其艺术特质。由图像自动生成点画是图像风格化和非真实感渲染的对象之一。为此,提出了一种基于图像结构特征的实时点画生成算法。使用一个预计算的增量 Voronoi 序列快速生成点画所需的采样点,通过输入图像和对应的结构特征图共同指导点画图中点的半径和色调,提高点画图像在边缘及细节上的质量。实验结果表明,该算法生成的点画结果在视觉效果和数值误差 (SSIM)上均优于现有点画生成算法,并且在绘制速度上能够达到实时的性能,可应用于高帧率的场景中。

入藏号: CSCD:6535082

地址: Liu Youquan, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Cairong, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Sun Zhao, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Ma Lei, School of Computer and Control, University of Chinese Academy of Sciences;;Institute of Software, Chinese Academy of Sciences, ;;, ;;, Beijing;;Beijing 100049;;100190.

Shi Jian, Institute of Automation, Chinese Academy of Sciences, Beijing 100190, China.

Chen Yanyun, Institute of Software, Chinese Academy of Sciences, Beijing 100190, China.

地址: 柳有权, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

张彩荣, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

孙昭, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

马雷, 中国科学院大学计算机控制学院;;中国科学院软件研究所, ;;, ;;, 北京;;北京 100049;;100190, 中国.

石剑, 中国科学院自动化研究所, 北京 100190, 中国.

陈彦云, 中国科学院软件研究所, 北京 100190, 中国.

电子邮件地址: youquan@chd.edu.cn

电子邮件地址: youquan@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Zhao Xiangmo; Cheng Jingjun; Xu Zhigang; Wang Wenwei; Wang Runmin; Wang Guanqun; Zhu Yu; Wang Guiping; Zhou Yu; Chen Nanfeng

作者: 赵祥模; 承靖钧; 徐志刚; 王文威; 王润民; 王冠群; 朱宇; 汪贵平; 周豫; 陈南峰

标题: An Indoor Rapid-testing Platform for Autonomous Vehicle Based on Vehicle-in-the-loop Simulation

标题: 基于整车在环仿真的自动驾驶汽车室内快速测试平台

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作者关键词: automotive engineering; indoor rapid-testing platform for autonomous driving; vehicle- in-the-loop; autonomous vehicle; bench detection

作者关键词: 汽车工程; 自动驾驶室内快速测试平台; 整车在环仿真; 自动驾驶汽车; 台架检测

摘要: The vehicle-in-the-loop simulation test method can validate the performance of autonomous vehicles safely and efficiently in complex environments and extreme conditions. This paper develops an indoor rapid-testing platform for autonomous vehicles based on vehicle-in-the-loop. This platform is comprised of seven subsystems: front-axle rotatable drum bench, automobile test bench detection system, virtual scenario automatic generation subsystem, virtual sensor simulation subsystem, driving simulators, autonomous vehicle, and result analyzing and evaluating automatically subsystem. The driving resistance was simulated by independently loading torque on the rollers supporting the four wheels of the automobile, so that different road adhesion coefficients were simulated. Slope, roll, and yaw follower mechanisms were used to simulate three degrees-of-freedom such as the pitch angle, roll angle, and course angle. Virtual reality technology was adopted to simulate various road traffic scenarios to verify performance indicators, such as intelligent perception and decision-making behavior of the autonomous vehicle, by means of flexible integration of the vehicle dynamics model, sensor simulators, simulations of complex traffic environments, and test cases. A closed loop system was modeled by coupling the automobile, the virtual simulation scenarios and the test bench in order to research and develop a number of key technologies, including the structural design of multi degrees-of-freedom and high-dynamic detection bench, automatic reconstruction method of virtual test scenes, and methods of simulation and injection for sensor data, which can meet the need to test the performance of autonomous vehicles in various scenarios. Further, to verify the effectiveness of the test platform, U-turn trajectory tracking control was taken as a research example. Based on a simplified vehicle kinematics model and the Model Predictive Control algorithm, a large amount of experiments was performed in virtual scenarios of U-turns to test the efficiency of the trajectory tracking control algorithm on the autonomous vehicle. The results showed that the platform could simulate automobile driving conditions on the road realistically, and the trajectory tracking effect of the autonomous vehicle in the virtual scenario is satisfactory. The deviation from the predicted trajectory is less than 8%, which demonstrates the effectiveness of the test platform.

摘要: 整车在环仿真测试方法可以安全、高效地验证复杂环境和极端工况等场景下自动驾驶

汽车性能的有效性,基于此研发一种基于整车在环仿真的自动驾驶汽车室内快速测试平台,该平台由前轴可旋转式转鼓试验台、试验台测控子系统、虚拟场景自动生成子系统、虚拟传感器模拟子系统、驾驶模拟器、自动驾驶汽车和测试结果自动分析评价子系统组成。通过在试验台滚筒上独立加载转矩模拟车辆行驶阻力,可动态模拟不同的路面附着系数,同时利用坡度、侧倾和转向随动机构可模拟车辆俯仰角、侧倾角和航向角 3 个自由度;采用虚拟现实技术柔性集成车辆动力学模型、传感器仿真、复杂道路交通环境及测试用例仿真,模拟多种道路交通场景,并通过传感器仿真及数据融合等技术快速测试自动驾驶汽车智能感知与行为决策等性能指标。将自动驾驶汽车、虚拟仿真场景和试验台耦合构建一个闭环系统,完成了多项关键技术研发,包括:多自由度高动态试验台结构设计、虚拟测试场景自动重构方法和传感器数据模拟及注入方法,可满足在各种场景下测试自动驾驶汽车整车性能的需求。此外,为验证快速测试平台的有效性,以 U-turn 轨迹跟踪控制为研究实例,基于简化的车辆运动学模型和模型预测控制算法,在平台上搭建 U-turn 场景并对自动驾驶汽车的轨迹跟踪控制算法性能进行大量测试。结果表明:自动驾驶汽车室内快速测试平台可以真实地模拟汽车在道路上的运行工况,自动驾驶汽车在虚拟场景中的轨迹跟踪效果良好,与参考轨迹的偏差小于 8%,证明了该测试平台检测方法的有效性。

入藏号: CSCD:6530258

地址: Zhao Xiangmo, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Cheng Jingjun, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Xu Zhigang, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Wenwei, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Runmin, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Guanqun, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhu Yu, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Guiping, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhou Yu, Shijiazhuang Huayan Transportation Technology Co.Ltd., Shijiazhuang, Hebei 050081, China.

Chen Nanfeng, Shijiazhuang Huayan Transportation Technology Co.Ltd., Shijiazhuang, Hebei 050081, China.

地址: 赵祥模, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

承靖钧, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

徐志刚, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王文威, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王润民, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王冠群, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

朱宇, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

汪贵平, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

周豫, 石家庄华燕交通科技有限公司, 石家庄, 河北 050081, 中国.
陈南峰, 石家庄华燕交通科技有限公司, 石家庄, 河北 050081, 中国.

电子邮件地址: xmzhao@chd.edu.cn; 2017024008@chd.edu.cn

电子邮件地址: xmzhao@chd.edu.cn; 2017024008@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Li Xiaochi; Zhao Xiangmo; Xu Zhigang; Wang Runmin; Wang Wenwei

作者: 李骁驰; 赵祥模; 徐志刚; 王润民; 王文威

标题: Modular Flexible Test Bed for Intelligent and Connected Transportation System

标题: 面向智能网联交通系统的模块化柔性试验场

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作者关键词: automotive engineering; intelligent transportation system; intelligent and connected transportation; vehicular network; unmanned driving; heterogeneous network

作者关键词: 汽车工程; 智能交通系统; 智能网联; 车联网; 无人驾驶; 异构网络

摘要: To provide a reference for the design and construction of an intelligent and connected transportation system, this paper reviews the status of testing technology in existing research. Combining the experience of testing and research on connected and autonomous vehicle test-sites at Chang'an University, this paper proposes a modular flexible test bed for an intelligent and connected transportation system. The modular flexible test bed included an application layer, a sensing and releasing layer, a network link layer, and a management service layer. The application layer simulated a real-world intelligent connected environment. The adaption of devices and services in different environments for intelligent connected transportation can be verified by simulating various aspects of weather, roads, and traffic conditions. The sensing and releasing layer collected information of the environment and traffic system and released control and service information, through sensing devices including a camera, light detection and ranging (lidar) device, and millimeter-wave radar, and releasing devices including a variable information board. The network link layer consisted of a heterogeneous vehicular network. Through

collaboration among networks,the network link layer could provide transparent transmission and exclusive network information services for devices and services in the application and sensing and releasing layers.The management service layer managed storage,backup,processing,and visualization of the lower layers'data,and implemented the management and maintenance of the lower layers'test devices.Based on the modular test bed mentioned above,an in-door test bench for an intelligent and connected vehicle was developed to cooperate with the test bed for simulating,recreating,and adjusting a traffic scene,so as to realize a flexible intelligent and connected transportation test.The modular flexible test bed for an intelligent and connected transportation system proposed in this paper has a standardized test environment and uses a controllable and traceable test process and scientific test evaluation method.It can verify intelligent and connected devices and services on functionality,application processing,application effects,and service utility,in different dimensions. The construction,promotion,and application of the modular flexible test bed for intelligent and connected transportation systems can promote the transformation of intelligent and connected technology from theoretical research to practical application and will play a crucial role in achieving innovation and reform of future transportation information services and transportation systems.

摘要: 为了给智能网联试验场设计与建设提供参考,分析了智能网联交通系统中测试技术的研究现状;结合长安大学车联网与智能汽车试验场的测试和研究经验,提出了一种面向智能网联交通系统的模块化柔性试验场,该试验场包括应用场景、感知发布、网络链路和管理服务 4 个层次。应用场景层通过模拟真实场景中的天气、道路和交通条件,验证智能网联交通设备和服务在不同环境、不同场景的适应性;感知发布层通过摄像头、激光雷达、毫米波雷达等传感设备以及可变情报板等信息发布设备,实现环境数据及交通信息的采集,并下发相应的控制信息和服务信息;网络链路层由车载异构网络构成,通过网络间的协同工作,为应用场景层和感知发布层的设备提供网络信息服务;管理服务层负责下层数据的存储、备份、处理和可视化,并实现下层测试设备的管理与维护。在上述模块化平台的基础上,开发智能网联汽车室内测试台架,配合试验场进行交通场景构建、测试场景复现和单一要素分析,实现智能网联交通的柔性场景测试。结果表明:所提出的试验场具有标准化的测试条件,可控可追踪的测试流程和科学的测试评价体系,能够模拟真实的道路交通场景,提高智能网联相关技术的开发和测试效率。该试验场的建设、推广与应用,能够推进智能网联和无人驾驶技术从理论研究到实际应用的转化,为实现未来交通信息服务和交通系统的创新与变革起到至关重要的作用。

入藏号: CSCD:6530259

地址: Li Xiaochi, School of Information Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Xiangmo, School of Information Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Xu Zhigang, School of Information Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Runmin, School of Information Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Wenwei, School of Information Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 李骁驰, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

赵祥模, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

徐志刚, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王润民, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王文威, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: xcli@chd.edu.cn; xmzhao@chd.edu.cn

电子邮件地址: xcli@chd.edu.cn; xmzhao@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Tian Bin; Zhao Xiangmo; Xu Zhigang; Wang Miao; Zhang Yuqin

作者: 田彬; 赵祥模; 徐志刚; 王淼; 张宇琴

标题: NRT-V2X: Adaptive Data Dissemination Protocol for Traffic Efficiency of Connected and Automated Highways

标题: 车路协同条件下智能网联高速公路通行效率信息自适应分发协议:NRT-V2X

来源出版物: 中国公路学报 卷: 32 期: 6 页: 293-307 出版年: 2019

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作者关键词: traffic engineering; intelligent vehicle infrastructure cooperative technology; adaptive algorithm; VANET protocol; intelligent transportation system; traffic efficiency

作者关键词: 交通工程; 车路协同技术; 自适应算法; 车联网网络协议; 智能交通系统; 通行效率

摘要: Intelligent vehicle infrastructure cooperative technique is the key to resolving the drawbacks of the current intelligent and autonomous vehicles. The development of a connected and automated highway makes this technique a potential platform. However, it is still a challenge to determine how the road side unit (RSU) disseminates the information from road side sensors or the traffic control center. This paper proposes an adaptive data dissemination protocol based on the fusion of V2V and V2I, named NRT-V2X. The protocol defines a region of interest (ROI) before the event area in the upstream traffic direction. The RSU can adaptively adjust the transmit interval according to the network traffic and the road traffic in the ROI. Thus, the packet delivery ratio can be guaranteed to be near 100%, while decreasing the overhead of RSU and the network redundancy of vehicles. Two scenarios and applications were built on the bidirectional coupled IoV simulation platform, based on which the proposed technique can be evaluated. The NRT-V2X can

improve the traffic efficiency of highway by at least 28%. Moreover,unlike the fixed transmit interval method and ATB protocol,NRT-V2Xcan ensure that the packet delivery ratio is close to 100%;the transmit overhead and received message redundancy decrease by more than 30% and 20%,respectively.Therefore,NRT-V2Xcan efficiently disseminate traffic-related information to the vehicles in the ROI,and help the vehicles select an optimal trajectory leading to a shorter journey.

摘要: 车路协同技术是解决自动驾驶中单车智能现存缺陷的关键技术。而智能网联高速公路的出现为车路协同技术真正应用于实际提供了良好的平台,其中,路侧单元(Road Side Unit,RSU)如何将路侧传感器信息或交通监控中心发布消息传递给路上车辆,是车路协同技术的一个关键环节。为此,提出一种基于 V2V(Vehicle to Vehicle)和 V2I(Vehicle to Infrastructure)融合的自适应数据分发协议(Adaptive Network and Road Traffic Data Dissemination for V2X,NRT-V2X)。NRTV2X 协议在影响通行效率事件的车流上游为 RSU 定义了一段服务区域(ROI,Region of Interest)。RSU 通过感知服务区域中车辆的无线通信网络状况和路面交通状况来自适应调整其信息发送间隔,从而在保证 ROI 中车辆信息全覆盖的前提下,降低 RSU 发送信息开销,抑制 ROI 内车辆的接收信息冗余。基于创建的 2 个场景和 2 个车路协同应用,利用双向耦合车联网仿真平台进行性能评估。试验结果表明:采用 NRT-V2X 协议的车路协同技术可使高速公路的通行效率提高 28%以上;与 RSU 固定发送间隔协议和典型 V2X 协议 ATB 相比,NRT-V2X 的信息覆盖率稳定在 100%,发送信息开销降低了至少 30%,接收信息冗余下降了 20%以上;NRT-V2X 能够将智能网联高速公路通行效率相关信息高效地由 RSU 分发到其定义的 ROI 中的所有车辆,从而保证所有车辆预先接收到相关信息,选择最优行车路线,提高通行效率。

入藏号: CSCD:6530274

地址: Tian Bin, School of Information Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Xiangmo, School of Information Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Xu Zhigang, School of Information Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Miao, School of Information Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Yuqin, School of Information Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 田彬, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

赵祥模, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

徐志刚, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王淼, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

张宇琴, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: tb@chd.edu.cn

电子邮件地址: tb@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Zhang Wei; Tian Liping; Liang Yu; Deng Jing

作者: 张伟; 田丽萍; 梁玉; 邓晶

标题: Key Management Scheme to Secure Coordinated Multi-point Joint Transmission for Vehicular Networks

标题: 面向车联网多点协作联合传输的安全认证与密钥更新方法

来源出版物: 中国公路学报 卷: 32 期: 6 页: 308-318 出版年: 2019

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作者关键词: traffic engineering; vehicular network; key management; intelligent transportation; CoMP-JT; cooperative vehicular-infrastructure

作者关键词: 交通工程; 车联网; 密钥管理; 智能交通; 多点协作联合传输; 车路协同

摘要: With the popularization of vehicle-to-everything(V2X)- based autonomous driving and cooperative vehicular infrastructure,the requirements of acceptable delays and potential attack surfaces introduced for vehicular network communications have become more stringent in order to satisfy the basic requirements of driving safety and privacy security.As the major vehicular communication solution,long-term evolution(LTE)-V2Xcontinues to use the coordinated multipoint joint transmission(CoMP-JT)introduced in LTE to reduce the handover delay at the base station(evolved node B,eNB)and mitigate the low quality of throughput in a high-speed moving scenario by employing the joint transmission technique during the handover process.However, the current security key management scheme in the LTE standard does not satisfy the requirements of the key management scenario in the CoMP-JT process.Therefore,this paper proposes a novel handover key generation and update scheme that can be used for CoMP-JT handover in LTE-V2Xcommunication.Before transmission handover,the serving eNB and target eNB should each have a public-private key pair based on their location information and also share a re-encryption key.Subsequently,the moving vehicle generates a handover request,which is encrypted with the public key of the target eNB,the shared key,and a random number.The handover request will be broadcasted to the serving and target eNBs.The target eNB can recover the shared key and calculate the subsequent session key from the received ciphertext with its private key.Synchronously,the vehicle calculates the subsequent session key based on the location information of the target eNB and the random number used to generate the handover request.With this proposed scheme,the separation of forward/backward key can be achieved without reduction of the diversity gain achieved from joint transmission handover.In other words,the session key is generated by the vehicle and transmitted to the eNBs involved securely. In this study,the scheme for key generation and update was verified and analyzed based on cryptography theory and the

capability of establishing a secure communication session between the vehicle and eNB without disrupting the separation of backward/forward keys in the process of handover during LTE-V2XCoMP-JT was demonstrated.The performance evaluation shows that compared with traditional schemes,the proposed scheme can reduce the communication delay introduced by the transmission handover process by 26.4%,and also reduce channel loading between the vehicle and target eNB by almost 50%.Moreover,with the increase in the number of vehicles in the cell range,the channel loading of the base station increases linearly,which improves the applicability of the scheme in the LTE-V2Xvehicular networking scenario.

摘要: 未来基于车联网的车路协同和自动驾驶场景要求车-车/车-路等网络通信在保证数据安全的前提下,具备低时延、高可靠的特性,从而保证车辆的行驶安全以及车/人的信息安全。LTE-V2X 作为车联网通信方案之一,LTE 的多点协作联合传输(Coordinated Multiple Points-Joint Transmission, CoMP-JT)技术不仅可以减少车辆在高速行驶过程中进行基站(Evolved Node B,eNB)切换时的通信中断,还能通过多个基站的协同传输来辅助提高网络的数据传输性能。然而当前 LTE 标准中的安全密钥管理方案无法满足多点协作联合传输过程中的密钥管理场景。针对该问题,提出一种可用于 LTE-V2X 车联网通信中多点协作传输切换的安全密钥生成与更新算法。该算法由车辆生成基站切换请求并使用随机数、共享密钥、目标基站公钥对切换请求进行加密、广播;基于密码学特性,目标基站不仅可基于私钥从密文请求中计算出共享密钥,还可以计算得到后续的会话密钥;车辆则可以基于目标基站位置信息、生成请求时的随机数计算出会话密钥,从而实现在只需要 1 次密钥传输的前提下,达成车辆与基站之间的密钥共享和密钥更新,并从密码学角度针对该密钥生成与更新算法进行验证分析。研究结果表明:在 LTE-V2X 多点协作传输时的基站切换过程中,该算法能够确保车辆与基站进行后向/前向密钥分离的安全认证以及会话密钥建立;与传统方案相比,所提方法可减少 26.4%的基站切换过程中引入的通信时延,基站信道负载均仅为传统方案的 1/2,并且随基站小区范围内车辆数目增加,基站的信道负载也仅线性增加,提升了该算法在 LTE-V2X 车联网场景中的适用性。

入藏号: CSCD:6530275

地址: Zhang Wei, School of Information Engineering,Chang'an University;;China Highway Engineering Consultants Corporation, ;; Xi'an;;, Shaanxi;;Beijing 710064;;100089.

Tian Liping, China Highway Engineering Consultants Corporation, Beijing 100089, China.

Deng Jing, China Highway Engineering Consultants Corporation, Beijing 100089, China.

Liang Yu, Tencent Technology, Shenzhen, Guangdong 518057, China.

地址: 张伟, 长安大学信息工程学院;;中国公路工程咨询集团有限公司, ;; 西安;;, 陕西;;北京 710064;;100089, 中国.

田丽萍, 中国公路工程咨询集团有限公司, 北京 100089, 中国.

邓晶, 中国公路工程咨询集团有限公司, 北京 100089, 中国.

梁玉, 腾讯科技有限公司, 深圳, 广东 518057, 中国.

电子邮件地址: 158172607@qq.com

电子邮件地址: 158172607@qq.com

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 1

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作者: Wu Huayue; Duan Liren

作者: 吴骅跃; 段里仁

标题: Unstructured road detection method based on RGB entropy and improved region growing

标题: 基于 RGB 熵和改进区域生长的非结构化道路识别方法

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作者关键词: traffic information engineering and control; unstructured road detection; RGB image entropy; region growing method; quadratic curve model

作者关键词: 交通信息工程及控制; 非结构化道路检测; RGB 图像熵; 区域生长方法; 二次曲线模型

摘要: Unstructured roads usually do not have leading lines such as lanes, and the road boundary is vague and there exist many interference factors around the roads. Therefore it is not reliable to use the lane keeping system for autopilot and driver assistance system in this kind of roads. By generating the entropy image from original image the minimum difference of histogram of the entropy image is computed, and the difference is used as the segmental threshold to preliminarily segment the image. Then, the improved region growing method is used to extract the lane from the preliminarily segmented image. The real-time quadratic curve is used to establish the lane model, and the improved least square fitting method is applied to effectively avoid noisy points on the edges of lane region and promote the fitting speed. The experimental results show that the improved methods can be used to rapidly extract the lane from road image and fit out the lane line, therefore it helps to achieve visual based lane keeping on unstructured road for autopilot and driver assistance system.

摘要: 非结构化道路通常没有车道线等引导标线,且边界模糊,周围干扰因素较多,在这种道路上自动驾驶以及车辆辅助驾驶的车道保持功能将不能可靠工作。通过生成道路 RGB 图像的熵图像,并计算此熵图像直方图的最小差值,以此差值作为阈值初步分割道路图像并使用改进区域生长方法提取出道路区域。使用实时性较好的二次曲线建立车道模型,并使用改进的最小二乘拟合方法可有效避开道路区域边缘杂点并提高边缘拟合速度。试验结果表明,改进的方法可以快速并较好地提取出非结构化道路图像中的车道并拟合出车道线,有利于实现基于视觉的自动驾驶和车辆辅助驾驶系统在非结构化道路上的车道保持。

入藏号: CSCD:6506359

地址: Wu Huayue, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Duan Liren, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064,

China.

地址: 吴骅跃, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

段里仁, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: whyinvr@126.com

电子邮件地址: whyinvr@126.com

使用次数 (最近 180 天): 0

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作者: Wang Jing; Zhang Xuefei; Wang Shuxia; Wang Tiantian; Liu Xiangyang

作者: 王静; 张雪飞; 王淑霞; 王甜甜; 刘向阳

标题: Construction of locally repairable codes based on fractional repetition cyclic codes in distributed storage systems

标题: 分布式存储系统中基于部分重复循环码的局部修复码构造

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作者关键词: distributed storage systems; fractional repetition cyclic codes; repair of failed nodes; locally repairable codes

作者关键词: 分布式存储系统; 部分重复循环码; 故障节点修复; 局部修复码

摘要: In order to optimize the disk I/O overhead and repair locality for repairing failed node in distributed storage systems, locally repairable codes based on fractional repetition cyclic codes (FRCC) is proposed in this paper. Specifically, FRCC is constructed at first, and then the local repair groups are divided on the basis. Finally, the corresponding locally repairable codes are obtained, and the failed nodes can be repaired by the neighboring nodes in the local repair group to ensure lower disk I/O overhead and repair locality. Performance analyses and simulation results show that, the repair locality of a single node failure is always 2 when the locally repairable codes based on FRCC are adopted in distributed storage systems, and the data of multiple failed nodes can be reconstructed quickly. Compared with three-copy replication, simple regenerating codes and locally repairable codes based on traditional fractional repetition codes (FRC), the locally repairable codes based on FRCC have lower bandwidth overhead and repair locality, as well as higher repair efficiency.

摘要: 为了进一步优化分布式存储系统故障节点修复的磁盘 I/O 开销和修复局部性,提出一种基于部分重复循环码的局部修复码方法。首先构造部分重复循环码(FRCC);然后在此基础上划分局部修复组;最终得到相应的局部修复码,且局部修复组内故障节点可以通过相邻节点实现协作修复,以确保较低的磁盘 I/O 开销和修复局部性。性能分析以及实验仿真表明,采用基于部分重复循环码的局部修复码,单节点故障的修复局部性恒为 2,并且可以快速实现多个故障节点的数据重构;与三副本复制策略、简单再生码以及基于传统 FRC 的局部修复码相比,基于部分重复循环码的局部修复码具有更低的修复带宽开销和修复局部性,修复效率更高。

入藏号: CSCD:6504593

地址: Wang Jing, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Xuefei, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Shuxia, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Tiantian, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Xiangyang, College of Information and Communication, National University of Defense Technology, Xi'an, Shaanxi 710106, China.

地址: 王静, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

张雪飞, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王淑霞, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王甜甜, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

刘向阳, 国防科技大学信息通信学院, 西安, 陕西 710106, 中国.

电子邮件地址: jingwang@chd.edu.cn; 1790256685@qq.com; 805326752@qq.com; 362236496@qq.com; xiangyangliu@mail.xidian.edu.cn

电子邮件地址: jingwang@chd.edu.cn; 1790256685@qq.com; 805326752@qq.com; 362236496@qq.com; xiangyangliu@mail.xidian.edu.cn

使用次数 (最近 180 天): 0

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作者: Ren Shuai; Wang Zhen; Su Dongxu; Zhang Tao; Mu Dejun

作者: 任帅; 王震; 苏东旭; 张弢; 慕德俊

标题: Information hiding algorithm based on mapping and structure data of 3D model

标题: 基于三维模型贴图与结构数据的信息隐藏算法

来源出版物: 通信学报 卷: 40 期: 5 页: 2019108-1-2019108-12 出版年: 2019

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语言: Chinese

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作者关键词: information hiding; two-dimensional discrete Daubechies wavelet transform; obj model; resistance against analysis

作者关键词: 信息隐藏; 二维离散 Daubechies 小波变换; obj 模型; 抗分析性

摘要: The existing 3D information hiding schemes are not robust enough against the joint attacks, as a result the secret information will be vulnerable and cannot be extracted correctly. In order to solve the above problem, an information hiding algorithm based on mapping and structure data of 3D models was proposed. First, several texture maps of the original 3D models in .stl format were picked from the standard model library, so the backup secret data after twice two-dimension discrete Daubechies transform can be embedded using db1 function just as the watermark. Secondly, the original 3D model in .stl format was operated by frame sampling in wavelet domain to obtain the coefficient in transform domain, thus the secret data was embedded into the corresponding transform coefficient. Finally, the .obj documents with the secret information were generated by multiplying the 2D texture map data and the 3D .stl data matrix based on orthogonal projection. Texture maps and coordinate space of 3D model were both used to embed the secret information repeatedly in order to enhance the robustness. The experiment analysis indicated that the imperceptibility, robustness and resistance against analysis are improved and information transmission safety in complex environment can be achieved based on the redundancy space of multi-type carriers.

摘要: 针对三维模型信息隐藏无法有效抵抗联合攻击, 秘密信息极易被破坏而无法正确提取的问题, 提出一种基于三维模型贴图与结构数据的信息隐藏算法。首先, 在标准图片库中选取多幅原始 .stl 三维模型载体的纹理贴图, 利用 db1 函数经过 2 次二维离散 Daubechies 变换将备份的隐秘消息以水印嵌入的思想隐藏其中; 其次, 以 .stl 类型的三维模型为原始结构载体, 利用帧化采样的小波域三维模型信息隐藏算法, 将要隐藏的隐秘信息嵌入相应变换空间; 最后, 利用正交投影的纹理映射算法将二维贴图数据与三维 .stl 数据矩阵相乘, 生成含密 .obj 模型文件进行传输。算法利用三维模型的贴图与拓扑坐标空间双重嵌入隐秘信息, 有效增强了算法的顽健性。实验分析表明, 含密三维模型的不可见性、顽健性以及抗分析性均有提升, 可以实现不同类型载体冗余空间的备份隐藏嵌入, 为复杂环境下的信息安全传输提供一种可靠的技术手段。

入藏号: CSCD:6493842

地址: Ren Shuai, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Zhen, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Su Dongxu, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Tao, School of Electronic and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Mu Dejun, College of Automation, Northwestern Polytechnical University, Xi'an, Shaanxi 710072, China.

地址: 任帅, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王震, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

苏东旭, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

张弢, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

慕德俊, 西北工业大学自动化学院, 西安, 陕西 710072, 中国.

电子邮件地址: chang123an123@163.com

电子邮件地址: chang123an123@163.com

使用次数 (最近 180 天): 0

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作者: Ren Shuai; Wang Zhen; Xu Zhenchao; Su Dongxu; He Yuan

作者: 任帅; 王震; 徐振超; 苏东旭; 贺媛

标题: Information Hiding Scheme Based on Texture Mapping of 3D Model in OBJ Format

标题: 一种基于 OBJ 三维模型纹理贴图的信息隐藏算法

来源出版物: 北京邮电大学学报 卷: 42 期: 1 页: 22-27 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: information hiding; multiple wavelet transform; singular value decomposition theory

作者关键词: 信息隐藏; 多元数小波变换; 奇异值分解理论

摘要: An information hiding algorithm based on texture mapping of one kind of the document formats of 3D models (OBJ) is proposed in order to improve the robustness. First, 3D model texture maps are transformed into multivariate wavelet form. Second, the singular value decomposition theory is used to extract the multivariate wavelet static coefficients. Last, the secret information and the above static coefficients are merged by multiplication using the three-dimensional Arnold scrambling and texture mapping algorithm, and the merged coefficients are operated by orthographic projection to form the embedding regions. The experiment results indicated that the robustness against some attacks such as wireframe rendering, vertex rendering, patch extrusion, and shearing was improved, and the feasibility of this method was acceptable.

摘要: 为改进三维模型信息隐藏的鲁棒性,提出了一种基于 OBJ(3D 模型文件格式)三维模型

纹理贴图的信息隐藏算法.选取三维模型贴图进行多元数小波变换;运用奇异值分解理论进行静态系数提取;利用三维 Arnold 置乱和纹理映射算法对隐秘信息和静态系数进行融合与正交投影.实验结果表明,算法能显著提高线框渲染、顶点绘制、面片挤出和剪切等攻击的鲁棒性.
入藏号: CSCD:6486047

地址: Ren Shuai, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Zhen, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Xu Zhenchao, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Su Dongxu, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

He Yuan, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 任帅, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王震, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

徐振超, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

苏东旭, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

贺媛, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: 814924777@qq.com

电子邮件地址: 814924777@qq.com

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

引用的参考文献数: 12

在中国科学引文数据库中的被引频次: 0

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作者: Liu Youquan; Li Wan; Wang Yuanchao; Xu Kun

作者: 柳有权; 李婉; 王愿超; 徐琨

标题: Real-Time Automatic Generation Algorithm of Exploded View with Collision Detection Enhancement

标题: 基于碰撞检测强化的实时爆炸视图自动生成算法研究

来源出版物: 图学学报 卷: 40 期: 2 页: 235-239 出版年: 2019

文献号: 2095-302X(2019)40:2<235:JYPZJC>2.0.TX;2-A

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文献号: 2095-302X(2019)40:2<235:JYPZJC>2.0.TX;2-A

语言: Chinese

文献类型: Article

作者关键词: exploded view; oriented bounding box; collision detection; spatial separation

作者关键词: 爆炸视图; 方向包围盒; 碰撞检测; 空间分离

摘要: Exploded view has been widely applied in mechanical design and assembly practice, facilitating the understanding of the mechanical structure and assembly relationship visually. To solve the interference problem in simulation, this paper presents an automatic exploded view generation algorithm enhanced by collision detection. Firstly, according to the size and position deviation of the bounding boxes, the sequence and direction of explosion is calculated to conduct the initial separation. Secondly, based on the mutual exclusion properties of objects, the real-time collision detection is done to further separate exploded parts to enhance the exploded view effect with physics effects. The method is easy to implement, allows for reasonable movement between parts and avoids potential penetrations. The experiments have verified our method's feasibility and universality.

摘要: 爆炸视图在机械设计和装配实践中有着广泛的应用,可帮助人们直观地理解机械结构和装配关系。为解决仿真中的干涉问题,提出一种基于碰撞检测强化的实时爆炸视图自动生成算法。首先,构建各机械零件的方向包围盒,根据包围盒的大小和位置偏差决定零件的分离次序和方向,构造爆炸分离模型。其次,基于真实世界物体互斥属性,对装配的零部件进行实时碰撞检测,借助碰撞响应推动各部件进行进一步分离。该方法简单易实现,保证了零部件之间的合理移动,同时避免穿透现象的发生。实验充分验证了算法可行性和通用性。

入藏号: CSCD:6482608

地址: Liu Youquan, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Wan, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Yuanchao, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Xu Kun, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 柳有权, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

李婉, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王愿超, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

徐琨, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: youquan@chd.edu.cn

电子邮件地址: youquan@chd.edu.cn

使用次数 (最近 180 天): 6

使用次数 (2013 年至今): 23

引用的参考文献数: 15

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作者: Ren Shuai; Xu Zhenchao; Wang Zhen; He Yuan; Zhang Tao; Su Dongxu; Mu Dejun

作者: 任帅; 徐振超; 王震; 贺媛; 张弢; 苏东旭; 慕德俊

标题: Low-density 3D model information hiding algorithm based on multiple fusion states

标题: 基于多融合态的低密度三维模型信息隐藏算法

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作者关键词: information hiding; 3D model; fusion state; local height theory; Mean Shift clustering analysis

作者关键词: 信息隐藏; 三维模型; 融合态; 局部高度理论; Mean Shift 聚类分析

摘要: Aiming at the problem that the existing 3D model information hiding algorithms cannot effectively resist uneven compression, a multi-carrier low-density information hiding algorithm based on multiple fusion states was proposed. Firstly, multiple 3D models were positioned, oriented and stereotyped by translation and scaling. Secondly, the 3D models were rotated at different angles and merged by using the center point as merging point to obtain multiple fusion states. Thirdly, local height and Mean Shift clustering analysis were used to divide the energy of the vertices of the fusion state model, obtaining the vertices with different energies. Finally, by changing the vertex coordinates, the secret information changed by Arnold scrambling was quickly hidden in multiple fusion states and 3D models. Experimental results show that the proposed algorithm is robust against uneven compression attacks and has high invisibility.

摘要: 针对现有三维模型信息隐藏算法无法有效抵抗不均匀压缩的问题,提出一种基于多融合态的多载体低密度的信息隐藏算法。首先通过平移和缩放对多个三维模型进行定位、定向及定型;其次对三维模型进行不同角度的旋转,以中心点作为融合点进行融合,得到多个融合态;再次,利用局部高度和 Mean Shift 聚类分析算法对融合态模型的顶点进行能量划分,得到不同能量的顶点;最后,通过修改顶点坐标的方法将经过 Arnold 置乱变化的秘密信息快速隐藏于多个融合态和三维模型中。实验结果表明,该算法对抵御不均匀压缩的攻击有很好的鲁棒性且具有很高的不可见性。

入藏号: CSCD:6469169

地址: Ren Shuai, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Xu Zhenchao, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Zhen, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

He Yuan, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Su Dongxu, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Tao, School of Electronic and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Mu Dejun, College of Automation, Northwestern Polytechnical University, Xi'an, Shaanxi 710072, China.

地址: 任帅, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

徐振超, 长安大学信息工程学院, 西安, 陕西 710064, 中国.
王震, 长安大学信息工程学院, 西安, 陕西 710064, 中国.
贺媛, 长安大学信息工程学院, 西安, 陕西 710064, 中国.
苏东旭, 长安大学信息工程学院, 西安, 陕西 710064, 中国.
张弢, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.
慕德俊, 西北工业大学自动化学院, 西安, 陕西 710072, 中国.

电子邮件地址: zt904@foxmail.com

电子邮件地址: zt904@foxmail.com

使用次数 (最近 180 天): 0

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作者: Wang Qinglong; Qiao Rui; Duan Zongtao

作者: 王青龙; 乔瑞; 段宗涛

标题: Security Analysis on VANETs Authentication Schemes:CPAV and ABV

标题: 针对车联网认证方案 CPAV 和 ABV 的安全分析

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文献类型: Article

作者关键词: Vehicular ad hoc networks (VANETs); Anonymous authentication; Privacy preserving; Bogus attack; Forgery attack; Associated attack; Conditional tracking

作者关键词: 车联网; 匿名认证; 隐私保护; 假冒攻击; 伪造攻击; 关联攻击; 条件追踪

摘要: Recently, many different anonymous authentication schemes have been proposed for privacy protection of vehicles in vehicular ad hoc networks (VANETs). In 2018, Vijayakumar et al. proposed a computationally efficient privacy preserving anonymous authentication scheme for VANETs (CPAV) and anonymous batch authentication scheme for VANETs (ABV). The schemes can achieve anonymous mutual authentication between the vehicle and the road side unit (RSU), as well as anonymous batch authentication of vehicle by the RSU, and resist bogus attacks, forgery attack, and associated attacks. TA (Trusted Agency) can track the true identity of registered vehicles when necessary. This paper deeply analyzed the security of CPAV and ABV. In CPAV scheme, the external attackers are fully able to successfully conduct bogus attack and forgery attack, which proves that this scheme does not satisfy non-repudiation, nor can it conduct conditional tracking for vehicles. In addition, because the anonymous identity used in the scheme is unique, the scheme

cannot resist the associated attacks, which indicates that this scheme doesn't possess the so-called unlinkability. At last, it's also proved that the anonymous batch authentication (ABV) scheme can't resist forgery attack.

摘要: 为了实现车联网中车辆身份的隐私保护,近年来人们提出了很多不同的匿名认证方案。Vijayakumar 等于 2018 年提出了针对车联网的计算有效的隐私保留匿名交互认证(CPAV)及批量认证(ABV)方案,该方案可以实现车辆与 RSU 之间的匿名互认证以及 RSU 对车辆的匿名批量认证,能够抵抗假冒攻击、伪造攻击以及关联攻击,并且在必要时 TA(Trusted Agency)能够追踪出已注册车辆的真实身份。文中对 CPAV 和 ABV 方案的安全性进行了深入分析,在 CPAV 方案中外部攻击者完全能够成功实施假冒攻击和伪造攻击,进而证明该方案不满足不可否认性,也不能实现对车辆的有条件追踪。另外,因为该方案中使用的匿名身份是唯一的,导致该方案不能抵抗关联攻击,这表明该方案也不具有所谓的不可连接性。此外,还证明了批量认证方案也不能抵抗伪造攻击。

入藏号: CSCD:6466458

地址: Wang Qinglong, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Qiao Rui, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Duan Zongtao, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 王青龙, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

乔瑞, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

段宗涛, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: qlwang@chd.edu.cn

电子邮件地址: qlwang@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Xu Zhigang; Che Yanli; Li Jinlong; Zhao Xiangmo; Pan Yong; Wang Zhongren; Wei Na; Song Hongxun

作者: 徐志刚; 车艳丽; 李金龙; 赵祥模; 潘勇; 王忠仁; 韦娜; 宋宏勋

标题: Research progress on automatic image processing technology for pavement distress

标题: 路面破损图像自动处理技术研究进展

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语言: Chinese

文献类型: Review

作者关键词: pavement maintenance; pavement distress; image processing; distress recognition; crack detection; distress classification

作者关键词: 路面养护; 路面破损; 图像处理; 破损识别; 裂缝检测; 破损分类

摘要: The important research achievements on the automatic image processing technology for pavement distress were summarized. The research progress of key technologies in this field was analyzed, including the pavement distress detection system, image processing algorithm and evaluation of recognition algorithm. The detection accuracy and applicability were compared for the different pavement distress detection systems and target automatic recognition algorithms. The possible future research directions of automatic pavement distress image processing technology were presented. Research result shows that in the aspect of pavement distress detection system, from early image acquisition based on the photography technology to the current 3D laser scanning technology, the pavement image acquisition technology becomes more and more convenient and effective. However, there still exist some challenges in the automatic analysis on distress images and automatic recognition algorithm on targets. In the aspect of pavement distress image processing algorithm, the traditional algorithms of segmenting pavement distress targets evolve from the methods using single feature (such as grayscale and edge shape) to multi-feature fusion-based methods and graph optimization-based detection methods. Furthermore, there emerges some dedicated algorithms for recovering or connecting cracks, greatly improving the detection accuracy of crack recognition. Nonetheless, as the complexity of these algorithms grows up, the required computational resources and the size of prior knowledge base both sharply increase. In the aspect of evaluation and comparison of crack processing algorithms, manual segmentation is mainly used to evaluate automatic recognition results. At present, it is urgent to establish a large-scale pavement distress image database opening to the world, so as to objectively and effectively evaluate various existing image processing algorithms for pavement distress. Automatic image processing algorithms for pavement distress based on 2D image features analysis is difficult to achieve the best results with detection accuracy, algorithm versatility and real-time performance simultaneously. In recent years, a large number of scholars begin to use the deep learning neural network to automatically recognize pavement distress, but the technology is still in an active evolution process. In the aspect of improving the accuracy and efficiency of automatic recognition for pavement distress, the 3D laser scanning technology and the deep learning technology based on artificial intelligence will greatly promote the final breakthrough on automatic image recognition technology for pavement distress in the future. 1 tab, 20 figs, 93 refs.

摘要: 总结了路面破损图像自动处理技术的重要研究成果, 分析了该领域关键技术的研究进展, 包括路面破损检测系统、图像处理算法和识别算法评估; 比较了不同路面破损检测系统与目标自动识别算法的检测精度和适用性, 给出了路面破损图像自动处理技术未来可能的研究方向。研究结果表明: 在路面破损检测系统方面, 从早期基于摄影技术的图像采集到目前的 3D 激光扫描技术, 路面图像采集技术更加便捷和高效, 但破损图像自动分析和目标自动识别算法仍然存在挑战; 在路面破损图像处理算法方面, 传统的路面裂缝目标分割算法已由过去的基于单一特征(灰度、边缘形状等)的检测方法演化到多特征融合检测方法和图优化检测方法, 还出现了一些精细化的裂缝目标连接与恢复算法, 大幅提高了裂缝检测精度, 但需要的计

算资源和人工先验知识库也随之不断增大;在路面裂缝处理算法评估和比较方面,主要利用人工分割来评价自动识别结果,目前迫切需要建立一个面向全球开放的大型路面破损图像数据库,以客观、有效地评估现有各种路面破损图像处理算法;基于 2D 图像特征分析的路面破损图像自动识别算法很难在识别精确性、算法通用性和实时性方面同时取得最佳效果;近年来,大量学者开始尝试借助深度学习神经网络自动识别路面破损,但该技术仍处于活跃的演进过程中;在提高路面破损自动识别精度和效率方面,3D 激光扫描技术和基于人工智能的深度学习技术的发展将对未来路面破损图像自动识别技术的最终突破产生重大推进作用。

入藏号: CSCD:6451300

地址: Xu Zhigang, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Jinlong, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Xiangmo, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wei Na, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Song Hongxun, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Che Yanli, Shijiazhuang Huayan Transportation Technology Co., Ltd., Xi'an Branch, Xi'an, Shaanxi 710000, China.

Pan Yong, School of Information Engineering, Chang'an University;; Zhongzi Data Co., Ltd., Xi'an;; Shaanxi;; Beijing 710064;; 100083.

Wang Zhongren, Division of Maintenance, California Department of Transportation, Sacramento, 95835, USA.

地址: 徐志刚, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

李金龙, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

赵祥模, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

韦娜, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

宋宏勋, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

车艳丽, 石家庄华燕交通科技有限公司西安分公司, 西安, 陕西 710000, 中国.

潘勇, 长安大学信息工程学院;; 中咨数据有限公司, Xi'an;; Shaanxi;; Beijing 710064;; 100083, China.

王忠仁, 美国加州交通厅养护处, 萨克拉门托, 95835.

电子邮件地址: xuzhigang@chd.edu.cn

电子邮件地址: xuzhigang@chd.edu.cn

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作者: Sun Zhao; Liu Youquan; Zhang Cairong; Shi Jian; Chen Yanyun

作者: 孙昭; 柳有权; 张彩荣; 石剑; 陈彦云

标题: A Scene-Distributed Interactive Rendering System

标题: 一种场景内容分布的交互式渲染系统

来源出版物: 图学学报 卷: 40 期: 1 页: 87-91 出版年: 2019

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文献类型: Article

作者关键词: rendering; distributed system; scene distribution; interactive

作者关键词: 渲染; 分布式系统; 场景分布; 交互式

摘要: With the constant increase in the scale and complexity of three-dimensional virtual scenes in recent years, very large-scale scenes (such as buildings, cities, etc.) can hardly be processed on single rendering node and their interactive performance can also be hard to achieve. Aiming at this shortcoming, the authors present an interactive distributed rendering framework. The authors divide the large scene into a set of renderable sub-scenes, which are distributed to different rendering nodes for processing. Intermediate sub-scene rendering results are merged to the final result based on depth information. To reduce the latency, the rendering results are compressed to accelerate the network transmission. The proposed distributed rendering system can efficiently process rendering and interaction for large-scale scenes. Moreover, the experiment has also confirmed that it is able to provide good scalability. A wide range of applications can benefit from interactive distributed rendering by this system.

摘要: 近年来, 三维虚拟场景的规模和复杂程度不断提高, 受到硬件的限制, 一些应用中的超大规模场景(如建筑群, 城市等)很难在单机上进行渲染或满足可交互的需求。针对该问题, 提出了一种分布式渲染框架, 将大规模场景在内容上进行划分, 得到单一节点可渲染的子场景。这些子场景被分布到集群中不同的渲染节点进行处理, 其渲染结果根据深度信息进行合成得到整个场景的最终渲染结果。为了降低交互响应时间, 需对子场景的渲染结果进行压缩传输。实验充分验证了提出的分布式渲染系统能够高效处理超大规模场景的渲染和交互, 并且具有良好的可扩展性, 能够满足很多领域中对大规模场景交互式渲染的需求。

入藏号: CSCD:6430734

地址: Sun Zhao, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Youquan, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Cairong, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Shi Jian, Institute of Automation, Chinese Academy of Sciences, State Key Laboratory of Pattern Recognition, Beijing 100190, China.

Chen Yanyun, Institute of Software, Chinese Academy of Sciences, State Key Laboratory of Computer Science, Beijing 100190, China.

地址: 孙昭, 长安大学信息工程学院, 西安, 陕西 710064, 中国.
柳有权, 长安大学信息工程学院, 西安, 陕西 710064, 中国.
张彩荣, 长安大学信息工程学院, 西安, 陕西 710064, 中国.
石剑, 中国科学院自动化研究所, 模式识别国家重点实验室, 北京 100190, 中国.
陈彦云, 中国科学院软件研究所, 计算机科学国家重点实验室, 北京 100190, 中国.
电子邮件地址: 2016124012@chd.edu.cn; youquan@chd.edu.cn
电子邮件地址: 2016124012@chd.edu.cn; youquan@chd.edu.cn
使用次数 (最近 180 天): 0
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作者: Qu Baiyi; Cheng Teng; Yu Dongsong; Li Zhiqi; Zhou Wei; Li Shanshan; Liu Lidong

作者: 屈八一; 程腾; 俞东松; 李智奇; 周渭; 李珊珊; 刘立东

标题: Design scheme for an all-digital phase locked loop with a high performance

标题: 一种高性能的全数字锁相环设计方案

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作者关键词: 数字锁相环; 边沿效应; 全数字式鉴相器; 数控振荡器

摘要: Aiming at the fact that a complex scheme is needed when the two frequencies in the phase locked loop are close to each other or have an approximate integer multiple relationship and the traditional analog phase locked loop is unsuitable for integration and on chip implementation, an all-digital phase locked loop is proposed, which is mainly composed of analog to digital converters, an all-digital phase detector, a digital low pass filter and a digitally controlled oscillator. The analog to digital converters' quantization errors have been greatly suppressed by using the clock cursor effect and digital edge effect and an all-digital phase locked loop with a high performance is achieved. Experiment indicates the correctness of the design scheme and shows that the proposed loop has characteristics of high precision and low noise.

摘要: 针对实现参考频率和输出的频率近似相等或者近似成整数倍关系时遇到的锁相环设计方案复杂以及高性能的模拟锁相环不适宜于集成化问题,设计了主要由模数转换器、全数字式鉴相器、数字式低通滤波器和数控振荡器等构成的全数字式锁相环。主要利用模数转换

器在动态量采集时具有的边沿效应从其采集的大量数据中选择出精度更高的数据用于后级的全数字式鉴相,实现了一种全数字式锁相环。实验结果表明了该方案的正确性及其具有锁定精度高和环路的本底噪声低等特性。

入藏号: CSCD:6449676

地址: Qu Bayi, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Cheng Teng, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Yu Dongsong, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Shanshan, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Lidong, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Zhiqi, School of Mechano-electronic Engineering, Xidian Univ., Xi'an, Shaanxi 710071, China.

Zhou Wei, School of Mechano-electronic Engineering, Xidian Univ., Xi'an, Shaanxi 710071, China.

地址: 屈八一, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

程腾, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

俞东松, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

李珊珊, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

刘立东, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

李智奇, 西安电子科技大学机电工程学院, 西安, 陕西 710071, 中国.

周渭, 西安电子科技大学机电工程学院, 西安, 陕西 710071, 中国.

电子邮件地址: 404182049@qq.com

电子邮件地址: 404182049@qq.com

使用次数 (最近 180 天): 0

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作者: Niu Dandan; Duan Zongtao; Chen Zhe; Kang Jun; Zhu Yishui; Tang Lei; Ge Jiandong; Jiang Hua

作者: 牛丹丹; 段宗涛; 陈柘; 康军; 朱依水; 唐蕾; 葛建东; 江华

标题: Visualization Analysis Method of Urban Taxi Passenger Travel Characteristics

标题: 城市出租车乘客出行特征可视化分析方法

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作者关键词: taxi GPS trajectory data; taxi passenger travel characteristics; visualization analysis; multi-view collaborative interaction

作者关键词: 出租车 GPS 轨迹数据; 出租车乘客出行特征; 可视化分析; 多视图协同交互

摘要: Visual analysis technology plays an increasingly important role in the analysis of traffic data, discovery of traffic problems and auxiliary decision-making through graphical and interactive forms of data. In order to show the information obtained from the GPS trajectory data clearly and intuitively, this paper presents an integrated clustering visualization and feature visualization method for the taxi GPS trajectory, aiming to solve the hard problem arising from the large data volume and complex spatial-temporal information. Firstly, the feature data used for visualization is extracted by data processing, then the visualization of the passenger pick-up point is carried out, and the trajectory data is visualized by the method of multi-view collaborative interaction. Finally, according to the visualization results, temporal and spatial distribution of the travel characteristics are analyzed. On this basis, an interactive visual analysis system is designed and the validity of the system is proved through case studies of real data sets.

摘要: 可视化技术通过图形表现数据的内在规律,并可利用交互的形式实现数据的层次化展示,其在分析交通数据、发现交通问题以及辅助决策中扮演着越来越重要的角色。为了更加清晰、直观地展示城市出租车 GPS 轨迹数据传递的信息,解决因其数据量庞大和时空信息复杂而带来的分析难题,提出一种集成聚集可视化、特征可视化对出租车 GPS 轨迹数据进行可视化分析的方法。首先,通过数据处理得到可用于可视化的特征数据,而后对乘客上下车点进行聚集可视化,并利用多视图协同交互的方法对轨迹数据进行了特征可视化;最后,根据可视化结果对城市出租车乘客出行特征时空分布情况进行了分析。在此基础上,设计了一个交互式可视分析系统,并通过真实数据集案例验证了系统的有效性。

入藏号: CSCD:6450367

地址: Niu Dandan, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Duan Zongtao, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064;710064.

Chen Zhe, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064;710064.

Kang Jun, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064;710064.

Zhu Yishui, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064;710064.

Tang Lei, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064;710064.

Ge Jiandong, 400015.

Jiang Hua, 400015.

地址: 牛丹丹, 长安大学信息工程学院, 西安, 陕西 710064, 中国.
段宗涛, 长安大学信息工程学院;;陕西省道路交通智能检测与装备工程技术研究中心, ;;陕西省道路交通智能检测与装备工程技术研究中心, 西安;;西安, ;; 710064;;710064.
陈柘, 长安大学信息工程学院;;陕西省道路交通智能检测与装备工程技术研究中心, ;;陕西省道路交通智能检测与装备工程技术研究中心, 西安;;西安, ;; 710064;;710064.
康军, 长安大学信息工程学院;;陕西省道路交通智能检测与装备工程技术研究中心, ;;陕西省道路交通智能检测与装备工程技术研究中心, 西安;;西安, ;; 710064;;710064.
朱依水, 长安大学信息工程学院;;陕西省道路交通智能检测与装备工程技术研究中心, ;;陕西省道路交通智能检测与装备工程技术研究中心, 西安;;西安, ;; 710064;;710064.
唐蕾, 长安大学信息工程学院;;陕西省道路交通智能检测与装备工程技术研究中心, ;;陕西省道路交通智能检测与装备工程技术研究中心, 西安;;西安, ;; 710064;;710064.
葛建东, 思建科技有限公司, 重庆 400015, 中国.
江华, 思建科技有限公司, 重庆 400015, 中国.
电子邮件地址: 2385330308@qq.com
电子邮件地址: 2385330308@qq.com
使用次数 (最近 180 天): 2
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第 36 条, 共 37 条

作者: Duan Zongtao; Gong Xuehui; Tang Lei; Chen Zhe

作者: 段宗涛; 龚学辉; 唐蕾; 陈柘

标题: Spatio-temporal trajectory retrieval and group discovery in shared transportation

标题: 共享交通的时空轨迹检索与群体发现

来源出版物: 计算机应用 卷: 39 期: 1 页: 220-226 出版年: 2019

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作者关键词: ridesharing; group discovery; spatial-temporal trajectory; 3-Dimensional R-tree (3DR-tree); Origin- Destination (OD)

作者关键词: 共乘出行; 群体发现; 时空轨迹; 3 维 R 树; 起讫点

摘要: Concerning low efficiency and accuracy of the ridesharing user group discovery in shared

transportation environment, a GeoOD-Tree index was established based on R-tree principle, and a group discovery strategy to maximize the multiplying rate was proposed. Firstly, the feature extraction and calibration processing of original spatio-temporal trajectory data was carried out to mine effective Origin-Destination(OD) trajectory. Secondly, a data structure termed GeoOD-Tree was established for effective storage management of OD trajectory. Finally, a group discovery model aiming at maximizing ridesharing travel was proposed, and a pruning strategy using by K Nearest Neighbors(KNN) query was introduced to improve the efficiency of group discovery. The proposed method was evaluated with extensive experiments on a real dataset of 12 000 taxis in Xi'an, in comparison experiments with Dynamic Time Warping(DTW) algorithm, the accuracy and efficiency of the proposed algorithm was increased by 10.12% and 1500% respectively. The experimental results show that the proposed group discovery strategy can effectively improve the accuracy and efficiency of ridesharing user group discovery, and it can effectively improve the rideshared travel rate.

摘要: 为解决共享交通下的共乘用户群体发现效率低、准确率不高问题,依据 R-树原理建立 GeoOD-Tree 索引,并在此基础上提出以最大化共乘率为目标的群体发现策略.首先,对原始时空轨迹数据进行特征提取与标定处理,挖掘有效出行起讫点(OD)轨迹;其次,针对用户起讫点轨迹的特征,建立 GeoOD-Tree 索引进行有效的存储管理;最后,给出以最大化共乘行程为目标的群体发现模型,并运用 K 最近邻(KNN)查询对搜索空间剪枝压缩,提高群体发现效率.采用西安市近 12 000 辆出租车营运轨迹数据,选取动态时间规整(DTW)等典型算法与所提算法在查询效率与准确率上进行性能对比分析.与 DTW 算法相比,所提算法的准确率提高了 10.12%,查询效率提高了约 15 倍.实验结果表明提出的群体发现策略能有效提高共乘用户群体发现的准确率和效率,可有效提升共乘出行方式的出行率.

入藏号: CSCD:6420646

地址: Duan Zongtao, School of Information Technology,Chang'an University, Xi'an, Shaanxi 710064, China.

Gong Xuehui, School of Information Technology,Chang'an University, Xi'an, Shaanxi 710064, China.

Tang Lei, School of Information Technology,Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Zhe, School of Information Technology,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 段宗涛, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

龚学辉, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

唐蕾, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

陈柘, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: tanglei24@chd.edu.cn

电子邮件地址: tanglei24@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 3

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第 37 条, 共 37 条

作者: Fan Na; Zhu Guangyuan; Kang Jun; Tang Lei; Zhu Yishui; Wang Luyang; Duan Jiabin

作者: 樊娜; 朱光源; 康军; 唐蕾; 朱依水; 王路阳; 段嘉欣

标题: Routing algorithm based on node cognitive interaction in Internet of vehicles environment

标题: 车联网环境下基于节点认知交互的路由算法

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文献号: 1001-9081(2019)39:2<518:CLWHJX>2.0.TX;2-F

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作者关键词: Internet of Vehicles (IoV); Delay Tolerant Network (DTN); routing algorithm; message forwarding

作者关键词: 车联网; 延迟容忍网络; 路由算法; 消息转发

摘要: In order to solve the problems such as low transmission efficiency and high network resource overhead in Internet of Vehicles (IoV) environment, a new routing algorithm based on node cognitive interaction, which is suitable for urban traffic environment, was proposed. Firstly, based on trust theory, a concept of cognitive interaction degree was proposed. Then, based on this, the vehicle nodes in IoV were classified and given with different initial values of cognitive interaction degree. Meanwhile, the influence factors such as interaction time, interaction frequency, physical distance, hops between nodes and the Time-To-Live of message were introduced, and a cognitive interaction evaluation model of vehicle nodes was constructed. The cognitive interaction degrees of vehicle nodes were calculated and updated by using the proposed model, and a neighbor node with higher cognitive interaction degree than others could be selected as relay node to forward the messages after the comparison between the nodes. Simulation results show that compared with Epidemic and Prophet routing algorithms, the proposed algorithm effectively increases the message delivery rate and reduces the message delivery delay, while significantly reducing the overhead of network resources and helping to improve the quality of message transmission in IoV environment.

摘要: 针对车联网(IoV)环境下消息传输效率低下、网络资源开销较大等诸多问题,提出一种适用于城市交通场景下基于车辆节点认知交互的路由算法。首先,依据信任理论提出节点认知交互度的概念,并在此基础上对车联网中的车辆节点进行分类,赋予它们不同的认知交互度初值;同时还引入车辆节点交互时间、交互频率、车辆节点物理间隔距离、间隔跳数以及消息生存时间等影响因子,进而构建了车辆节点认知交互评估模型。基于该模型计算并更新节点的认知交互度,并通过比较对应车辆节点间的认知交互度值来选取认知交互度相对较高的邻居节点作为中继节点进行消息转发。仿真实验结果表明,与 Epidemic 和 Prophet 路由算法相比,所提路由算法有效提高了消息投递率并降低了消息投递时延,同时显著降低了网络资源的开销,有助于提升车联网环境的消息传输质量。

入藏号: CSCD:6426756

地址: Fan Na, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064,

China.

Zhu Guangyuan, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Kang Jun, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Tang Lei, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhu Yishui, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Luyang, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Duan Jiabin, Shaanxi Intercity Railway Company Limited, Xi'an, Shaanxi 710018, China.

地址: 樊娜, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

朱光源, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

康军, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

唐蕾, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

朱依水, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

王路阳, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

段嘉欣, 陕西城际铁路有限公司, 西安, 陕西 710018, 中国.

电子邮件地址: 837647811@qq.com

电子邮件地址: 837647811@qq.com

使用次数 (最近 180 天): 1

使用次数 (2013 年至今): 2

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电子与控制工程学院

第 1 条, 共 25 条

作者: Yang Yiming; Wang Guiping

作者: 杨一鸣; 汪贵平

标题: Design of Object-Oriented Failure Detection Expert System of Autonomous Vehicle

标题: 面向对象的无人车电源故障检测专家系统设计

来源出版物: 汽车技术 期: 6 页: 30-35 出版年: 2019

文献号: 1000-3703(2019)6<30:MXDXDW>2.0.TX;2-Q

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文献号: 1000-3703(2019)6<30:MXDXDW>2.0.TX;2-Q

语言: Chinese

文献类型: Article

作者关键词: Object oriented; Expert system; Power diagnosis; Autonomous vehicle

作者关键词: 面向对象; 专家系统; 电源检测; 无人车

摘要: In order to improve accuracy and diagnosis efficiency of automotive power supply failure detection expert system of existing autonomous vehicle, a modified depth-first search algorithm is used to design inference machine. In order to address the difficulty of the static tree model in applying to complicated vehicle power supply system, dynamic tree generation algorithm is designed. Object-oriented programming approach is utilized to design power supply failure detection expert system of autonomous vehicle, for fault reasoning and positioning, the expert system is then simulated and tested on vehicle. Test results show that this expert system can accurately and rapidly infer fault cause and locate fault position.

摘要: 为提升现有无人车车载电源故障检测专家系统的准确性和诊断效率,使用改进的深度优先搜索算法进行推理机的设计;为解决静态树模型难以应用于复杂车辆电源系统的问题,设计了动态树生成算法;运用面向对象的程序设计方法,设计了无人车电源故障检测专家系统,实现故障原因推理和故障定位,并对该专家系统进行了模拟和实车测试。测试结果表明,该专家系统可以准确、快速地推理故障原因并定位故障位置。

入藏号: CSCD:6512233

地址: Yang Yiming, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Guiping, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 杨一鸣, 长安大学, 西安, 陕西 710064, 中国.

汪贵平, 长安大学, 西安, 陕西 710064, 中国.

使用次数 (最近 180 天): 0

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第 2 条, 共 25 条

作者: Huang He; Li Xinrui; Song Jing; Wang Huifeng; Ru Feng; Sheng Guangfeng

作者: 黄鹤; 李昕芮; 宋京; 王会峰; 茹锋; 盛广峰

标题: A traffic image dehaze method based on adaptive transmittance estimation with multi-scale window

标题: 多尺度窗口的自适应透射率修复交通图像去雾方法

来源出版物: 中国光学 卷: 12 期: 6 页: 1311-1320 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: dark channel; image dehazing; traffic image; edge detection algorithm

作者关键词: 暗通道理论; 去雾; 交通图像; 边缘检测算法

摘要: Aiming at the halo effect and the color distortion of bright areas when using traditional dark priori image defogging algorithms, we propose a traffic image dehaze method based on adaptive transmittance estimation with multi-scale window in this paper. Firstly, a new 8-direction edge detection operator is used to detect abrupt changes in field depth in images. According to the dark channel prior theory and the abrupt change of field depth obtained in the previous step, a $5 * 5$ window is used in the larger area of field depth transformation and a $15 * 15$ window is used in the smaller area to obtain a dark primary color estimation image. At the same time, targeting the problem of inaccurate estimation of transmittance when there is a white area in the closerange region due to the dark channel priori principle, we introduce an adaptive transmittance restoration method. An edge-enhanced dark image is obtained by using a guide filter, and the texture difference between the edge-enhanced dark image and the original dark primary image is used to correct the transmittance in the close-range region, and then to complete image dehazing. The experimental results show that the halo phenomenon exists in both the bilateral filter and the gradient bilateral filter, and the color distortion is serious in the bright area containing white objects, causing the objective evaluation index to be meaningless. Compared with the guide filter, the indexes of the dehazing algorithm used in this paper show improvement, wherein the average gradient increased by 8.305%, the PSNR increased by 12.455% and the edge strength factor increased by 7.77%. The algorithm can effectively solve issues arising from the halo effect and color distortion in bright areas in restored images while providing a more effective dehazing effect.

摘要: 基于传统暗原色先验原理的图像去雾算法存在的 halo 效应,且图像中明亮区域存在颜色失真现象,针对此问题,本文提出了多尺度窗口的自适应透射率修复交通图像去雾方法。首先,利用新的 8 方向边缘检测算子求取图像中景深突变区域,根据暗通道先验理论和前一步求得的景深突变区域,在景深变化较大区域使用 $5 * 5$ 的窗口,景深变化较小区域则使用 $15 * 15$ 的窗口得到暗原色估计图。同时,针对暗通道先验原理对近景部分存在白色区域时透射率估计不准确的问题,引入了自适应透射率修复方法,通过引导滤波器得到边缘增强后的暗原色图像,并利用其与原暗原色图像的纹理差对近景区域的透射率进行修正,完成图像去雾。实验结果表明:双边滤波和梯度双边滤波两种算法均存在 halo 现象,并且在包含白色物体的明亮区域色彩失真严重,客观评价指标失去意义;相比于引导滤波,本文去雾算法的各项指标均有所提高,其中平均梯度平均提高了 8.305%,PSNR 平均提高了 12.455%,边缘强度因子平均提高了 7.77%。本文算法有效解决了复原图像中 halo 效应现象和明亮区域颜色失真现象,去雾效果最优。

入藏号: CSCD:6639777

地址: Huang He, School of Electronic and Control Engineering, Chang'an University;; Shaanxi Road Traffic Intelligent Detection and Equipment Engineering Technology Research Center, ;; Shaanxi Road Traffic Intelligent Detection and Equipment Engineering Technology Research Center, Xi'an;; Xi'an, ;; 710064;; 710064.

Wang Huifeng, School of Electronic and Control Engineering, Chang'an University;; Shaanxi Road Traffic Intelligent Detection and Equipment Engineering Technology Research Center, ;; Shaanxi Road Traffic Intelligent Detection and Equipment Engineering Technology Research Center, Xi'an;; Xi'an, ;; 710064;; 710064.

Li Xinrui, School of Electronic and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Song Jing, School of Electronic and Control Engineering, Chang'an University, Xi'an, Shaanxi

710064, China.

Ru Feng, School of Electronic and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Sheng Guangfeng, School of Electronic and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 黄鹤, 长安大学电子与控制工程学院;;陕西省道路交通智能检测与装备工程研究中心, ;;陕西省道路交通智能检测与装备工程研究中心, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

王会峰, 长安大学电子与控制工程学院;;陕西省道路交通智能检测与装备工程研究中心, ;;陕西省道路交通智能检测与装备工程研究中心, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

李昕芮, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

宋京, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

茹锋, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

盛广峰, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: 8793141@qq.com; 1076359350@qq.com

电子邮件地址: 8793141@qq.com; 1076359350@qq.com

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第 3 条, 共 25 条

作者: Feng Mengxi; Zhao Liang; Qian Chao

作者: 冯梦溪; 赵亮; 钱超

标题: Design of road tunnel operation environment awareness system based on GPRS

标题: 基于 GPRS 的公路隧道运营环境感知系统设计

来源出版物: 传感器与微系统 卷: 38 期: 12 页: 89-92 出版年: 2019

文献号: 2096-2436(2019)38:12<89:JYGDGL>2.0.TX;2-F

来源出版物: Transducer and Microsystem Technology 卷: 38 期: 12 页: 89-92 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: highway tunnel; environment perception; general packet radio service(GPRS)

作者关键词: 公路隧道; 环境感知; 通用分组无线业务(GPRS)

摘要：Aiming at real-time data requirements of highway tunnel early warning system and ventilation control system, the real-time and integration degree of the existing monitoring system is improved, and the road tunnel operation environment awareness system based on general packet radio service (GPRS) is designed. The system uses STM32 as the core to collect and process harmful gas, temperature and air pressure, visibility and wind speed information, then upload to the server by GPRS module. The upper personal computer (PC) of the monitoring center obtains and analyzes the operational data. The experimental results show that the system is stable in operation and high in accuracy, which can meet the design requirements and has positive significance for ensuring the safety of highway tunnel operation.

摘要：针对公路隧道预警系统与通风控制系统的实时数据需求,提高现有监控系统的实时性与集成度,设计了基于通用分组无线业务(GPRS)的公路隧道运营环境感知系统。系统以STM32为核心,集中采集并处理有害气体、温度与气压、能见度与风速信息,并由GPRS模块上传服务器,由监控中心上位机获取、处理分析运营数据。实验结果表明:本系统运行稳定,准确度较高,可以达到设计要求,对保障公路隧道运营安全具有积极意义。

入藏号: CSCD:6640003

地址: Feng Mengxi, School of Electronic and Control Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Qian Chao, School of Electronic and Control Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Zhao Liang, CCCC First Highway Consultants Co Ltd, Xi'an, Shaanxi 710061, China.

地址: 冯梦溪, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

钱超, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

赵亮, 中交第一公路勘察设计研究院有限公司, 西安, 陕西 710061, 中国.

电子邮件地址: 2017132042@chd.edu.cn; 695087566@qq.com

电子邮件地址: 2017132042@chd.edu.cn; 695087566@qq.com

使用次数 (最近 180 天): 0

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作者: Yan Yuchan; Bai Lin; Wu Qisheng; Ye Zhen

作者: 晏雨婵; 白璘; 武奇生; 叶珍

标题: Traffic congestion prediction and assessment based on multi-index fuzzy comprehensive evaluation

标题: 基于多指标模糊综合评价的交通拥堵预测与评估

来源出版物: 计算机应用研究 卷: 36 期: 12 页: 3697-3700,3704 出版年: 2019

文献号: 1001-3695(2019)36:12<3697:JYDZBM>2.0.TX;2-H

来源出版物: Application Research of Computers 卷: 36 期: 12 页: 3697-3700,3704

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文献号: 1001-3695(2019)36:12<3697:JYDZBM>2.0.TX;2-H

语言: Chinese

文献类型: Article

作者关键词: traffic congestion; multi-index fuzzy comprehensive evaluation; factor index; entropy method; trapezoidal membership function

作者关键词: 交通拥堵; 多指标模糊综合评价; 因素指标; 熵值法; 梯形隶属度函数

摘要: In view of the different impacts of different traffic periods on traffic congestion and single factor fail to accurately characterize the traffic congestion state, this paper proposed a multi-index fuzzy comprehensive evaluation method for traffic congestion state evaluation. The method used the particle swarm optimization algorithm to optimize the support vector regression to predict the average road speed and traffic flow, obtained the predicted values of the average speed v , traffic flow density D , and road saturation S . It input the three factor indexes to multi-index fuzzy comprehensive evaluation model to establish the set of factors and evaluation (level) for traffic congestion. It determined the weight coefficients of three factors under the morning peak, the evening peak and other periods by the entropy method, then determined the degree of membership of each index in each period by the trapezoidal membership function. Finally, it divided the traffic congestion state into six levels. The results of predictive evaluation at the traffic data of the I405 highway in PeMS show that the traffic congestion state evaluated by the proposed method is basically consistent with the actual state, the proposed method has a high prediction accuracy, the correct rate can reach 94.79%.

摘要: 针对各交通时段对交通拥堵的不同影响、单因素无法准确表征交通拥堵状态的问题,提出了一种采用多指标模糊综合评价的交通拥堵评价预测方法。该方法利用粒子群算法优化支持向量回归机对道路平均速度和交通流量进行预测,得到三个因素指标平均速度 v 、交通流密度 D 、道路饱和度 S 的预测值。将三个因素指标输入到多指标模糊综合评价模型中,即首先建立交通拥堵状态的因素集和评价集,通过熵值法确定早高峰、晚高峰、其他时段下三个因素指标的权重系数,再通过梯形隶属度函数确定各指标在各时段的隶属度,最终将交通拥堵状态划分为六个级别。通过对美国 PeMS 数据库中 I405 高速路交通数据的预测评价实验,证明采用该方法预测的交通拥堵状态基本与实际状态吻合,具有较高的预测精度,正确率可达 94.79%。

入藏号: CSCD:6629388

地址: Yan Yuchan, School of Electronics & Control Engineering, Changan University, Xian, 710064.

Bai Lin, School of Electronics & Control Engineering, Changan University, Xian, 710064.

Wu Qisheng, School of Electronics & Control Engineering, Changan University, Xian, 710064.

Ye Zhen, School of Electronics & Control Engineering, Changan University, Xian, 710064.

地址: 晏雨婵, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

白璘, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

武奇生, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

叶珍, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: 2213859010@qq.com

电子邮件地址: 2213859010@qq.com

使用次数 (最近 180 天): 0

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作者: Huang He; Guo Lu; Xu Zhe; Wang Huifeng; Meng Yun; Dai Liang

作者: 黄鹤; 郭璐; 许哲; 王会峰; 孟芸; 代亮

标题: Adaptive GM-CBMeMber filtering algorithm for clustering UAVs positioning signals

标题: 集群无人机定位信号的自适应 GM-CBMeMber 滤波算法

来源出版物: 中国惯性技术学报 卷: 27 期: 4 页: 492-498 出版年: 2019

文献号: 1005-6734(2019)27:4<492:JQWRJD>2.0.TX;2-B

来源出版物: Journal of Chinese Inertial Technology 卷: 27 期: 4 页: 492-498 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: GM-CBMeMber filtering; adaptive filter; unmanned aerial vehicle; navigation; multi-target tracking

作者关键词: 高斯混合-多目标平衡多目标多伯努利滤波; 自适应滤波; 无人机集群; 导航; 多目标跟踪

摘要: In view that actual random noise is easy to be mixed into the navigation and positioning signals of clustering UAVs (unmanned aerial vehicle) during the signal communication, and traditional GM-CBMeMber filtering algorithm would cause the filter to diverge, an adaptive GM-CBMeMber filtering algorithm for clustering UAV positioning signals is proposed. Firstly, the signals are processed, and the corresponding mathematical model is established. Then, the signals are tracked and filtered by the observation model and the measurement model. On this basis, the dynamic processing and further prediction of noise are realized by using the random finite set and the attenuation factor, and the iterative prediction update is performed in combination with the predicted values until the filtering process ends. Meanwhile, the pruning combination of Gaussian terms is introduced to improve the filtering precision. Experimental results show that, compared with the traditional algorithm, the proposed algorithm not only reduces the number of clutter points on the trajectories, but also reduces the overall average error by 26.6%. Besides, the proposed algorithm is simple and easy to implement.

摘要: 针对集群无人机导航定位信号通信过程中,易混入实际随机噪声,而传统 GM-CBMeMber 滤波算法处理会导致滤波器发散的问题,提出了一种用于集群无人机定位信号的自适应 GM-CBMeMber 滤波算法。首先,构建对应的数学模型,通过观测模型和量测模型对信号进行跟踪、滤波。在此基础上,利用随机有限集和衰减因子实现对噪声的动态处理和进一步预测,结合预测值进行迭代更新,直到滤波过程结束。同时,引入高斯项的剪枝合并来提高滤波精度。实验结果表明,改进算法与传统算法相比较,在集群无人机定位航迹上的杂波点

有所减少,总体平均误差降低了 26.6%。同时,方法简单易行,便于工程实现。

入藏号: CSCD:6613117

地址: Huang He, Changan University, Xian, 710064.

Wang Huifeng, Changan University, Xian, 710064.

Meng Yun, Changan University, Xian, 710064.

Dai Liang, Changan University, Xian, 710064.

Guo Lu, Xian ASN Technology Group Company;; ;;UAV National Engineering Research Center, Xian;;Xian, ;; 710075;;710072.

Xu Zhe, The 20th Research Institute, Xian, 710068.

地址: 黄鹤, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

王会峰, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

孟芸, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

代亮, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

郭璐, 西安爱生技术集团公司;;西北工业大学, ;;无人机系统国家工程研究中心, 西安;;西安, ;; 710075;;710072.

许哲, 中电科第 20 研究所, 西安, 陕西 710068, 中国.

电子邮件地址: 8793141@qq.com; tolovely1ulu@163.com

电子邮件地址: 8793141@qq.com; tolovely1ulu@163.com

使用次数 (最近 180 天): 0

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作者: Wen Changbao; Wang Meng; Zhong Chenhao; Su Jianbin; Ju Yongfeng

作者: 文常保; 王蒙; 钟晨昊; 宿建斌; 巨永锋

标题: Research on Temperature Compensation of Silicon based Piezoresistive Pressure Sensor based on DE-SVM

标题: 基于 DE-SVM 的硅基压阻式压力传感器温度补偿研究

来源出版物: 传感技术学报 卷: 32 期: 10 页: 1493-1498 出版年: 2019

文献号: 1004-1699(2019)32:10<1493:JYDSDG>2.0.TX;2-W

来源出版物: Chinese Journal of Sensors and Actuators 卷: 32 期: 10 页: 1493-1498

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作者关键词: DE-SVM; detection technology; temperature compensation; DE-SVM; silicon based material; piezoresistive pressure sensor

作者关键词: 检测技术; 温度补偿; 硅基材料; 压阻式压力传感器

摘要: In order to solve the problem that silicon-based piezoresistive pressure sensors are susceptible to ambient temperature, a temperature compensation scheme for silicon-based piezoresistive pressure sensors based on DE-SVM is proposed. The scheme mainly consists of the training data preprocessing module, the DE parameter optimization module, the SVM training module, the data acquisition module, the measurement data preprocessing module and the SVM correction module. It takes the nonlinear regression function of the SVM algorithm as the core. The SVM parameters are optimized by the DE algorithm. The temperature correction module is obtained after training, and the measurement data is input to the module. Finally the corrected pressure value is output. The result from the test of single sensor shows that the maximum error and mean square error are reduced by 93.87% and 99.89% respectively after its pressure value is corrected by DE-SVM model. In the case of multi-sensor composed of seven silicon-based piezoresistive pressure sensors, the maximum error and the mean square error are reduced by 93.17% and 99.27%, respectively. Moreover, the average relative error decreased from 14.06% to 0.45%. Finally, the temperature points not included in the training data are tested by the established model. The model still performs well.

摘要: 针对硅基压阻式压力传感器易受环境温度影响的特点,提出了一种基于 DE-SVM 的硅基压阻式压力传感器温度补偿方案。该方案主要由训练数据预处理模块、DE 参数寻优模块、SVM 训练模块、数据采集模块、测量数据预处理模块及 SVM 校正等模块组成,以 SVM 算法的非线性回归功能为核心,通过 DE 算法优化 SVM 参数,经训练后得到温度校正模块,模块接收测量数据后输出校正后的压力值。实验表明,对单个传感器压力值使用 DE-SVM 模型进行校正,最大误差和均方误差分别下降了 93.87%和 99.89%;在七块硅基压阻式压力传感器构成的多传感器情况下,最大误差和均方误差分别下降了 93.17%和 99.27%,平均相对误差由 14.06%下降至 1.20%;最后选取训练数据不包含的温度点使用所建立的模型进行测试,模型仍能够较好地进行温度补偿。

入藏号: CSCD:6608437

地址: Wen Changbao, Institute of Micro-Nanoelectronics, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Meng, Institute of Micro-Nanoelectronics, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhong Chenhao, Institute of Micro-Nanoelectronics, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Su Jianbin, Institute of Micro-Nanoelectronics, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Ju Yongfeng, Institute of Micro-Nanoelectronics, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 文常保, 长安大学电子与控制工程学院微纳电子研究所, 西安, 陕西 710064, 中国.

王蒙, 长安大学电子与控制工程学院微纳电子研究所, 西安, 陕西 710064, 中国.

钟晨昊, 长安大学电子与控制工程学院微纳电子研究所, 西安, 陕西 710064, 中国.

宿建斌, 长安大学电子与控制工程学院微纳电子研究所, 西安, 陕西 710064, 中国.

巨永锋, 长安大学电子与控制工程学院微纳电子研究所, 西安, 陕西 710064, 中国.

电子邮件地址: estlab@chd.edu.cn; 1410014289@qq.com

电子邮件地址: estlab@chd.edu.cn; 1410014289@qq.com

使用次数 (最近 180 天): 0

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作者: Dai Liang; Zhang Yanan; Qian Chao; Meng Yun; Huang He

作者: 代亮; 张亚楠; 钱超; 孟芸; 黄鹤

标题: Joint velocity and queue aware stochastic optimization of packet scheduling in roadside units

标题: 联合车速-队列感知的路边单元分组调度随机优化

来源出版物: 控制理论与应用 卷: 36 期: 10 页: 1707-1718 出版年: 2019

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作者关键词: Internet of vehicles; roadside unit; packet scheduling; stochastic optimization; velocity-aware

作者关键词: 车联网; 路边单元; 分组调度; 随机优化; 车速感知

摘要: The roadside unit (RSU), which provides information service for the passing vehicles entering its coverage, is infrastructure of Internet of vehicles. Packets transmission between RSUs can be implemented by mobile vehicles which serve as opportunistic store-carry-forward devices. The end-to-end delay of packet transmission consists of two parts: queuing delay at buffer of the source RSU and transmission delay caused by vehicles traveling from the source to the destination RSU. In order to minimize the average end-to-end delay in the transmission, a joint velocity and queue aware stochastic optimization method (VQSO) of packet scheduling in RSUs was proposed in this paper. The proposed method determines whether to send packets to the passing vehicles based on the queuing length of packets and the velocity of the vehicles. By analyzing the queuing delay and transmission delay in the Markov decision process (MDP) framework, a nonlinear optimization problem of average end-to-end delay is established. Simulation results show that the proposed scheduling method can significantly reduce average end-to-end delay in packet transmission between RSUs, and improve the throughput of packet transmission.

摘要: 路边单元(RSU)是车联网中为其无线覆盖范围内过往车辆提供信息服务的基础设施,

路边单元间的分组传输可通过移动车辆存储-载带-转发的方式进行,其传输过程中分组的端到端时延由源 RSU 缓存中的排队时延与车辆载带过程的传播时延两部分组成.为使 RSU 间分组传输过程中平均端到端时延最小化,本文提出一种联合车速-队列感知的路边单元分组调度随机优化方法,该方法根据源 RSU 缓存队列长度和经过源 RSU 覆盖范围的车辆速度状态作分组调度决策.通过马尔科夫决策(MDP)框架对分组传输过程中的平均排队时延和平均传播时延进行分析,建立一个非线性平均端到端时延最小化问题并求解.仿真结果表明,所提出的 RSU 分组调度随机优化方法可以显著降低 RSU 间分组传输过程中的平均端到端时延,并提高系统中分组传输的吞吐量.

入藏号: CSCD:6602823

地址: Dai Liang, School of Electronics and Control Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Zhang Yanan, School of Electronics and Control Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Qian Chao, School of Electronics and Control Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Meng Yun, School of Electronics and Control Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Huang He, School of Electronics and Control Engineering, Changan University, Xi'an, Shaanxi 710064, China.

地址: 代亮, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

张亚楠, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

钱超, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

孟芸, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

黄鹤, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: ldai@chd.edu.cn; 2016132053@chd.edu.cn; qianchao@chd.edu.cn; mengyun@chd.edu.cn; huanghe@chd.edu.cn

电子邮件地址: ldai@chd.edu.cn; 2016132053@chd.edu.cn; qianchao@chd.edu.cn; mengyun@chd.edu.cn; huanghe@chd.edu.cn

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作者: Zhou Xiwei; Zhao Xiangmo; Liu Weiguo; Wang Guiping; Li Dengfeng

作者: 周熙炜; 赵祥模; 刘卫国; 汪贵平; 李登峰

标题: Dead-time voltage vector deviation and correction of TNPC converter in AC-DC hybrid

microgrid

标题: 交直流混合微电网 TNPC 变换器的死区电压矢量偏差及修正

来源出版物: 电力自动化设备 卷: 39 期: 10 页: 32-38 出版年: 2019

文献号: 1006-6047(2019)39:10<32:JZLHHW>2.0.TX;2-N

来源出版物: Electric Power Automation Equipment 卷: 39 期: 10 页: 32-38 出版年: 2019

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文献类型: Article

作者关键词: AC-DC hybrid microgrid; TNPC; three-level converter; space voltage vector deviation; instruction; correction

作者关键词: 交直流混合微电网; T 型中点箝位型; 三电平变换器; 空间电压矢量偏差; 指令; 修正

摘要: The dead-time voltage vector deviation in the vector space for TNPC(T-type Neutral-Point-Clamped) converter is analyzed, and its occurrence rules are summarized. The pre-corrected instruction voltage vector is obtained according to the position and amplitude of the reference voltage vector. From the linear modulation space to the over-modulation space, the corresponding adjustment approach of the voltage second characteristic equation is obtained. In addition, considering the fact that dynamic disturbance of parameters might result in over-compensation or under-compensation, the correction factor is introduced to provide an adaptive correction of PWM(Pulse Width Modulation) instruction voltage vector, which can also be used in multi-level converters. The proposed approach avoids the issue of pulse loss or saturation that suffered by traditional PWM pulse width shaping approaches.

摘要: 对 T 型中点箝位型双向变换器在矢量空间中的死区电压矢量偏差进行分析, 总结其发生规律, 并根据参考电压矢量的位置和幅值得到提前修正的指令电压矢量。从线性调制空间到过调制空间得到相应的伏秒特性方程的调整办法。同时, 考虑到系统在动态扰动下可能引发的欠补偿或过补偿, 引入一个补偿深度的调节因子, 实现脉宽调制(PWM)指令电压矢量的自适应修正。该方法可推广到有更多电平的变换器中, 避免了采用传统 PWM 脉冲宽度整形法时出现的脉冲损失或饱和问题。

入藏号: CSCD:6588093

地址: Zhou Xiwei, School of Electronic and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Xiangmo, School of Electronic and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Guiping, School of Electronic and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Dengfeng, School of Electronic and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Weiguo, School of Automation, Northwestern Polytechnical University, Xi'an, Shaanxi 710072, China.

地址: 周熙炜, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

赵祥模, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

汪贵平, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

李登峰, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

刘卫国, 西北工业大学自动化学院, 西安, 陕西 710072, 中国.

电子邮件地址: seekclue@sina.com

电子邮件地址: seekclue@sina.com

使用次数 (最近 180 天): 0

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作者: Gao Ting; Wang Xiaonan

作者: 高婷; 王晓楠

标题: The Database Selection Based on Hesitant Linguistic Information Aggregation Algorithm

标题: 基于犹豫语言信息集结算法的数据库选择

来源出版物: 控制工程 卷: 26 期: 8 页: 1444-1449 出版年: 2019

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来源出版物: Control Engineering of China 卷: 26 期: 8 页: 1444-1449 出版年: 2019

文献号: 1671-7848(2019)26:8<1444:JYYYYY>2.0.TX;2-S

语言: Chinese

文献类型: Article

作者关键词: Multi-attribute group decision making; hesitant fuzzy linguistic set; Heronian mean; Archimedean norm; information aggregation operator; database

作者关键词: 多属性群决策; 犹豫模糊语言集; Heronian 平均; Archimedean 范数; 信息集成算子; 数据库

摘要: In order to improve the efficiency of database selection, and solve problem of the multi-attribute group decision making (MAGDM). It puts forward a method of the database selection based on hesitant linguistic information aggregation. Firstly, a database selection model on the basis of the generalized hesitant linguistic Heronian mean (GHLHM) operator is developed. Secondly, under the hesitant linguistic environment, the new operations are defined based on the Archimedean norms. Then, by using the defined operational laws and Heronian mean, the GHLHM operator is proposed, whose desirable properties and some special cases are discussed in detail. The generalized hesitant linguistic weighted Heronian mean (GHLWHM) operator is introduced. In addition, a novel hesitant fuzzy linguistic MAGDM model based on GHLWHM operator is investigated, which can capture the relationship among the input decision making information and enable decision maker to select different parameters to make decision. Finally, the practicality and effectiveness of the developed model is illustrated with a numerical example for the selection of database. Experiments show that this method can achieve

comprehensive optimization of database performance, and has broad application prospects in other fields.

摘要: 为了提高数据库选择效率,针对多属性群决策问题提出了一种基于犹豫语言多属性群决策算法的数据库选择方法。首先,构建一种基于广义犹豫语言 Heronian 平均(GHLHM)算子的数据库选择模型。其次,将 Archimedean 范数引入到犹豫语言环境下,定义了新的犹豫语言运算法则;其次,基于新的运算法则和 Heronian 平均,提出了 GHLHM 算子,并探讨了 GHLHM 算子的一些基本性质,研究了 GHLHM 算子的几类常用算子形式,提出了广义犹豫语言加权 Heronian 平均(GHLWHM)算子;最后,基于 GHLWHM 算子构建了一种新的犹豫语言多属性群决策方法并将其应用于数据库选择中,实验证明,该方法可以实现对数据库性能的综合优选排序,在其他领域也有着广泛的应用前景。

入藏号: CSCD:6555458

地址: Gao Ting, School of Electronic and Control Engineering, Chang'an University, Xian, Shaanxi 710064, China.

Wang Xiaonan, School of Electronic and Control Engineering, Chang'an University, Xian, Shaanxi 710064, China.

地址: 高婷, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

王晓楠, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

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作者: Li Li; Xu Zhigang; Zhao Xiangmo; Wang Guiping

作者: 李立; 徐志刚; 赵祥模; 汪贵平

标题: Review of Motion Planning Methods of Intelligent Connected Vehicles

标题: 智能网联汽车运动规划方法研究综述

来源出版物: 中国公路学报 卷: 32 期: 6 页: 20-33 出版年: 2019

文献号: 1001-7372(2019)32:6<20:ZNWLQC>2.0.TX;2-T

来源出版物: China Journal of Highway and Transport 卷: 32 期: 6 页: 20-33 出版年: 2019

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语言: Chinese

文献类型: Review

作者关键词: traffic engineering; intelligent connected vehicle; review; route planning; path planning; maneuver planning; trajectory planning

作者关键词: 交通工程; 智能网联汽车; 综述; 路径规划; 路线规划; 动作规划; 轨迹规划

摘要: Recent studies on motion planning methods of intelligent connected vehicle(ICV)are

analyzed in this paper. In terms of working space, time, and objective, ICV's motion planning is divided into four subtasks: route planning, path planning, maneuver planning, and trajectory planning. Past research and applications of the techniques of vehicle intelligence and connection in each subtask are reviewed. Behavioral characteristics of the ICV driver and their impact on the outcome of ICV motion planning are discussed. Four aspects of the current trend in ICV motion planning research are discussed: technical background, research scenario, algorithm flow and applied theory. As an ICV mainly depends on vehicle connecting information to plan travelling route, this survey finds that the difficulty of ICV route planning increases when ICV's with different connecting functions coexist in the road network. Dynamics of multiple surrounding vehicles and lane configuration are rarely considered in ICV's path planning. This is likely to be addressed by integrating the existing path planning algorithms with microscopic traffic flow models. The issues of human-machine cooperation and task transfer in ICV have recently become hot topics of research. These issues include lane changing and turning maneuver planning in urban arterial roads, maneuver guidance of ICV for non-connecting vehicle and others. There is academic consensus that the behavior of the driver in an ICV should be considered in trajectory planning. However, there is limited application of vehicle-to-vehicle and vehicle-to-infrastructure connecting information. We propose that applying feedback-iteration to coordinate ICV's path and maneuver planning as well as its motion planning and trajectory tracking control could help in globally optimized motion planning and vehicle control. Furthermore, formulating a model for ICV's motion planning on a theoretical foundation that is appropriate for the specific motion planning task could not only take advantage of the merits of the theory but also increase flexibility and adaptability of the motion planning algorithms.

摘要: 分析了近年来智能网联汽车(Intelligent Connected Vehicle, ICV)运动规划方法的研究,根据规划时空尺度和任务目标,将 ICV 运动规划细分为路径规划、路线规划、动作规划和轨迹规划 4 级子任务,回顾了各级子任务中智能网联技术的研究和应用现状;探讨了 ICV 中驾驶人行为特性及其对运动规划结果的影响;从技术背景、研究场景、算法流程和应用理论 4 个方面,提出 ICV 运动规划方法研究的未来发展方向。结果表明:由于 ICV 主要依赖车辆网联信息规划运动路径,而路网中同时存在不同网联等级的 ICV,这将增加路径规划问题的求解难度;现有 ICV 路线规划模型较少考虑周边多车运动状态以及路段车道设置情况,将现有算法与微观交通流模型相结合有助于解决此问题;ICV 中人机协同及任务切换领域已出现诸多研究热点,如城市道路上换道与转弯动作规划、ICV 引导非网联车辆行驶等问题;借鉴驾驶人行为模式规划 ICV 运动轨迹已成为研究共识,但是车-车、车-路网联信息在此领域的应用仍然有限;采用反馈-迭代的方法进行 ICV 运动路线和动作协同规划、运动规划和轨迹跟踪控制有助于获得全局最优的运动规划结果和车辆控制策略;根据具体规划任务特点选择构建 ICV 运动规划模型的基础理论,有助于发挥各类理论的优势,提升规划算法的灵活性和适用性。

入藏号: CSCD:6530247

地址: Li Li, School of Electronic and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Guiping, School of Electronic and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Xu Zhigang, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Xiangmo, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 李立, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

汪贵平, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

徐志刚, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

赵祥模, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: lili@chd.edu.cn; xuzhigang@chd.edu.cn

电子邮件地址: lili@chd.edu.cn; xuzhigang@chd.edu.cn

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作者: Xiao Jian; Li Wenjiang; Geng Hongyang; Zhai Yingbo

作者: 肖剑; 李文江; 耿洪杨; 翟英博

标题: An Anti-DoS Attack RFID Security Authentication Protocol in the Internet of Vehicles

标题: 车联网中可抵抗 DoS 攻击的 RFID 安全认证协议

来源出版物: 北京邮电大学学报 卷: 42 期: 2 页: 114-119 出版年: 2019

文献号: 1007-5321(2019)42:2<114:CLWZKD>2.0.TX;2-4

来源出版物: Journal of Beijing University of Posts Telecommunications 卷: 42 期: 2 页: 114-119 出版年: 2019

文献号: 1007-5321(2019)42:2<114:CLWZKD>2.0.TX;2-4

语言: Chinese

文献类型: Article

作者关键词: radio frequency identification technology; internet of vehicles; security authentication protocol; denial of service attack

作者关键词: 射频识别技术; 车联网; 安全认证协议; 拒绝服务攻击

摘要: In order to overcome the security problem of radio frequency identification technology in the internet of vehicles, a security authentication protocol based on key distribution center was proposed. First the label without the legal key was filtered by the updateable private key stored in the key distribution center, and then the identity of the tag was authenticated through the background server. While solving the security problems, such as counterfeit attacks, replay attacks, and tracking attacks in the traditional protocol, the denial of service (DoS) attacks existing in the internet of vehicles were also solved. Through the BAN logic proof, as well as the comparison of security and performance analysis, it shows that this protocol can provide effective security protection in the internet of vehicles, which greatly reduces the computing burden of the background server facing multiple tags.

摘要: 针对车联网中射频识别技术存在的安全问题, 提出了一种基于密钥分配中心的安全认

证协议.通过密钥分配中心储存的可更新私钥先过滤没有合法密钥的标签,再经过后台服务器进行身份认证.在解决传统协议中的假冒攻击、重放攻击、跟踪攻击等安全问题的同时,还解决了车联网中存在的拒绝服务攻击.BAN 逻辑证明以及安全和性能分析对比结果显示,本协议在车联网中能提供更有效的安全保护,极大地降低后台服务器面对多标签时的计算负担.

入藏号: CSCD:6515467

地址: Xiao Jian, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Wenjiang, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Geng Hongyang, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhai Yingbo, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 肖剑, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

李文江, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

耿洪杨, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

翟英博, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: xiaojian@chd.edu.com

电子邮件地址: xiaojian@chd.edu.com

使用次数 (最近 180 天): 0

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作者: Zhang Tao; Liu Yunong; Xing Yalin; Ren Shuai; Zhang Degang

作者: 张弢; 柳雨农; 邢亚林; 任帅; 张德刚

标题: Lossless information hiding in AMBTC domain based on histogram shift

标题: 基于直方图移位的 AMBTC 域无损信息隐藏

来源出版物: 计算机应用研究 卷: 36 期: 6 页: 1771-1775 出版年: 2019

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来源出版物: Application Research of Computers 卷: 36 期: 6 页: 1771-1775 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: information hiding; chaotic scrambling transform; stroke compression coding; AMBTC

作者关键词: 信息隐藏; 混沌置乱变换; 行程压缩编码; 绝对矩阵块截断编码

摘要: For the secure transmission of confidential information, this paper proposed an information hiding algorithm. Using chaos scrambling transform and run-length code compression simultaneously in the secret information preprocessing, it improved the embedding capacity and robustness of the stego. In order to achieve the lossless hiding and improve the capacity, it used the histogram-shift technology and the AMBTC (absolute moment block truncating coding) to hide the preprocessed secret information in high and low mean value sequence, and the capacity was larger than that of the algorithm which was only based on the AMBTC. The experimental results show that the extracted secret information can be highly identified even after some attacks, and the normalization coefficient is always larger than 0.6, which proves the advantages of the proposed algorithm in terms of robustness and hiding efficiency. Therefore, the proposed method of information hiding achieves the goal of secure transmission of secret information and has good anti-aggression.

摘要: 针对秘密信息的安全传输, 提出一种信息隐藏算法, 将混沌置乱变换及行程压缩编码同时应用于秘密信息预处理, 以改善隐藏载体的嵌入容量和鲁棒性. 该算法将直方图移位技术应用于信息嵌入过程, 在绝对矩阵块截断编码 (AMBTC) 生成的高低平均值序列上隐藏预处理后的秘密信息, 实现了载体的无损隐藏并提升了嵌入容量, 且嵌入容量高于直接在由 AMBTC 生成的高低平均值序列上进行隐藏的算法. 实验结果表明, 在受到某些攻击后仍保证提取出的秘密信息具有较高的可辨识度, 归一化系数始终高于 0.6, 证明了该算法在鲁棒性和隐藏效率方面的优势. 因此, 提出的信息隐藏方法能达到秘密信息安全传输的目的, 同时具有很好的抗攻击性.

入藏号: CSCD:6514032

地址: Zhang Tao, School of Electronic & Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Yunong, School of Electronic & Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Xing Yalin, School of Electronic & Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Ren Shuai, School of Information Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Degang, Education Training Evaluation Center, Yunnan Power Grid Co., Kunming, Yunnan 650033, China.

地址: 张弢, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

柳雨农, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

邢亚林, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

任帅, 长安大学信息工程学院, 西安, 陕西 710064, 中国.

张德刚, 云南电网有限责任公司教育培训评价中心, 昆明, 云南 650033, 中国.

电子邮件地址: 1639624145@qq.com

电子邮件地址: 1639624145@qq.com

使用次数 (最近 180 天): 0

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作者: Liang Huagang; Wen Xiaoqian; Liang Dandan; Li Huaide; Ru Feng

作者: 梁华刚; 温晓倩; 梁丹丹; 李怀德; 茹锋

标题: Fine-grained food image recognition of a multi-level convolution feature pyramid

标题: 多级卷积特征金字塔的细粒度食物图片识别

来源出版物: 中国图象图形学报 卷: 24 期: 6 页: 870-881 出版年: 2019

文献号: 1006-8961(2019)24:6<870:DJJTZ>2.0.TX;2-O

来源出版物: Journal of Image and Graphics 卷: 24 期: 6 页: 870-881 出版年: 2019

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语言: Chinese

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作者关键词: food picture recognition; convolutional neural network; attention network; fine-grained recognition; feature pyramid

作者关键词: 食物图片识别; 卷积神经网络; 注意力网络; 细粒度识别; 特征金字塔

摘要: Objective Food images have special characteristics,uncertainties in food appearances,complex backgrounds, inter-class similarities,and intra-class differences. Hence,these images are more difficult to identify than ordinary finegrained pictures. Traditional food image recognition mainly uses manual design features,including color,histogram of oriented gradient (HOG),and local binary pattern (LBP),then utilizes a classifier (e. g.,support vector machine (SVM)) to deal with features. However,manual design features cannot establish the connection between various features. Several integrated feature methods only superimpose numerous features; thus,the recognition accuracy on each food image data set is up to 70% only. Compared with the weak expression capability of manual design features,deep learning has a stronger feature representation capability. They both use large-scale,labeled food images to train multi-level convolutional neural network models for food image recognition to improve recognition accuracy. However,in the current method of using the sonorous convolutional neural network for food image classification,the food image is directly inputted into the convolutional neural network to extract features. The food image has a relatively complicated background information,which critically influences the recognition result. We developed a model called multi-level convolution feature pyramid for fine-grained food image recognition to improve the accuracy of food image recognition and take full advantage of the local details. Method We extracted features from the whole to local,which not only avoids the shortcomings of baseline methods but also retains the global information and local details. We extracted features only from the target areas of the food image and discarded the background information with large interference. The multi-level

convolution feature pyramid model consists of three main parts,namely,food feature extraction,attention localization,and feature fusion networks. The single-level feature extraction network cannot obtain the global and local features of the food image simultaneously. We developed a three-level food feature extraction network by cascading,which can transfer features from global to local. Moreover,a feature pyramid network was constructed between the feature maps of each food feature extraction network to deal with the large variation of food image scale. To automatically locate the network to the fine-grained area,an attention area localization network was designed between the levels of the feature extraction network,and the feature extraction range was reduced from global to local. Then,the fine-grained area of the original picture was cropped,enlarged,and inputted to the next-level feature extraction network.

摘要: 目的食物图片具有结构多变、背景干扰大、类间差异小、类内差异大等特点,比普通细粒度图片的识别难度更大。目前在食物图片识别领域,食物图片的识别与分类仍存在精度低、泛化性差等问题。为了提高食物图片的识别与分类精度,充分利用食物图片的全局与局部细节信息,本文提出了一个多级卷积特征金字塔的细粒度食物图片识别模型。方法本文模型从整体到局部逐级提取特征,将干扰较大的背景信息丢弃,仅针对食物目标区域提取特征。模型主要由食物特征提取网络、注意力区域定位网络和特征融合网络3部分组成,并采用3级食物特征提取网络的级联结构来实现特征由全局到局部的转移。此外,针对食物图片尺度变化大的特点,本文模型在每级食物特征提取网络中加入了特征金字塔结构,提高了模型对目标大小的鲁棒性。结果本文模型在目前主流公开的食物图片数据集 Food-101、ChineseFoodNet 和 Food-172 上进行实验,分别获得了 91.4%、82.8%、90.3% 的 Top-1 正确率,与现有方法相比提高了 1%~8%。结论本文提出了一种多级卷积神经网络食物图片识别模型,可以自动定位食物图片区分度较大的区域,融合食物图片的全局与局部特征,实现了食物图片的细粒度识别,有效提高了食物图片的识别精度。实验结果表明,该模型在目前主流食物图片数据集上取得了最好的结果。

入藏号: CSCD:6510411

地址: Liang Huagang, School of Electronics and Control Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Wen Xiaoqian, School of Electronics and Control Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Liang Dandan, School of Electronics and Control Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Li Huaide, School of Electronics and Control Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

Ru Feng, School of Electronics and Control Engineering,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 梁华刚, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

温晓倩, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

梁丹丹, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

李怀德, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

茹锋, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: hgliang@chd.edu.cn; wenxiaoqian@chd.edu.cn; 1261523826@qq.com; lihuaide@chd.edu.cn; fengru@chd.edu.cn

电子邮件地址: hgliang@chd.edu.cn; wenxiaoqian@chd.edu.cn; 1261523826@qq.com; lihuaide@chd.edu.cn; fengru@chd.edu.cn

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作者: Liu Yiyan; Tian Tian; Wang Caixia

作者: 刘义艳; 田甜; 王彩霞

标题: Trend prediction of structural health status based on EWT and FESN

标题: 基于 EWT 和 FESN 的结构健康状态趋势预测

来源出版物: 应用力学学报 卷: 36 期: 3 页: 645-651 出版年: 2019

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来源出版物: Chinese Journal of Applied Mechanics 卷: 36 期: 3 页: 645-651 出版年: 2019

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文献类型: Article

作者关键词: empirical wavelet transform; echo state network; fuzzy echo state network; structural health status; forecast

作者关键词: 经验小波变换; 回声状态网络; 模糊回声状态网络; 结构健康状态; 趋势预测

摘要: In order to detect and deal with the damage of large structure and equipment in the service period in time, an empirical wavelet transform(EWT) and fuzzy echo state network(FESN) prediction method of structural health status is presented in this paper. First, the original signal is decomposed by EWT, and the instantaneous frequency is obtained by Hilbert transformation of the AM-FM components; then, the instantaneous frequency is used as the input parameter of the FESN prediction model to predict the health state of the structure. Simulation and engineering experiment results show that compared with EMD method, the empirical wavelet transform (EWT) can decompose the inherent components of the signal clearly, and there is no false mode. The prediction accuracy of the FESN model and the classical ESN model are 0.0125 and 0.0389, respectively. Obviously, the former is closer to the actual value and the precision is higher. Meanwhile, the combination of EWT and FESN has good adaptability and stability to deal with the nonlinear and non-stationary characteristics of complex engineering structure signals.

摘要: 为了能够及时发现并处理大型结构和设备在服役期出现的损伤问题,本文提出了一种基于 EWT-FESN 的结构健康状态趋势预测方法。首先,原始信号经 EWT 分解,对得到的 AM-FM 分量进行了希尔伯特变换得到瞬时频率;然后,将瞬时频率作为 FESN 预测模型的输入参数进行了结构健康状态趋势预测。仿真和工程实验结果表明:经验小波变换可以将信号的各个固有分量清楚地分解出来,不存在虚假模态;FESN 模型与经典的 ESN 模型预测精度分别为 0.0125、0.0389,显然前者更接近实际值,精度更高;同时,EWT 与 FESN 的结合对于处理

复杂工程结构信号的非线性、不平稳性等特点具有较好的适应性和稳定性。

入藏号: CSCD:6508773

地址: Liu Yiyan, School of Electronic and Control Engineering, Changan University, Xian, 710064.

Tian Tian, School of Electronic and Control Engineering, Changan University, Xian, 710064.

Wang Caixia, School of Electronic and Control Engineering, Changan University, Xian, 710064.

地址: 刘义艳, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

田甜, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

王彩霞, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: 906891080@qq.com

电子邮件地址: 906891080@qq.com

使用次数 (最近 180 天): 0

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作者: Song Yongchao; Ju Yongfeng; Du Kai; Han Yixuan

作者: 宋永超; 巨永锋; 杜凯; 韩宜轩

标题: Off-line city traffic light recognition algorithm based on chromaticity direction angle

标题: 基于色度方向角的离线城市红绿灯识别算法

来源出版物: 北京交通大学学报. 自然科学版 卷: 43 期: 2 页: 72-79 出版年: 2019

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文献类型: Article

作者关键词: traffic information engineering & control; intelligent transportation; traffic light identification; chromaticity direction angle; recognition classifier

作者关键词: 交通信息工程及控制; 智能交通; 红绿灯识别; 色度方向角; 识别分类器

摘要: As automatic driving becomes an inevitable trend in the development of intelligent transportation system, traffic light recognition is a significant research project. Currently, the problem that traffic lights show chromatic aberration at different locations is not fully considered in most of traffic light recognition algorithms. Therefore, this paper proposes an offline traffic light recognition algorithm based on the chromaticity direction angle. First, a collective image of red and

green lights by manually calibrating color lumps of these lights is worked out under different scenes and the RGB space of the image is converted into the geometric mean log chromaticity space. Second, chromaticity direction angles of the red and green lights is determined based on Shannon entropy, and their chromaticity directions images is obtained, based on which segmentation thresholds of the red and green lights are determined and a traffic light recognition classifier is established. Finally, traffic lights in different image sequences bare recognized by employing the recognition classifier. According to experimental results, the proposed algorithm achieves effective recognition and high recognition precision both on LARA and LISA standard sets, and can meet the real-time requirements for traffic light recognition in real life.

摘要: 车辆自动驾驶已成为智能交通系统发展的必然趋势, 红绿灯识别研究扮演着极为重要的角色. 针对大多数红绿灯识别算法中没有充分考虑同种颜色不同位置红绿灯存在的颜色差异问题, 提出了基于色度方向角的离线红绿灯识别算法. 首先手工标定不同场景下的红灯、绿灯色块组成红灯、绿灯集合图, 将集合图 RGB 空间转换为几何均值对数色度空间; 然后根据香农熵确定红灯、绿灯各自的色度方向角, 得到各自的色度方向图; 其次根据红灯、绿灯色度方向图确定出红灯、绿灯分割阈值, 建立红绿灯识别分类器; 最后根据识别分类器将不同图像序列中的红绿灯识别出来. 实验结果表明: 该算法在 LARA、LISA 标准集上均获得很好的识别结果, 识别精度高, 能满足实际红绿灯识别的实时性要求.

入藏号: CSCD:6497802

地址: Song Yongchao, School of Electronic and Control Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Ju Yongfeng, School of Electronic and Control Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Du Kai, School of Electronic and Control Engineering, Changan University, Xi'an, Shaanxi 710064, China.

Han Yixuan, School of Electronic and Control Engineering, Changan University, Xi'an, Shaanxi 710064, China.

地址: 宋永超, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

巨永锋, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

杜凯, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

韩宜轩, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: 2015132047@chd.edu.cn; yfju@chd.edu.cn

电子邮件地址: 2015132047@chd.edu.cn; yfju@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Wen Limin; Ju Yongfeng; Zhang Changli; Wang Huifeng

作者: 温立民; 巨永锋; 张昌利; 王会峰

标题: Algorithm of Fog Removal of Image Based on Improved Kuwahara Filter

标题: 基于改进 Kuwahara 滤波的图像去雾算法

来源出版物: 控制工程 卷: 26 期: 5 页: 997-1002 出版年: 2019

文献号: 1671-7848(2019)26:5<997:JYGJKL>2.0.TX;2-5

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语言: Chinese

文献类型: Article

作者关键词: Fog; image processing; dark channel prior; Kuwahara filter; atmospheric model

作者关键词: 雾; 图像处理; 暗原色; Kuwahara 滤波; 大气散射模型

摘要: Concerning the shortcoming of low efficiency of the algorithm for single-image fog removal, an algorithm based on improved Kuwahara filter is proposed to detail rough transmission of foggy images. This algorithm introduces the square integral operator to transform calculation for pixel areas into calculation of four vertices of a rectangle. Amended algorithm based on threshold for transmission is used to go a step further detail the transmission for sky areas in order to increase the efficiency of the algorithm and avoid the color-cross of sky areas. Simulation test shows that it only needs 10 ms to deal with a foggy image of 800*600 pixel, and the velocity based on the improved Kuwahara is 3 000 times of He's, 2 000 times of Shi's, and could meet the real-time processing need for expressway images.

摘要: 针对单幅图像去雾算法中存在运行效率低下的不足,提出改进的 Kuwahara 滤波细化粗糙透射率算法,引入积分图和平方积分图算法,将面积像素计算转化为目标矩形四个顶点的计算;对天空区域使用阈值透射率修正算法做进一步平滑,以提高算法执行效率,避免天空区域色彩失真。经仿真测试,对于 800*600 的雾图像,需 10 ms 即可完成去雾处理;对于大小为 135 K 的图像,改进 Kuwahara 处理速度是 He 的 3 000 倍,是 Shi 的 2 000 倍,表明算法能满足高速图像处理的实时性需求。

入藏号: CSCD:6492825

地址: Wen Limin, School of Electronic & Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Ju Yongfeng, School of Electronic & Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Wang Huifeng, School of Electronic & Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Changli, School of Information and Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 温立民, 长安大学电控学院, 西安, 陕西 710064, 中国.

巨永锋, 长安大学电控学院, 西安, 陕西 710064, 中国.

王会峰, 长安大学电控学院, 西安, 陕西 710064, 中国.

张昌利, 长安大学信息学院, 西安, 陕西 710064, 中国.

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作者: Wen Changbao; Ma Wenbo; Liu Pengli

作者: 文常保; 马文博; 刘鹏里

标题: RBF neural network structure optimization based on improved genetic algorithm

标题: 基于改进遗传算法的 RBF 神经网络结构优化研究

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语言: Chinese

文献类型: Article

作者关键词: improved genetic algorithm (IGA); radial basis function(RBF)neural network; structure optimization; environment prediction

作者关键词: 改进遗传算法; RBF 神经网络; 结构优化; 环境预测

摘要: In order to deal with the complex structure of radial basis function(RBF)neural networks due to the excessive number of hidden layer nodes,we propose a RBF neural network structure optimization algorithm based on an improved genetic algorithm (IGA).The IGA is used to optimize the RBF neural network structure based on orthogonal least squares.We globally optimize the column vectors of the output matrixes of the hidden layers to design a RBF network with better structure based on IGA optimization(IGA-RBF).The algorithm is applied to a temperature and humidity prediction model for the electronic components storage environment.Results show that compared with the RBF neural network structure based on orthogonal least squares,the number of the hidden layer nodes of IGA-RBF network is reduced by 34,and the number of training steps is reduced by 44.The errors of temperature and humidity of the prediction model for the electronic components storage environment are smaller,and the fitting accuracy is greater than 0.95,thus having better prediction accuracy.

摘要: 针对 RBF 神经网络隐含层节点数过多导致网络结构复杂的问题,提出了一种基于改进遗传算法(IGA)的 RBF 神经网络优化算法。利用 IGA 优化基于正交最小二乘法的 RBF 神经网络结构,通过对隐含层输出矩阵的列向量进行全局寻优,从而设计出结构更优的基于 IGA 的 RBF 神经网络(IGARBF)。将 IGA-RBF 神经网络的学习算法应用于电子元器件贮存环境温度湿度预测模型,与基于正交最小二乘法的 RBF 神经网络进行比较的结果表明:IGA-RBF 神经网络设计出来的网络训练步数减少了 44 步,隐含层节点数减少了 34 个,且预测模型得到的温湿度误差较小,拟合精度大于 0.95,具有更高的预测精度。

入藏号: CSCD:6494207

地址: Wen Changbao, Institute of Micro-Nanoelectronics, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Ma Wenbo, Institute of Micro-Nanoelectronics, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Pengli, Institute of Micro-Nanoelectronics, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 文常保, 长安大学电子与控制工程学院微纳电子研究所, 西安, 陕西 710064, 中国.

马文博, 长安大学电子与控制工程学院微纳电子研究所, 西安, 陕西 710064, 中国.

刘鹏里, 长安大学电子与控制工程学院微纳电子研究所, 西安, 陕西 710064, 中国.

电子邮件地址: estlab@chd.edu.cn; 13335354783@163.com; 921156593@qq.com

电子邮件地址: estlab@chd.edu.cn; 13335354783@163.com; 921156593@qq.com

使用次数 (最近 180 天): 0

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作者: Xu Guimin; Zhang Guanjun; Yao Congwei; Shi Xingmin; Duan Chendong

作者: 许桂敏; 张冠军; 姚聪伟; 石兴民; 段晨东

标题: Optical and Electrical Characteristics of Atmospheric Pressure Argon Plasma Jet Under Different Interaction States

标题: 大气压氩气等离子体射流在不同作用状态下的光电特性

来源出版物: 高电压技术 卷: 45 期: 5 页: 1375-1386 出版年: 2019

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作者关键词: atmospheric pressure plasma jet; interacting states; electrical characteristic; emission spectrum; electrical and flow field distribution simulation

作者关键词: 大气压等离子体射流; 作用状态; 电气特性; 发射光谱; 静电场与流场仿真

摘要: In order to investigate the effect of treated objects on atmospheric pressure plasma jet characteristics during its application for skin wound healing, we investigated the basic optical-electrical characteristics, the processes of generation and evolution, and the emission characters of spectrum of the argon APPJ under the conditions of free standing jet state and of interacting with culture medium and skin tissue. The experimental results show that, compared with those in the free standing jet state, the length and diameter of APPJ outside nozzle are

increased when Ar APPJ interacts with the culture medium and skin tissue. Besides, the excited particles and reactive species at different positions in the axial direction are basically the same as those in the free standing jet state, only the relative intensity of spectral lines is different. Moreover, the relative intensities of OH radical, the second positive band system of the nitrogen molecule, and the excited state Ar and O atom in the place 15 mm away from nozzle will increase compared with those in the free standing jet state. The numerical simulation results of electric and flow field distribution indicate that, compared with in the free standing jet state, the treated objects with different permittivity and state set outside the quartz tube not only make the applied electric field intensity to be strengthened, but also change the molar concentration distribution of working gas outside the tube. These factors may further change the optical and electrical characteristics of Ar APPJ eventually.

摘要: 为研究皮肤创伤愈合应用中作用对象对大气压等离子体射流(APPJ)特性的影响,研究了 Ar APPJ 分别在自由状态、处理培养液和处理皮肤组织 3 种不同作用状态下的基本光电特性、产生发展过程和发射光谱特性。实验发现相同实验参数的 Ar APPJ 在与培养液和皮肤组织作用时,管外射流的长度和直径均比自由状态下增加;Ar APPJ 在轴向不同位置处的激发态粒子、活性基团种类与自由状态下是基本相同的,仅在谱线的相对强度上有所差别;管外距管口 15 mm 处的射流等离子体中 OH 自由基、第二正带系 N₂、激发态 Ar 和激发态 O 原子相对强度均比自由状态上升高。静电场与流场数值仿真结果表明,与自由状态相比,管口外设置不同介电常数和形态的作用对象,不仅会提高射流管外的外施电场强度,也会改变管外工作气体的摩尔浓度分布,进而引起 Ar APPJ 光电特性的变化。

入藏号: CSCD:6496622

地址: Xu Guimin, School of Electronics and Control Engineering, Changan University;;Xian Jiaotong University, ;;State Key Laboratory of Electrical Insulation and Power Equipment, Xi'an;;Xi'an, ;; 710064;;710049.

Zhang Guanjun, Xian Jiaotong University, State Key Laboratory of Electrical Insulation and Power Equipment, Xi'an, Shaanxi 710049, China.

Yao Congwei, Xian Jiaotong University, State Key Laboratory of Electrical Insulation and Power Equipment, Xi'an, Shaanxi 710049, China.

Shi Xingmin, School of Public Health, Xian Jiaotong University, Xi'an, Shaanxi 710061, China.

Duan Chendong, School of Electronics and Control Engineering, Changan University, Xi'an, Shaanxi 710064, China.

地址: 许桂敏, 长安大学电子与控制工程学院;;西安交通大学, ;;电力设备电气绝缘国家重点实验室, 西安;;西安, ;; 710064;;710049.

张冠军, 西安交通大学, 电力设备电气绝缘国家重点实验室, 西安, 陕西 710049, 中国.

姚聪伟, 西安交通大学, 电力设备电气绝缘国家重点实验室, 西安, 陕西 710049, 中国.

石兴民, 西安交通大学公共卫生学院, 西安, 陕西 710061, 中国.

段晨东, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: gmxu@chd.edu.cn; gjzhang@xjtu.edu.cn

电子邮件地址: gmxu@chd.edu.cn; gjzhang@xjtu.edu.cn

使用次数 (最近 180 天): 0

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作者: Hu Xin; Gao Jiali

作者: 胡欣; 高佳丽

标题: Target tracking algorithm based on improved TLD

标题: 基于改进的 TLD 目标跟踪算法

来源出版物: 计算机应用研究 卷: 36 期: 5 页: 1597-1600 出版年: 2019

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文献类型: Article

作者关键词: TLD algorithm; ViBe algorithm; SIFT feature matching algorithm; tracking drift

作者关键词: TLD 算法; ViBe 算法; SIFT 特征匹配算法; 跟踪漂移

摘要: Aiming at the problems of that the detecting module scans a large number of sub windows, which results the detection time is too long, and when the target has serious occlusion and deformation during the tracking process, the traditional tracking learning detection (TLD) target tracking algorithm will fail to track, so this paper proposed the improved TLD target tracking algorithm. Before the detection module, it added the ViBe model to estimate the foreground target, which greatly reduced the detection area. The tracking module used the SIFT feature matching algorithm to replace the optical flow method in the original algorithm, accurately tracked the target to avoid the tracking drift, reduced the complexity of the calculation and improved the ability of the algorithm to adapt to the environment. The experiment results show that the improved TLD algorithm can improve the running speed, and the tracking accuracy can also be improved when the target is seriously occluded and the light intensity changes dramatically.

摘要: 针对传统跟踪-学习-检测(tracking-learning-detecting, TLD)目标跟踪算法由于检测模块扫描大量窗口而导致检测时间过长, 并且在跟踪过程中当目标发生严重遮挡、形变时, TLD 算法会出现跟踪失败的问题进行了研究, 提出改进 TLD 目标跟踪算法。改进算法在检测模块前加入 ViBe 模型预估前景目标, 极大地缩小了检测区域。追踪模块用 SIFT 特征匹配算法来代替原算法中的光流法, 准确跟踪目标避免发生跟踪漂移, 减少了计算的复杂度, 提高了算法适应环境的能力。实验表明, 改进后的 TLD 算法运行速度得到提升, 并且当目标出现严重遮挡、光照强度剧烈变化时的跟踪精度也得到了很好的改善。

入藏号: CSCD:6484407

地址: Hu Xin, School of Electronics & Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Gao Jiali, School of Electronics & Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 胡欣, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

高佳丽, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: (453316867@qq.com)

电子邮件地址: (453316867@qq.com)

使用次数 (最近 180 天): 0

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作者: Wang Hui Feng; Zhang Jiajia; Zhao Xiangmo; Wei Feiting; Wang Guiping

作者: 王会峰; 张佳佳; 赵祥模; 魏飞婷; 汪贵平

标题: Lane Line Detection and Recognition by Polarisation Imaging

标题: 成像偏振在车道线检测与识别中的应用

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作者关键词: adverse environments; lane line detection; Hough transformation; polarization imaging

作者关键词: 复杂环境; 车道线检测; Hough 变换; 偏振成像

摘要: The detection of lane lines in an adverse environments is a complex and popular topic in both assisted safe driving and intelligent vehicle research. An optical polarization theory was introduced into traditional lane detection technology, aimed at external adverse road environments. In addition, a lane-line detection method was proposed based on imaging polarization by analysing the basic features of the lane line image. Firstly, a three-angle special environment road polarization-image was collected to obtain a polarization degree image. Secondly, the polarization degree images were converted by binarization, divided first into regions of interest, and then according to the straight-line feature of the lane edge before the edge detection of road images were conducted; hence, the actual lane line edge could be obtained. Finally, the improved Hough algorithm proposed through the Hough transform principle could detect the lane marking; and the vehicle driving deflection angle was calculated. The simulation and experimental results demonstrate this method can accurately detect and identify the lane line in an adverse environment with an error of less than 0.3° between the detected and actual declination angle of the lane line.

摘要: 复杂环境下的车道检测是目前智能车和辅助安全驾驶研究的难点和热点.针对外部复杂的道路环境,将光学偏振理论引入传统的车道检测技术,提出了一种基于成像偏振的车道线检测方法.通过对车道线图像基本特征的分析,首先采集 3 个角度的特殊环境道路偏振图像,获得偏振度图像;然后对偏振度图像作二值化和图像感兴趣区域的划分;再根据车道线边缘的直线特性,进行道路图像的边缘检测从而可以获得车道边缘;最后通过 Hough 变换原理提出了改进的 Hough 算法,并得以实现检测出车道标线,计算出汽车行驶偏角.通过仿真和实验验证表明,该方法能够准确地检测和识别出复杂环境下的车道线,车道线的检测偏角与实际偏角之间的误差小于 0.3° .

入藏号: CSCD:6473564

地址: Wang Huifeng, School of Electronic & Control Engineering Changan University;;Road Traffic Intelligent Detection and Equipment Technology Research Center of Shaanxi, ;;Road Traffic Intelligent Detection and Equipment Technology Research Center of Shaanxi, Xian;;Xian, ;; 710064;;710064.

Wang Guiping, School of Electronic & Control Engineering Changan University;;Road Traffic Intelligent Detection and Equipment Technology Research Center of Shaanxi, ;;Road Traffic Intelligent Detection and Equipment Technology Research Center of Shaanxi, Xian;;Xian, ;; 710064;;710064.

Zhang Jiajia, School of Electronic & Control Engineering Changan University, Xian, 710064.

Zhao Xiangmo, School of Electronic & Control Engineering Changan University, Xian, 710064.

Wei Feiting, School of Electronic & Control Engineering Changan University, Xian, 710064.

地址: 王会峰, 长安大学电子与控制工程学院;;陕西省道路交通智能检测与装备工程技术研究中心, ;;陕西省道路交通智能检测与装备工程技术研究中心, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

汪贵平, 长安大学电子与控制工程学院;;陕西省道路交通智能检测与装备工程技术研究中心, ;;陕西省道路交通智能检测与装备工程技术研究中心, 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

张佳佳, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

赵祥模, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

魏飞婷, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: conquest8888@126.com

电子邮件地址: conquest8888@126.com

使用次数 (最近 180 天): 0

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作者: Dai Liang; Mei Yang; Qiao Chao; Meng Yun; Lv Jinming

作者: 代亮; 梅洋; 钱超; 孟芸; 吕金明

标题: Survey on Short-term Traffic Flow Forecasting Based on Deep Learning

标题: 基于深度学习的短时交通量预测研究综述

来源出版物: 计算机科学 卷: 46 期: 3 页: 39-47 出版年: 2019

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作者关键词: 短时交通量预测; 交通控制与管理; 深度学习; 生成型深度结构; 判别型深度结构

摘要: Short-term traffic flow forecasting is a hot topic in the field of intelligent transportation, which is of great significance in traffic control and management. The traditional traffic flow forecasting methods are difficult to describe the internal characteristics of the traffic data accurately. Deep learning can learn the internal complex multivariate coupled structure of the traffic flow data through its deep structure and then make a more accurate forecasting of the traffic flow, which makes deep learning a hot topic in the current traffic flow forecasting field. Firstly, the traditional traffic flow forecasting methods and the current research status of deep learning were briefly introduced. Then the methods of short-term traffic flow forecasting based on deep learning were classified according to generative deep architecture and discriminative deep architecture. This paper also summarized the main methods of deep learning in the field of traffic flow forecasting and compared their performance. Finally, the existing problems and development directions of deep learning in short-term traffic flow forecasting were discussed.

摘要: 短时交通量预测是智能交通领域的研究热点,对交通控制与管理具有重要的意义。传统的交通量预测方法难以准确地描述交通量数据内部的本质特征,而深度学习通过其深层结构,能够学习到交通量数据内部复杂的多因素耦合结构,进而对交通量做出更精准的预测,这也使得深度学习成为当前短时交通量预测领域的研究热点。文中首先介绍了传统交通量预测方法和深度学习的研究现状;然后按照生成型和判别型深度结构对现有基于深度学习的短时交通量预测方法进行分类,并总结了深度学习在短时交通量预测研究领域的主要方法,对其性能进行了对比研究;最后对深度学习在短时交通量预测领域存在的问题和发展趋势进行了探讨。

入藏号: CSCD:6466386

地址: Dai Liang, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Mei Yang, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Qiao Chao, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Meng Yun, School of Electronics and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Lv Jinming, IBM China Systems and Technology Laboratories, Xi'an, Shaanxi 710068, China.

地址: 代亮, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

梅洋, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

钱超, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

孟芸, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

吕金明, IBM 中国系统与科技开发中心, 西安, 陕西 710068, 中国.

电子邮件地址: ldai@chd.edu.cn

电子邮件地址: ldai@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Ru Feng; Xu Jin; Chang Qi; Kan Danhui

作者: 茹锋; 徐锦; 常琪; 阚丹会

标题: High Order Statistics Structured Sparse Algorithm for Image Genetic Association Analysis

标题: 一种用于影像遗传学关联分析的高阶统计量结构化稀疏算法

来源出版物: 计算机科学 卷: 46 期: 4 页: 66-72 出版年: 2019

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来源出版物: Computer Science 卷: 46 期: 4 页: 66-72 出版年: 2019

文献号: 1002-137X(2019)46:4<66:YZYYX>2.0.TX;2-S

语言: Chinese

文献类型: Article

作者关键词: Image genetics; Correlation analysis; Sparse representation; Feature selection; Higher-order statistics

作者关键词: 影像遗传学; 关联分析; 稀疏表示; 特征选择; 高阶统计量

摘要: The development of neuroimaging technology and molecular genetics has produced a large number of imaging genetic data, which has greatly promoted the study of complex mental diseases. However, because the dimensions of the data are too high and the correlation measure is based on the assumption that data obey Gaussian distribution, traditional algorithms often fail to explain the dependencies between two types of data. In order to solve the shortcomings of traditional algorithms, this paper proposed a method for correlation analysis of a large number of SNP and fMRI data. This method guides fused lasso to perform feature selection by constructing a network structure of features, and uses higher-order statistics to extract statistically significant variables. Thus, biomarkers associated with mental illness are identified. The experimental results show that the distribution of typical vector values obtained by the algorithm in simulation data are almost consistent with the real data, and the correlation coefficient obtained is the closest to the

correlation coefficient in the real dataset. The average correlation coefficient of the proposed algorithm is up to 81%, which is about 20% higher than L1-SCCA and about 3% higher than FL-SCCA. Compared with the other two algorithms in real data, the proposed algorithm can find more genes and brain regions that have potential effects on schizophrenia. The experimental results show that the proposed algorithm can effectively identify risk genes and abnormal brain regions within a reasonable time.

摘要: 神经影像技术和分子遗传学的发展产生了大量的影像遗传学数据,极大地促进了复杂精神疾病的研究。但因为该数据的特征维度过高且相关性的度量都是假设数据服从高斯分布,所以传统的算法往往无法很好地解释两类数据之间的依赖关系。为了解决传统算法的问题,文中提出了一种对大量 SNP 和 fMRI 数据进行关联分析的方法,该方法通过构建稀疏的特征网络结构来指导 fused lasso 进行特征选择,与此同时,该方法利用高阶统计量提取出具有统计显著性的变量,从而识别出与精神疾病有关的生物标记物。实验结果表明,在模拟数据中所提算法得到的典型向量值的分布与实际数据中值的分布几乎一致且得到的相关系数与数据集中实际的相关系数最接近,所提算法的平均相关系数最高达到 81%,比 L1-SCCA 提高了约 20%,比 FL-SCCA 提高了约 3%;在真实数据中,相比另外两种算法,所提算法可以找出更多的对精神分裂症有潜在影响的基因与脑区。实验结果证明:该算法可以在合理时间内有效识别出风险基因和异常脑区。

入藏号: CSCD:6466440

地址: Ru Feng, School of Electronic Control, Chang'an University, Xi'an, Shaanxi 710064, China.

Xu Jin, School of Electronic Control, Chang'an University, Xi'an, Shaanxi 710064, China.

Chang Qi, School of Electronic Control, Chang'an University, Xi'an, Shaanxi 710064, China.

Kan Danhui, School of Electronic Control, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 茹锋, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

徐锦, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

常琪, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

阚丹会, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: 35831406@qq.com

电子邮件地址: 35831406@qq.com

使用次数 (最近 180 天): 0

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作者: Duan Chendong; Zhang Rong

作者: 段晨东; 张荣

标题: Locomotive Bearing Fault Diagnosis Using an Improved Empirical Wavelet Transform

标题: 基于改进经验小波变换的机车轴承故障诊断

来源出版物: 中国机械工程 卷: 30 期: 6 页: 631-637 出版年: 2019

文献号: 1004-132X(2019)30:6<631:JYGJJY>2.0.TX;2-G

来源出版物: China Mechanical Engineering 卷: 30 期: 6 页: 631-637 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: empirical wavelet transform(EWT); time-frequency kurtosis spectrum; boundary of sub-band; characteristic frequency; feature extraction

作者关键词: 经验小波变换; 时频峭度谱; 子频带边界; 特征频率; 特征提取

摘要: Locomotive bearings worked in the background of loud noise,it was difficult to extract the fault characteristics effectively.To solve this problem,an EWT was proposed.In order to overcome the problem of noise component interference sub-band divisions in EWT method,an approach was proposed,which used local minimum on a kind of time-frequency kurtosis spectrum of analyzed signals to make the frequency-band partitions,and orthogonal wavelet filter group was constructed based on the sub-bands to perform EWT decomposition.Simulation experiments and engineering applications show that the improved EWT may better overcome the interference of noise components on sub-band divisions,and effectively extract the defect features of locomotive bearings.

摘要: 机车轴承在噪声较大的背景下工作,发生故障时,难以有效地提取其故障特征,针对这一问题,提出了经验小波变换(EWT)方法。为克服经验小波变换方法中噪声分量干扰子频带划分的问题,提出一种采用信号时频峭度谱局部极小值划分频带的方法,基于子频带构造正交小波滤波器组对信号进行 EWT 分解。仿真实验和工程应用表明,改进后的 EWT 能够较好地克服噪声分量对子频带划分的干扰,有效地分离出机车轴承损伤故障的特征。

入藏号: CSCD:6455878

地址: Duan Chendong, School of Electronic &Control Engineering,Changan University, Xian, 710064.

Zhang Rong, School of Electronic &Control Engineering,Changan University, Xian, 710064.

地址: 段晨东, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

张荣, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: cdduan@chd.edu.cn

电子邮件地址: cdduan@chd.edu.cn

使用次数 (最近 180 天): 1

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作者: Meng Yun; Hu Xin; Dai Liang; Yu Lei

作者: 孟芸; 胡欣; 代亮; 余雷

标题: Connectivity Improvement Resource Allocation Algorithm in Interference Vehicular Networks

标题: 干扰车载网络中增强连通性的资源分配算法

来源出版物: 计算机工程与应用 卷: 55 期: 7 页: 9-15,22 出版年: 2019

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文献类型: Article

作者关键词: connectivity; interference vehicular networks; resource allocation; graph theory

作者关键词: 连通性; 干扰车载网络; 资源分配; 图论

摘要: The vehicular networks become denser with the expanding of various services. Therefore, the interference poses a big challenge for the connectivity of network. In the existing works, the connectivity is determined by the signal strength and the distance between the pair of vehicular, where the interference induced by resource allocation has not been considered. Unlike the existing works, in this study, firstly, to represent the influence of the resource and interference on the connectivity, it uses the graph theory to model the connectivity of network, and it gives the definitions of connectivity indices related with resource allocation and interference. Secondly, it analyzes the minimum number of resources that can guarantee the network connectivity by coloring theory. At last, it proposes a resource allocation algorithm based on the minimum spanning tree, which can improve the connectivity in the limited resources. The simulations show that the proposed algorithm can improve the connectivity compared with the comparative algorithm.

摘要: 随着车载网络中各种业务的飞速增长,网络密集程度不断增加,因此,愈发严重的干扰问题对网络的连通性构成了很大的挑战.已有研究中网络的连通性仅由信号强度或车辆之间的距离确定,而没有考虑资源分配引起的干扰对网络连通性的影响.针对这个问题,为了表征网络中资源与干扰对连通性的影响,使用图论对网络连通性进行了建模,定义了与资源分配相关的连通性度量指标;利用染色理论对能够保证网络连通性的所需资源数目的最小值进行了分析;提出了一种基于最小生成树的资源分配算法,以改善网络的连通性.仿真结果证实了相比其他算法,该算法能够提高车载网络的连通性.

入藏号: CSCD:6457836

地址: Meng Yun, School of Electrical and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Hu Xin, School of Electrical and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Dai Liang, School of Electrical and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Yu Lei, School of Electrical and Control Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 孟芸, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

胡欣, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

代亮, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

余雷, 长安大学电子与控制工程学院, 西安, 陕西 710064, 中国.

电子邮件地址: mengyun@chd.edu.cn

电子邮件地址: mengyun@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

引用的参考文献数: 23

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作者: Yu Lei; Ma Shengtao; Yang Jie; Kang Yuan

作者: 余雷; 马生涛; 杨杰; 康缘

标题: Research and analysis of VMS location based on improved genetic algorithm

标题: 基于改进遗传算法的 VMS 选址研究与分析

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作者关键词: intelligent transportation; VMS optimal layout; genetic algorithm; road network; traffic induction

作者关键词: 智能交通; 可变信息板最优布局; 遗传算法; 路网; 交通诱导

摘要: For the intelligent traffic guidance system in the domestic application of immature, this paper used the improved genetic algorithm to optimize the location of VMS in the road network, and improved the coding method and selection method in the basic genetic algorithm. At the same time, it used the dynamic decay mutation probability to perform the mutation operation, used the multi-objective optimization to simulate the multi-objective function, and introduced the attenuation influence factor for the different degree of VMS on the downstream of the road segment. Then, it carried out the VMS layout simulation test with the complex virtual road network as the simulation example. The results show that the method uses VMS utility and economic cost as the evaluation index, it can achieve the optimal distribution of VMS site in the traffic network and the purpose of saving resources, which has certain scientificity and practicability.

摘要: 针对智能交通诱导系统在国内应用的不成熟, 采用改进型遗传算法对可变信息板(VMS)在路网中的布点位置进行了全局索优, 对基本遗传算法中的编码方式、选择方法进行了改进, 同时采用动态衰减变异概率进行变异操作, 并运用多目标优化算法将多目标函数单一化, 针对

某一路段上的 VMS 对该路段下游不同位置的影响程度的不同,引入衰减影响因子;然后以复杂虚拟路网为仿真实例进行了 VMS 布局仿真检验。结果表明,该方法以 VMS 效用和经济成本为评价指标,较好地实现了交通路网中 VMS 选址的最优分布,同时达到了节约资源的目的,具有一定的科学性和实用性。

入藏号: CSCD:6432594

地址: Yu Lei, College of Electronics & Control Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Ma Shengtao, College of Electronics & Control Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Yang Jie, College of Electronics & Control Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

Kang Yuan, College of Electronics & Control Engineering, Chang'an University, Xi'an, Shaanxi 710054, China.

地址: 余雷, 长安大学电子与控制工程学院, 西安, 陕西 710054, 中国.

马生涛, 长安大学电子与控制工程学院, 西安, 陕西 710054, 中国.

杨杰, 长安大学电子与控制工程学院, 西安, 陕西 710054, 中国.

康缘, 长安大学电子与控制工程学院, 西安, 陕西 710054, 中国.

电子邮件地址: 848563535@qq.com

电子邮件地址: 848563535@qq.com

使用次数 (最近 180 天): 0

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工程机械学院

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作者: Zhang Qingzhe; Wang Yong

作者: 张青哲; 王勇

标题: Binocular Stereo Vision Calibration Accuracy Evaluation Using Epipolar Constraint

标题: 基于对极约束的双目立体视觉标定精度评价方法

来源出版物: 激光与光电子学进展 卷: 56 期: 23 出版年: 2019

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作者关键词: machine vision; stereo vision; camera calibration; epipolar constraint; accuracy

evaluation

作者关键词: 机器视觉; 立体视觉; 摄像机标定; 对极约束; 精度评价

摘要: The accuracy of binocular stereo vision calibration obtained using the mean of total residuals of left and right images is unsatisfactory. To overcome this limitation, this study proposes a method for evaluating the accuracy of binocular stereo vision calibration based on the epipolar constraint. The proposed method considers the constraint relationship between left and right image features in binocular stereo vision and global characteristics of camera calibration parameters. Based on the principle of minimum matching cost, a stereo feature matching method based on scale-invariant feature transform is used for corner detection and matching. The accuracy of binocular stereo vision calibration is evaluated based on the matching degree of measured corner points on the left and right image planes with their corresponding epipolar lines on the relative image plane. This proposed algorithm is added to the calibration algorithm to realize real-time evaluation of camera calibration accuracy during the calibration experiment. Experiments demonstrate that the proposed method is more accurate than the method using the mean of residuals, with accuracy increased by up to 54.0%.

摘要: 为解决现有利用左右图像总残差的均值来评价双目立体视觉标定不够精确的问题,提出一种基于对极约束的双目立体视觉标定精度评价方法。该方法充分考虑双目立体视觉中左右图像特征的约束关系及相机标定参数的全局性特征。遵循最小匹配代价原则,该方法利用尺度不变特征变换立体特征匹配法来进行角点检测和匹配。通过左右图像平面上实测角点与其在相对图像平面上对应极线的匹配程度来评价双目立体视觉标定精度,并将这种算法加入到标定算法中,实现了在标定实验过程中对相机标定精度的实时评价。实验表明,该方法比总残差均值法精度更高,精度最高提高了 54.0%。

入藏号: CSCD:6646911

地址: Zhang Qingzhe, Chang'an University, Key Laboratory of Road Construction & Equipment, Ministry of Education, Xi'an, Shaanxi 710064, China.

Wang Yong, Chang'an University, Key Laboratory of Road Construction & Equipment, Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 张青哲, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

王勇, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: zqzh@chd.edu.cn

电子邮件地址: zqzh@chd.edu.cn

使用次数 (最近 180 天): 0

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第 2 条, 共 24 条

作者: Zhang Chunguo; Liu Qiankun; Li Guangshang; Liu Rongwei

作者: 张春国; 刘乾坤; 李光尚; 刘荣伟

标题: Effect of Prefabricated Crack Arrest Line on Fatigue Crack Growth Behavior of Industrial Pure Iron DT4C

标题: 预制止裂线对 DT4C 工业纯铁疲劳裂纹扩展行为的影响

来源出版物: 机械工程材料 卷: 43 期: 12 页: 7-11,18 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: fatigue fracture; fatigue crack growth; crack arrest line; stress distribution

作者关键词: 疲劳断口; 疲劳裂纹扩展; 止裂线; 应力分布

摘要: According to the ANSYS simulation, the size of the prefabricated straight-circles shaped crack arrest line on the fatigue crack growth path was determined. Standard extended compact tensile specimens were sampled from industrial pure iron DT4C, and then crack arrest lines were prefabricated at different distances from the root of the U-shaped notch (L_a was 6.4, 7.0, 7.6 mm, respectively). The effect of L_a on the fatigue crack growth behavior of specimens was studied by fatigue crack growth tests and fatigue fracture surface analysis. The results show that when L_a was 7.6 mm, the introduction of crack arrest line reduced the stress at the crack tip and prolonged the fatigue life of the specimen. Before the crack tip reached the arrest crack line position, the introduction of the crack arrest line at L_a of 6.4 mm improved the crack growth rate, while that at L_a of 7.6 mm reduced the crack growth rate. After the fatigue crack tip passed through the crack arrest line position, the crack growth rates of all the specimens with crack arrest line decreased significantly. The crack growth zone of specimens without and with crack arrest lines showed fatigue striation characteristics and the instantaneous fracture zone showed dimple fracture characteristics.

摘要: 借助 ANSYS 仿真结果, 确定在疲劳裂纹扩展路径上预制直线-圆形止裂线的尺寸; 在 DT4C 工业纯铁上加工出标准扩展紧凑拉伸试样, 在距其 U 型切口根部不同距离 (L_a 分别为 6.4, 7.0, 7.6 mm) 处预制止裂线, 通过疲劳裂纹扩展试验及疲劳断口分析, 研究了 L_a 对试样疲劳裂纹扩展行为的影响。结果表明: 当 L_a 为 7.6 mm 时, 止裂线的引入降低了裂纹尖端的应力, 延长了试样的疲劳寿命; 在裂纹尖端到达止裂线位置之前, 当 L_a 为 6.4 mm 时, 止裂线的引入提高了裂纹扩展速率, 而当 L_a 为 7.6 mm 时则降低了试样的裂纹扩展速率; 在裂纹尖端穿过止裂线位置之后, 含止裂线试样的裂纹扩展速率均明显降低; 不含止裂线和含止裂线试样的裂纹扩展区呈现疲劳辉纹特征, 瞬断区呈现韧窝断裂特征。

入藏号: CSCD:6641446

地址: Zhang Chunguo, Chang'an University, Key Laboratory of Road Construction Technology and Equipment, MOE, Xi'an, Shaanxi 710064, China.

Liu Qiankun, Chang'an University, Key Laboratory of Road Construction Technology and Equipment, MOE, Xi'an, Shaanxi 710064, China.

Li Guangshang, Chang'an University, Key Laboratory of Road Construction Technology and Equipment, MOE, Xi'an, Shaanxi 710064, China.

Liu Rongwei, Chengde Petroleum College, Chengde, Hebei 067000, China.

地址: 张春国, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

刘乾坤, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

李光尚, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

刘荣伟, 承德石油高等专科学校, 承德, 河北 067000, 中国.

使用次数 (最近 180 天): 0

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第 3 条, 共 24 条

作者: Chen Guang; Lyu Pengmin; Li Yao; Li Xin

作者: 陈光; 吕彭民; 李瑶; 李欣

标题: A equivalent method for fatigue test load of excavator working device's bench

标题: 挖掘机工作装置台架疲劳试验载荷等效方法研究

来源出版物: 制造业自动化 卷: 41 期: 10 页: 1-5,16 出版年: 2019

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来源出版物: Manufacturing Automation 卷: 41 期: 10 页: 1-5,16 出版年: 2019

文献号: 1009-0134(2019)41:10<1:WJGZZ>2.0.TX;2-L

语言: Chinese

文献类型: Article

作者关键词: 挖掘机工作装置; 疲劳试验方法; 载荷等效; 疲劳可靠性试验; 疲劳寿命预测

摘要: 以挖掘机工作装置为研究对象,提出了一种考虑分段载荷均值特性的挖掘机工作装置台架疲劳试验方法,确定了疲劳试验姿态、试验等效载荷及试验载荷加载方式。首先,选取粘土、重粘土、密实硬土三类典型介质进行载荷采集试验,根据挖掘机实际载荷特性,分别对挖掘、提升回转、卸载、返回四个实际工况进行了平稳性检验。其次,选取挖掘阶段溢流阀打开时刻对应的实测油缸位移均值作为台架疲劳试验的加载姿态,通过调整斗尖当量载荷方向使各大应力点当量应力与实测应力误差最小的方法确定加载方向。最后,由力与应力之间的关系计算得斗尖等效载荷,并通过各测点等效应力与实测应力对比验证了该方法的合理性。这种台架试验载荷等效方法为挖掘机工作装置载荷谱疲劳可靠性试验及疲劳寿命预测提供参考。

入藏号: CSCD:6588390

地址: Chen Guang, 710064.

Lyu Pengmin, 710064.

Li Yao, 710064.

Li Xin, 710064.

地址: 陈光, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

吕彭民, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

李瑶, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

李欣, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

使用次数 (最近 180 天): 0

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第 4 条, 共 24 条

作者: Han Gongle; Zhang Jiexin; Zhang Fuqiang

作者: 韩共乐; 张接信; 张富强

标题: An improved flower pollination algorithm based on AGV localization in RFID scenes

标题: 一种基于 RFID 场景布局的 AGV 改进花朵授粉定位算法

来源出版物: 制造业自动化 卷: 41 期: 9 页: 68-72 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: RFID

作者关键词: AGV 定位; 花朵授粉算法

摘要: AGV(Automated Guided Vehicle)定位技术是推动网络协同制造和智能工厂建设的重点研究问题之一。结合 RFID(Radio Frequency Identification)技术,提出了一种新型的 AGV 定位算法。首构建了基于 RFID 场景布局的 AGV 定位模型;其次依据室内环境下 RFID 信号衰减与距离的传播模型初步估计待定位的 AGV 到 4 个读写器的距离;然后用改进花朵授粉算法精确计算 AGV 上电子标签的坐标,实现 AGV 的定位。最后,通过实例对模型进行分析验证。结果表明,与基本花朵授粉算法相比,改进花朵授粉算法收敛速度更快,迭代次数少,可以较好满足 AGV 精确定位的要求。

入藏号: CSCD:6569080

地址: Han Gongle, 710064.

Zhang Jiexin, 710064.

Zhang Fuqiang, 710064.

地址: 韩共乐, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

张接信, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

张富强, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

使用次数 (最近 180 天): 0

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第 5 条, 共 24 条

作者: Chen Shibin; Yuan Yongqiang; Yao Yunshi; Gao Feng; Zhang Liangqi

作者: 陈世斌; 袁永强; 姚运仕; 高峰; 张良奇

标题: Test on strengthening interlayer cohesion of semi-rigid base asphalt pavement by interlayer treatment

标题: 半刚性基层沥青路面层间处治增强黏结力的试验

来源出版物: 长安大学学报. 自然科学版 卷: 39 期: 4 页: 44-51 出版年: 2019

文献号: 1671-8879(2019)39:4<44:BGXJCL>2.0.TX;2-E

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文献号: 1671-8879(2019)39:4<44:BGXJCL>2.0.TX;2-E

语言: Chinese

文献类型: Article

作者关键词: road engineering; semi-rigid asphalt pavement; base treatment; bonding force; pits

作者关键词: 道路工程; 半刚性沥青路面; 基层处治; 黏结力; 凹坑

摘要: In order to improve the interlayer cohesion between cement stabilized macadam and asphalt layer in semi-rigid asphalt pavement, a new method of interlayer treatment by introducing regular pits on the surface of semi-rigid cement stabilized macadam base course was proposed. The standard size die combined with hydrostatic forming method was used to form the regular pits on base course, and the semi-rigid base asphalt pavement was finally formed by the die integration. The stress properties of the samples were tested by shear stress and pulling stress equipment, then the new treatment methods and traditional treatment methods were compared. The results show that the designed forming method can effectively form semi-rigid cement stabilized macadam base and semi-rigid base asphalt pavement with regular pits on the surface. The maximum interlayer shear stress of the pavement with 9 pits of diameter is 18mm ($\Phi 18$) on the base is 5.2% higher than that of the milling process, and the maximum pulling stress is increased by 7.39%. The maximum interlayer shear stress is 41.05% higher than the base course with oil permeable layer, and the maximum pulling stress is increased by 29.51%. The maximum interlayer shear stress is 71.65% higher than that of the untreated base course, and the maximum pulling stress is increased by 80.38%. The maximum shear force of the base course with 12 pits is 22.72% higher than that of 4 pits, and the maximum pulling force is increased by 23.2%, the maximum interlayer shear force of the base course with 9 pits of $\Phi 18$ mm is 43.4% higher than that of 9 pits of $\Phi 8$ mm, and the maximum pulling stress is increased by 35.87%. Increasing size and number is equivalent to increasing friction coefficient and rivet resistance, which can improve mechanical property efficiency. With the change of the pavement temperature, the maximum shear force of the pavement treated with pits changes little, which enhances the fatigue strength of the

pavement. Compared with the traditional interlayer treatment method, the semi-rigid cement stabilized macadam base treated by pits can effectively improve the shear strength, pulling strength and fatigue strength of the pavement under external loads. This method can provide a reference for engineering treatment of the base course. 4 tabs, 7 figs, 25 refs.

摘要: 为提高半刚性沥青路面中水泥稳定碎石基层和沥青层的层间黏结力, 提出一种在半刚性水泥稳定碎石基层表面引入规则凹坑的层间处治新方法。采用标准尺寸的模具结合静压成型法, 成型具有规则凹坑的基层表面, 再整体成型半刚性基层沥青路面, 采用剪应力和拉拔应力测试设备对试验样本进行最大应力测试, 并对半刚性水泥稳定碎石基层处治凹坑后成型的沥青路面与传统的层间处治方法进行比较。研究表明: 所设计的成型方法能高效成型表面有规则凹坑的半刚性基层及半刚性基层沥青路面。处治 9 个直径 18mm(Φ 18)凹坑的路面层间最大剪应力比精铣刨工艺时所受剪应力提高 5.2%, 最大拉拔力提高 7.39%; 比喷洒透油层时最大剪应力提高 41.05%, 最大拉拔力提高 29.51%; 比未处治时最大剪应力提高 71.65%, 最大拉拔力提高 80.38%。路面处治 12 个凹坑的最大剪应力比 4 个凹坑时提高 22.72%, 最大拉拔力提高 23.2%; 9 个 Φ 18 凹坑比 9 个 Φ 8 凹坑承受的层间最大剪应力增加 43.4%, 最大拉拔力增加 35.87%, 增加凹坑的尺寸和个数均可等效于增加了其摩擦因数和铆锁抵抗力, 具有提高力学性能的效果。当路面的环境温度变化时, 采用凹坑处治的路面承受的层间最大剪应力变化最小, 增强了环境变化下抗疲劳强度能力。与传统的层间处治方法相比, 通过对半刚性水泥稳定碎石基层处治凹坑后成型的沥青路面能有效提高路面在外载荷下的抗剪强度、抗拉拔强度及抗疲劳强度能力, 该方法可为半刚性基层层间工程化处治提供借鉴。

入藏号: CSCD:6555490

地址: Chen Shibin, Chang'an University, Key Laboratory of Road Construction Technology and Equipment, Ministry of Education, Xi'an, Shaanxi 710064, China.

Yuan Yongqiang, Chang'an University, Key Laboratory of Road Construction Technology and Equipment, Ministry of Education, Xi'an, Shaanxi 710064, China.

Gao Feng, Chang'an University, Key Laboratory of Road Construction Technology and Equipment, Ministry of Education, Xi'an, Shaanxi 710064, China.

Yao Yunshi, Chang'an University;; Henan Wanli Transportation Science & Technology Group Co., Ltd., Key Laboratory of Road Construction Technology and Equipment, Ministry of Education;; Xi'an;; Xuchang, Shaanxi;; Henan 710064;; 461000.

Zhang Liangqi, Henan Wanli Transportation Science & Technology Group Co., Ltd., Xuchang, Henan 461000, China.

地址: 陈世斌, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

袁永强, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

高峰, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

姚运仕, 长安大学;; 河南万里交通科技股份有限公司, 道路施工技术与装备教育部重点实验室;; 西安;; 许昌, 陕西;; 河南 710064;; 461000, 中国.

张良奇, 河南万里交通科技股份有限公司, 许昌, 河南 461000, 中国.

电子邮件地址: sbchen@chd.edu.cn; yaoy@chd.edu.cn

电子邮件地址: sbchen@chd.edu.cn; yaoy@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Shao Yuhong; Wang Binhua; Lu Qiang

作者: 邵雨虹; 王斌华; 芦强

标题: Research on bolt group bearing capacity of trussed girder of movable scaffolding system passing through piers

标题: 造桥机过孔状态下桁架导梁螺栓群的分析研究

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文献号: 1009-0134(2019)41:7<125:ZQJGKZ>2.0.TX;2-4

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语言: Chinese

文献类型: Article

作者关键词: 移动模架; 桁架导梁; 螺栓群; 有限元分析; 螺栓承载力

摘要: 移动模架是用于现场浇筑桥梁的大型施工机械, 必须保证设备运行安全性. 利用大型有限元分析软件 ANSYS 建立了移动模架开模状态的有限元模型, 针对移动模架过孔工况进行了仿真模拟, 通过改变支撑约束位置模拟设备过孔运动, 利用板壳单元和约束方程模拟螺栓群构造, 分析获得了各螺栓的承载力历程. 分析结果表明: 提出的移动模架有限元建模方法可有效模拟设备过孔工况, 并分析获得各螺栓承载力历程; 螺栓群中各螺栓承载力存在显著的非均匀承载现象, 因此通过有限元模拟导梁螺栓群以评估螺栓极限载荷对螺栓群设计具有重要意义; 分析结果验证了该设备的导梁螺栓群设置的合理性, 也为同类型设备提供了参考.

入藏号: CSCD:6532537

地址: Shao Yuhong, 710064.

Wang Binhua, 710064.

Lu Qiang, 730070.

地址: 邵雨虹, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

王斌华, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

芦强, 中航工业兰州万里航空机电有限责任公司, 兰州, 甘肃 730070, 中国.

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第 7 条, 共 24 条

作者: Cao Leilei; Cao Lulu; Liu Kui; Gu Yufeng; Bai Jie

作者: 曹蕾蕾; 曹露露; 刘奎; 古玉锋; 白杰

标题: Reliability Evaluation of Loader Drive Axle Based on GM- Bootstrap Method Under Extreme Small Samples

标题: 极小子样下基于 GM-Bootstrap 方法的装载机驱动桥可靠性评估

来源出版物: 机械设计与研究 卷: 35 期: 3 页: 150-154 出版年: 2019

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文献类型: Article

作者关键词: extreme small sample; fatigue reliability; grey model(GM); bootstrap method; loader driving axle

作者关键词: 极小子样; 疲劳可靠性; 灰色模型(GM); Bootstrap 方法; 装载机驱动桥

摘要: As a large scale complicated structural component, it is difficult to do full- scale- fatigue test on the loader driving axle due to high cost, so the extreme small sample size can hardly meet the statistical requirements of traditional methods. In this paper, a GM- Bootstrap combined method was proposed to estimate the extremely small scale sample fatigue test. First, the sample size was expanded by using the GM prediction model, and then Bootstrap method was used to evaluate the fatigue reliability of the expanded sample. The reliability evaluation of loader drive axle was conducted by the proposed method and semi empirical method. The results verify the feasibility and reliability of the proposed method. Moreover, it provides a new way for reliability evaluation of high cost large scale complicated structural component.

摘要: 装载机驱动桥作为大型复杂结构件, 进行足尺疲劳试验成本高且子样数少, 无法满足经典统计方法样本容量的要求。为此, 提出一种针对极小子样试验的 GM-Bootstrap 组合评估方法。先利用 GM 预测模型对小子样试验的试验样本进行扩充, 再采用 Bootstrap 方法对扩充后的样本进行评估, 得到未知参数的估计。通过 GM- Bootstrap 方法对装载机驱动桥可靠性评估结果与半经验法的结果对比, 验证了该方法的可行性和评估结果的可靠性, 为成本昂贵的大型复杂结构件的可靠性评估问题提供了一种新的途径。

入藏号: CSCD:6520356

地址: Cao Leilei, Chang'an University, Key Laboratory for Road Construction Technology & Equipment, Xi'an, Shaanxi 710064, China.

Cao Lulu, Chang'an University, Key Laboratory for Road Construction Technology & Equipment, Xi'an, Shaanxi 710064, China.

Liu Kui, Chang'an University, Key Laboratory for Road Construction Technology & Equipment, Xi'an, Shaanxi 710064, China.

Gu Yufeng, Chang'an University, Key Laboratory for Road Construction Technology & Equipment, Xi'an, Shaanxi 710064, China.

Bai Jie, Chang'an University, Key Laboratory for Road Construction Technology & Equipment, Xi'an, Shaanxi 710064, China.

地址: 曹蕾蕾, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

曹露露, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

刘奎, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

古玉锋, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

白杰, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: caoleilei@chd.edu.cn

电子邮件地址: caoleilei@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Pang Liye; Lyu Pengmin; Xiang Qingyi; Huang Binglei; Li Yao

作者: 庞利叶; 吕彭民; 向清怡; 黄炳雷; 李瑶

标题: Fatigue life evaluation of hydraulic excavators bucket rod based on hot spot stress method

标题: 基于热点应力法的液压挖掘机斗杆疲劳寿命评估

来源出版物: 制造业自动化 卷: 41 期: 6 页: 8-11 出版年: 2019

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语言: Chinese

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作者关键词: 液压挖掘机斗杆; 有限元分析; 热点应力法; 疲劳寿命评估

摘要: 由于挖掘机的工作载荷复杂多变,易造成斗杆疲劳破坏,以某中型液压挖掘机斗杆为研究对象,采用热点应力法对斗杆进行疲劳寿命评估。通过有限元仿真结果,确定了斗杆上翼板油缸座焊趾处为危险部位,并对油缸座焊趾处进行了疲劳强度分析,发现各热点位置处的等效时间从中间到两边逐渐增大且焊趾处最外侧 2 个热点位置处的等效工作时间分别为 8250 小时和 8190 小时。通过斗杆疲劳台架试验可知,疲劳破坏位置与分析位置相一致,斗杆油缸座焊趾处两侧出现可见裂纹的等效工作时间为 9870 小时,两者时间基本一致。因此,热点应力法适用于斗杆疲劳寿命评估,且精度较高。

入藏号: CSCD:6515674

地址: Pang Liye, 710064.

Lyu Pengmin, 710064.

Xiang Qingyi, 710064.

Huang Binglei, 710064.

Li Yao, 710064.

地址: 庞利叶, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

吕彭民, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

向清怡, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

黄炳雷, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

李瑶, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

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作者: Wan Yipin; Song Xuding; Yu Luping; Yuan Zhengwen

作者: 万一品; 宋绪丁; 郁录平; 员征文

标题: Load Identification Model and Measurement Method of Loader Working Device

标题: 装载机工作装置载荷识别模型与载荷测取方法

来源出版物: 振动、测试与诊断 卷: 39 期: 3 页: 582-589 出版年: 2019

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来源出版物: Journal of Vibration, Measurement and Diagnosis 卷: 39 期: 3 页: 582-589 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: loader; working device; load identification model; load measurement method

作者关键词: 装载机; 工作装置; 载荷识别模型; 载荷测取

摘要: The characteristics of the load and the change of the external load of the loader working device are studied. First, the external load identification model is established according to the relationship between the bucket hinge point force and the bucket tip force. Then, the three direction force pin sensor method and the boom section moment method are proposed. The load verification and dynamic load test of iron ore material are carried out on the prototype of the LW900K loader. The results show that the hinge point force could be gained accurately by these two methods, and the accuracy of the boom section moment test results is lower than that of the pin shaft sensor. Under the test equipment of iron ore material, the load of the working device appears in the time of digging and unloading materials. For the first time, the inertial impact load of LW900K loader is obtained through the test, and the peak load is about 400kN. The relationship

between the mean, amplitude and frequency of the resultant force of the working device is obtained by the rain flow counting method. It is found that the distributions of load mean and amplitude obey normal distribution and Weibull distribution with three-parameter respectively. The load identification model could effectively solve the problem of the external load acquisition difficulty of loader working device, and the load time history data could be used as reference for the load spectrum and the analysis of the structural fatigue characteristics.

摘要: 为了研究装载机铲装作业时所受外载荷大小及变化特性,根据铲斗铰点力与斗尖力关系建立工作装置外载荷识别模型。以国产 LW900K 装载机为试验样机,提出了三向力销轴传感器法和动臂截面弯矩法两种载荷制取方法,进行典型作业姿态下的载荷验证和铁矿粉物料下的载荷测试试验。结果表明:提出的三向力销轴传感器法和动臂截面弯矩法都能够准确获取外载荷识别所需要的铰点载荷,销轴传感器法结果精度高于动臂截面弯矩法;试验样机工作装置所受大载荷出现在物料铲掘和卸载时刻,测得卸料时的惯性冲击载荷峰值约为 400kN;通过雨流计数得到外载荷合力的均值服从正态分布,幅值服从三参数威布尔分布。载荷测试和分析结果能够有效解决装载机工作装置外载荷难以获取的问题,为载荷谱编制和疲劳特性分析提供依据。

入藏号: CSCD:6514862

地址: Wan Yipin, Chang'an University, The Key Laboratory of Road Construction Technology and Equipment of MOE, Xi'an, 710061.

Song Xuding, Chang'an University, The Key Laboratory of Road Construction Technology and Equipment of MOE, Xi'an, 710061.

Yu Luping, Chang'an University, The Key Laboratory of Road Construction Technology and Equipment of MOE, Xi'an, 710061.

Yuan Zhengwen, Engineering Machinery Research Institute of Xuzhou Construction Machinery Group, Xuzhou, Jiangsu 221004, China.

地址: 万一品, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710061, 中国.

宋绪丁, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710061, 中国.

郁录平, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710061, 中国.

员征文, 徐工集团江苏徐州工程机械研究院, 徐州, 江苏 221004, 中国.

电子邮件地址: wyipin@chd.edu.cn

电子邮件地址: wyipin@chd.edu.cn

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作者: Dong Wu; Xie Shiyuan; Zhao Lijun; Feng Zhongxu

作者: 董武; 谢诗元; 赵利军; 冯忠绪

标题: Influence of Vibration on Mixing Process of Cement Stabilized Macadam and Its Performance

标题: 振动对水泥稳定碎石搅拌过程和性能的影响

来源出版物: 中国公路学报 卷: 32 期: 5 页: 181-190 出版年: 2019

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文献号: 1001-7372(2019)32:5<181:ZDDSNW>2.0.TX;2-#

语言: Chinese

文献类型: Article

作者关键词: mechanical engineering; cement stabilized macadam mixture; vibratory mixing; mixing power; unconfined compressive strength; drying shrinkage coefficient

作者关键词: 机械工程; 水泥稳定碎石; 振动搅拌; 搅拌功率; 无侧限抗压强度; 干缩系数

摘要: In order to study the influence of vibration on the mixing process and performance of cement stabilized macadam, the mixing power curves of different mixing methods were tested based on the rheological behavior of cement stabilized macadam at different stages in the mixing process. On this basis, comparative tests of vibration mixing and conventional mixing were carried out using C-B-1 and C-B-3 cement stabilized macadam mixtures with different cement dosage, and the effects of vibration on the compressive strength, microstructure, and dry shrinkage properties of cement stabilized macadam were analyzed. The results show the following: The mixing process of cement stabilized macadam can be divided into the dry mixing stage, homogeneous dispersion stage of each component, coarse aggregate coating stage, and homogeneous mixing stage according to the inflection point of the changing trend of mixing power; the mixtures change from elastomer to visco-elastic body with some plasticity; the vibration force can reduce the internal friction between the components of the mixture; the mixing power is 9.1%-15.2% lower; the vibration mixing accelerates the mixing process of each component in the uniform dispersion stage; and the wet mixing time is 37.5% shorter. Compared with conventional mixing, vibration mixing improves the uniformity of the cement stabilized macadam mixture. The microstructure is uniform and dense, which causes the material to have higher compressive strength and smaller strength variability. It is concluded that there is a linear positive correlation between the cement dosage of the mixtures in different mixing methods at the same strength standard, the cement savings are linearly and positively correlated with the cement dosage, and the cement savings rate is inversely proportional to the cement dosage. The cement savings achieved by vibration mixing increases with increase in cement content in the mixture. With vibration mixing, the average maximum dry shrinkage strain of C-B-1 mixtures with 5.0% cement dosage is 20.4% less, the average dry shrinkage coefficient is 18.7% less, and the variability of dry shrinkage coefficient is smaller, compared to conventional mixing.

摘要: 为了研究振动对水泥稳定碎石搅拌过程及其性能的影响规律,通过对不同搅拌方式搅拌功率曲线的测试,结合水泥稳定碎石在搅拌过程中不同阶段的流变状态,分析振动对水泥稳定碎石搅拌过程的影响。在此基础上采用不同水泥掺量的 C-B-1 型和 C-B-3 型水泥稳定碎石混合料,开展振动搅拌与常规搅拌的对比试验,分析振动对水泥稳定碎石抗压强度、微观结构、干缩性能的影响。结果表明:水泥稳定碎石搅拌过程可根据搅拌功率变化趋势的拐点分为干拌阶段、弥散阶段、裹覆阶段和均匀阶段,混合料逐渐从弹性体转变为具有一定塑性的黏-弹

性体;振动能量能减小混合料各组份间的内摩擦力,搅拌功率比常规搅拌方式低 9.1%~15.2%,振动加快了各组份弥散阶段的搅拌过程,湿拌时间缩短了 37.5%;与常规搅拌相比振动搅拌改善了水泥稳定碎石混合填充料的均匀性,微观结构均匀且致密,有更多的 C-S-H 凝胶使其抗压强度更高且强度变异系数更小;同强度标准时不同搅拌方式混合料水泥用量呈线性正相关,水泥节约量与水泥用量呈线性正相关,水泥节约率与水泥用量成反比例函数关系;振动搅拌混合料节约的水泥量随水泥用量的增加而增多;振动搅拌水泥掺量为 5%的 C-B-1 型混合料时其平均最大干缩应变要比常规搅拌的少 20.4%,平均干缩系数少 18.7%,且干缩系数变异性更小。

入藏号: CSCD:6490487

地址: Dong Wu, Chang'an University, Key Laboratory of Highway Construction Technology and Equipment of Ministry of Education, Xi'an, Shaanxi 710064, China.

Zhao Lijun, Chang'an University, Key Laboratory of Highway Construction Technology and Equipment of Ministry of Education, Xi'an, Shaanxi 710064, China.

Feng Zhongxu, Chang'an University, Key Laboratory of Highway Construction Technology and Equipment of Ministry of Education, Xi'an, Shaanxi 710064, China.

Xie Shiyuan, CCCC Road Engineering and Disaster Prevention Research Institute, Xi'an, Shaanxi 710065, China.

地址: 董武, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

赵利军, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

冯忠绪, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

谢诗元, 中交第一公路勘察设计研究院有限公司, 西安, 陕西 710065, 中国.

电子邮件地址: comdw@chd.edu.cn; 354106475@qq.com

电子邮件地址: comdw@chd.edu.cn; 354106475@qq.com

使用次数 (最近 180 天): 0

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作者: Xu Yuanbo; Cai Zongyan; Ding Kai

作者: 徐元博; 蔡宗琰; 丁凯

标题: Bearing fault detection based on an analytic energy operator of symmetrical differencing under complex background

标题: 复杂背景下对称差分解析能量算子在轴承故障诊断中的应用

来源出版物: 振动与冲击 卷: 38 期: 8 页: 246-254 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: fault diagnosis; rolling bearing; energy operator of symmetrical differencing; analytic energy operator of symmetrical differencing

作者关键词: 故障诊断; 滚动轴承; 对称差分能量算子; 对称差分解析能量算子

摘要: An alternative energy operator, analytic energy operator of symmetrical differencing was proposed. The improved demodulation technique was developed based on the energy operator of symmetrical differencing. The energy operator of symmetrical differencing is sensitive to noise and vibration interferences, so its application is limited in some fields. However, the analytic energy operator of symmetrical differencing is able to detect the weak fault signatures from the heavily contaminated signals. Thus, it is more robust than the energy operator of symmetrical differencing. The results of simulation test and bearing fault experiments demonstrate that the novel method can effectively extract fault features, certifying its superiority in comparison with previous methods. Therefore, it is likely to be useful and practical in the fault detection area, especially under the condition of strong noise and vibration interferences.

摘要: 针对对称差分能量算子对噪声和振动干扰较为敏感的不足,在其基础上提出了对称差分解析能量算子。对称差分解析能量算子在很大程度上克服了噪声和振动干扰的影响,能从重度污染的信号中提取出微弱的故障信号频率,因此具有更强的鲁棒性。将该方法应用于模拟实验和真实轴承故障诊断实验中,并且与对称差分能量算子和传统能量算子进行对比,该方法取得了良好的诊断效果,体现了优越性。将该方法应用于故障诊断领域,尤其是工作背景复杂的环境下,有着很大的实际意义。

入藏号: CSCD:6483770

地址: Xu Yuanbo, Chang'an University, Key Laboratory of Road Construction & Equipment of MOE, Xi'an, Shaanxi 710064, China.

Cai Zongyan, Chang'an University, Key Laboratory of Road Construction & Equipment of MOE, Xi'an, Shaanxi 710064, China.

Ding Kai, Chang'an University, Key Laboratory of Road Construction & Equipment of MOE, Xi'an, Shaanxi 710064, China.

地址: 徐元博, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

蔡宗琰, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

丁凯, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

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作者: Wan Yipin; Song Xuding; Chen Lele; Zhang Lei

作者: 万一品; 宋绪丁; 陈乐乐; 张磊

标题: RESEARCH ON LOAD TEST AND SPECTRUM COMPILATION METHOD OF
LOADER CONNECTING ROD

标题: 装载机连杆载荷测试与载荷谱编制方法研究

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文献类型: Article

作者关键词: Loader; Connecting rod; Load test; Spectrum compilation

作者关键词: 装载机; 连杆; 载荷测试; 载荷谱编制

摘要: In order to study the load test and load spectrum for fatigue reliability test of loader connecting rod,a method of connecting rod load test and load spectrum is presented.A kind of sensor is designed to measure the force of the connecting rod.The test experiment was carried out in primary stone,clay,sand and small stone under the conditions of these 4 kinds of material.By using the method of peak valley extraction and wavelet processing,the compression of the measured data is realized.By means of rain flow counting,the relationship between the mean frequency and amplitude frequency of the connecting rod load is obtained under the condition of synthesis,and they are subject to the normal distribution and three parameter Weibull distributions,and the load distribution of the mean value and amplitude distribution are independent of each other.The two-dimensional load spectrum and fatigue test program spectrum of the connecting rod are established,which can provide the basis for the reliability test and anti fatigue design of connecting rod structure.

摘要: 为了研究装载机连杆载荷与疲劳可靠性试验所需载荷谱特性,提出一种连杆载荷测试与载荷谱编制方法。设计连杆力测试传感器,在大石方、黏土、砂子和小石方4种物料工况下进行连杆载荷测试试验。利用峰谷抽取和小波处理实现了实测数据的压缩编辑,通过雨流计数获得了合成工况下连杆载荷均值频次和幅值频次分别服从正态分布和三参数威布尔分布的拟合数学模型,且载荷均值分布和幅值分布相互独立,编制了连杆二维载荷谱和疲劳试验程序谱,为连杆结构疲劳可靠性分析提供依据。

入藏号: CSCD:6484843

地址: Wan Yipin, Chang'an University, Key Laboratory of Road Construction Technology and Equipment,Ministry of Education, Xi'an, Shaanxi 710064, China.

Song Xuding, Chang'an University, Key Laboratory of Road Construction Technology and Equipment,Ministry of Education, Xi'an, Shaanxi 710064, China.

Chen Lele, Chang'an University, Key Laboratory of Road Construction Technology and Equipment,Ministry of Education, Xi'an, Shaanxi 710064, China.

Zhang Lei, Chang'an University, Key Laboratory of Road Construction Technology and Equipment,Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 万一品, 长安大学, 道路施工技术装备教育部重点实验室, 西安, 陕西 710064, 中国.

宋绪丁, 长安大学, 道路施工技术装备教育部重点实验室, 西安, 陕西 710064, 中国.

陈乐乐, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

张磊, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: chdwyp1818@163.com

电子邮件地址: chdwyp1818@163.com

使用次数 (最近 180 天): 0

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作者: Suo Xuefeng; Jiao Shengjie; Ma Xiyong; Li Kai

作者: 索雪峰; 焦生杰; 马锡勇; 李凯

标题: Experimental Research on Riding Comfort of Mining Dump Trucks

标题: 矿用自卸车乘坐舒适性试验研究

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作者关键词: vibration and wave; mining dump truck; ride comfort; random road; frequency response

作者关键词: 振动与波; 矿用自卸车; 乘坐舒适性; 随机路面; 频域响应

摘要: Vehicle comfort has a serious impact on the driver's physical and mental health. In order to study the ride comfort of mining dump trucks driving on random roads, this article takes a 110 t mining dump truck as the research object. A 10-DOF dynamic model for the mining dump truck is established to study the influence factors of the vehicle comfort. Meanwhile, the in-situ test and analysis are conducted on the random road in the mine area. The time domain response, frequency response and ride comfort of the vehicle under different working conditions are obtained. The result indicates that as the vehicle speed increases, both the acceleration magnitude and the frequency of the the road excitation increase, resulting in poor vehicle comfort. With the increase of vehicle's load, the frequency of road excitation decreases and the vehicle's comfort improves.

摘要: 车辆舒适性对驾驶员的身心健康有重要影响。为研究矿用自卸车在随机路面上行驶时的乘坐舒适性问题,以某 110 吨矿用自卸车为研究对象,建立整车 10 自由度动力学模型,分析车辆舒适性的影响因素,并选择矿区随机路面进行现场试验测试和分析,获得不同路面激励工况下的时域响应、频域响应以及车辆乘坐舒适性。结果表明随着车速增加,路面激励加速度的大小和频率都增大,导致车辆舒适性变差;随着车辆载重增加,路面激励频率减小,车辆舒适性提高。

入藏号: CSCD:6476497

地址: Suo Xuefeng, Chang'an University, Key Laboratory of Road Construction Technology and Equipment of MOE, Xi'an, Shaanxi 710064, China.

Jiao Shengjie, Chang'an University, Key Laboratory of Road Construction Technology and Equipment of MOE, Xi'an, Shaanxi 710064, China.

Ma Xiyong, Chang'an University, Key Laboratory of Road Construction Technology and Equipment of MOE, Xi'an, Shaanxi 710064, China.

Li Kai, Chang'an University, Key Laboratory of Road Construction Technology and Equipment of MOE, Xi'an, Shaanxi 710064, China.

地址: 索雪峰, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

焦生杰, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

马锡勇, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

李凯, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: jsj@chd.edu.cn

电子邮件地址: jsj@chd.edu.cn

使用次数 (最近 180 天): 1

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作者: Zhao Yong; Wang Yuanyuan; Wei Lulu

作者: 赵勇; 王媛媛; 魏路路

标题: Energy management strategy of series hybrid bulldozer

标题: 串联混合动力推土机能量管理策略

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作者关键词: mechanical engineering; hybrid; bulldozer; energy management; fuel economy

作者关键词: 机械工程; 混合动力; 推土机; 能量管理; 燃油经济性

摘要: To improve the minimum fuel consumption of the vehicle as a control target, the energy management strategy of a series hybrid bulldozer was studied. First, according to the structure of two independent motors of a series hybrid bulldozer, the mathematical models of the engine,

generator, motor and its controller, ultra-capacitor, and dynamic of bulldozer were established. Next, the combination method of thermostat and the power following energy management strategy were proposed, based on optimal fuel consumption power curve of the engine. Finally, the series hybrid bulldozer and its control strategy were simulated by MATLAB/Simulink software by modeling method of combining the theory and experiment. The energy distribution of power source and the economy of comprehensive working conditions were simulated by using the typical working conditions of the 130 s bulldozer. The results show that this strategy can reasonably distribute the engine output power and the charging and discharging power of the supercapacitor to meet the power demand of the vehicle. Consequently, the charging and discharging times of the supercapacitor are reduced. The SOC value is in its best working range. The fluctuation of engine load is also significantly reduced. The fuel consumption of the original engine is 1 512 g and that of the hybrid engine is 1 358 g. The fuel consumption is reduced by 10.2%. Therefore, the proposed method is effective for energy management.

摘要: 以提高整车的最低燃油消耗为控制目标,研究了串联混合动力推土机的能量管理策略。首先,根据双电机独立驱动的串联混合动力推土机结构,建立了发动机、发电机、电机及其控制器、超级电容、推土机动力学的数学模型;然后,基于发动机最佳燃油消耗功率曲线,提出一种恒温器式与功率跟随式相结合的能量管理控制策略;最后,采用 MATLAB/Simulink 软件,通过理论与试验相结合建模方法对串联混合动力推土机的整机和控制策略进行了仿真建模,利用 130 s 推土机的典型工况对动力源的能量分配和综合工况的经济性进行了仿真研究。研究表明:该策略可对发动机输出功率与超级电容充放电功率进行合理分配,满足整车功率需求,超级电容充放电次数明显减少且荷电状态(SOC)值在最佳工作区间内;混合动力发动机比原机型发动机燃油消耗率降低,发动机负载波动也明显减小,原机型发动机燃油消耗量为 1 512 g,混合动力发动机燃油消耗量为 1 358 g,其比原机型节油 10.2%,整机燃油经济性得到明显提高。该方法是一种有效的串联混合动力推土机能量管理方法。

入藏号: CSCD:6470865

地址: Zhao Yong, Chang'an University, Key Laboratory of Highway Construction Technology and Equipment of Ministry of Education, Xi'an, Shaanxi 710064, China.

Wang Yuanyuan, Chang'an University, Key Laboratory of Highway Construction Technology and Equipment of Ministry of Education, Xi'an, Shaanxi 710064, China.

Wei Lulu, Chang'an University, Key Laboratory of Highway Construction Technology and Equipment of Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 赵勇, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

王媛媛, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

魏路路, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: 87020250@qq.com

电子邮件地址: 87020250@qq.com

使用次数 (最近 180 天): 0

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作者: Wan Yipin; Song Xuding; Lu Pengmin; Yuan Zhengwen

作者: 万一品; 宋绪丁; 吕彭民; 员征文

标题: External load equivalent and load spectrum compilation of loader based on moment equivalent

标题: 基于弯矩等效的装载机外载荷当量与载荷谱编制

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作者关键词: mechanical engineering; loader; moment equivalent; external load; load spectrum

作者关键词: 机械工程; 装载机; 弯矩等效; 外载荷; 载荷谱

摘要: To study the fatigue performance of the load spectrum of loader working device, an equivalent method of loader external load based on the bending moment section was suggested. When the loader loads the material, the load on the working device was simplified as a concentrated external load acting on the bucket and compiled the load spectrum. A boom coordinate system was constructed based on a hinge line at the front and rear ends of the moving arm, and the actual load of the bucket hinge point was transformed into a hinge load on the boom structure under the boom coordinate system. The synchronous relationship between the moment of the boom section and the external load of the working device was studied, and the action point position and direction of the external force was determined. The external load equivalent model of the working device based on the bending moment of the maximum bending moment section of the boom was established. Considering the load equivalent load of the bucket hinge point under typical working condition of the ZL50G loader working device as the basis, the statistical characteristics of mean load, frequency, and amplitude were obtained by rain flow counting. The load spectrum of the fatigue test program under various working conditions was determined. The results show that the position and direction of the equivalent external load on the working device can be accurately obtained based on the bending moment section equivalent method. The time history of the equivalent load is obtained by the bending moment section of the maximum bending moment section of the boom, and the value and change rule of the boom bending moment section are coincident under the conditions of equivalent load and measured load. The mean of the equivalent load is fit to the normal distribution and the amplitude is fit to the three-parameter Weibull distribution. The variable mean load spectrum for the fatigue test of the working equipment of the loader is compiled using rain flow counting and parameter extrapolation, and the loading time of the fatigue bench test is minimized. The proposed equivalent load model based on the bending moment section equivalent and the proposed method of compiling the load spectrum of the loader working device provide basis for the accurate evaluation of structural reliability and

establishment of scientific indoor bench test specifications.

摘要: 为了编制装载机工作装置载荷谱进行结构疲劳性能研究,提出了一种基于动臂截面弯矩等效的装载机外载荷当量方法,将装载机铲装物料时所受外载荷简化为一个作用在铲斗上的集中载荷并进行载荷谱编制。以动臂前后两端铰点连线为基准构建动臂局部坐标系,将铲斗铰点实测载荷转化为局部坐标系下动臂铰点载荷,研究铲掘姿态下动臂截面弯矩和装载机外载荷的同步对应关系,确定了外载荷作用点位置和作用方向,利用动臂最大弯矩截面的弯矩等效建立了装载机外载荷的当量数学模型。由实测的铲斗铰点载荷时间历程和装载机外载荷当量模型得到ZL50G装载机当量外载荷的时间历程,采用雨流计数得到典型作业介质下当量外载荷均值、幅值、频次的统计特性,编制多工况合成的工作装置疲劳试验程序载荷谱。结果表明:基于动臂截面弯矩等效方法能够获取固定姿态下装载机当量外载荷作用位置和作用方向;利用动臂最大弯矩截面的弯矩得到当量载荷时间历程,且在当量载荷与实测载荷下动臂截面弯矩变化规律和大小保持一致;当量载荷均值服从正态分布、幅值服从三参数威布尔分布,利用雨流计数和参数外推法编制的适用于工作装置疲劳试验的变均值加速加载程序载荷谱,缩短了疲劳台架试验的加载时间。提出的基于动臂截面弯矩等效的装载机外载荷当量模型以及载荷谱编制方法,可为装载机工作装置疲劳寿命评估和台架试验规范的制定提供依据。

入藏号: CSCD:6470866

地址: Wan Yipin, Chang'an University, Key Laboratory of Road Construction Technology and Equipment, Ministry of Education, Xi'an, Shaanxi 710064, China.

Song Xuding, Chang'an University, Key Laboratory of Road Construction Technology and Equipment, Ministry of Education, Xi'an, Shaanxi 710064, China.

Lu Pengmin, Chang'an University, Key Laboratory of Road Construction Technology and Equipment, Ministry of Education, Xi'an, Shaanxi 710064, China.

Yuan Zhengwen, Engineering Machinery Research Institute, Xuzhou Construction Machinery Group, Xuzhou, Jiangsu 221004, China.

地址: 万一品, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

宋绪丁, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

吕彭民, 长安大学, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

员征文, 徐工集团江苏徐州工程机械研究院, 徐州, 江苏 221004, 中国.

电子邮件地址: wyipin@chd.edu.cn

电子邮件地址: wyipin@chd.edu.cn

使用次数 (最近 180 天): 0

使用次数 (2013 年至今): 0

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作者: Ding Kai; Chan Tungsun; Wang Yan; Zhu Xuekai; Zhang Fuqiang; Zhang Chao

作者: 丁凯; 陈东桑; 王岩; 朱学凯; 张富强; 张超

标题: Industrial Internet of things architecture and autonomous production control technologies for smart factories based on cloud-edge interplay

标题: 基于云-边协同的智能工厂工业物联网架构与自治生产管控技术

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作者关键词: smart factory; industrial Internet of things; cloud-edge interplay; human-machine-product symbiosis; autonomous production control

作者关键词: 智能工厂; 工业物联网; 云-边协同; 人-机-物共融; 自治生产管控

摘要: Focusing on the requirements of cloud-level mining and edge-level computing of real-time manufacturing big data generated from Industrial Internet of Things(IIoT)devices in smart factories,an IIoT architecture for smart factories based on cloud-edge interplay was proposed,together with the edge nodes configuration method and the cloud application services configuration method.Under this architecture,time-insensitive and time-sensitive manufacturing data computing tasks were executed by cloud server and IoT edge nodes respectively.Considering human workers,machine tools,physical objects,and other manufacturing resources in a smart factory were endowed with different levels of intelligence,the key technologies to realize the human-machine-product-symbiosis-based autonomous production control were researched from the perspectives of production planning,execution,monitoring,and optimization.From a case study,it was concluded that cloud-edge interplay-based IIoT architecture and autonomous production control technologies could not only make manufacturing data processing and analysis from both cloud-level and edge-level,but also achieve the real-time production status monitoring and autonomous production control of smart factories,which provided a basis for realizing smart and autonomous production in factories.

摘要: 针对智能工厂底层大量物联设备产生的海量制造数据在云端处理分析和边缘端实时计算两个层面的需求,提出一种基于云-边协同的智能工厂工业物联网架构以及边缘节点、云端应用服务的配置方法。在该架构下,时间不敏感型与时间敏感型制造数据处理任务分别由工厂云服务器、工业物联网边缘节点完成。考虑智能工厂内人、机、物等生产主体均具有智能,进一步从生产计划、执行、监控、优化的逻辑视角,阐述了基于人-机-物共融的智能工厂自治生产管控关键技术。通过案例研究得出,所提出的智能工厂工业物联网架构可在云端与边缘端两个层面进行制造数据处理分析,并实现智能工厂实时生产状态监控与自治生产过程响应控制,为实现制造工厂智能化、自治化生产提供技术支撑。

入藏号: CSCD:6649159

地址: Ding Kai, School of Construction Machinery,Chang'an University;;Department of Industrial and Systems Engineering,The Hong Kong Polytechnic University, ;; Xi'an;; ;;Hong Kong 710064;;999077.

Chan Tungsun, Department of Industrial and Systems Engineering,The Hong Kong Polytechnic University, 999077, Hong Kong.

Wang Yan, School of Mechanical Engineering,Xi'an University of Science and Technology, Xi'an, Shaanxi 710049, China.

Zhu Xuekai, The 723Institute of CSIC, Yangzhou, Jiangsu 225001, China.

Zhang Fuqiang, School of Construction Machinery,Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Chao, School of Mechanical Engineering,Xi'an Jiaotong University, Xi'an, Shaanxi 710049, China.

地址: 丁凯, 长安大学工程机械学院;;香港理工大学工业与系统工程系,;; 西安;; 陕西;;香港 710064;;999077, 中国.

陈东燊, 香港理工大学工业与系统工程系, 999077, 香港.

王岩, 西安科技大学机械工程学院, 西安, 陕西 710049, 中国.

朱学凯, 中国船舶重工集团公司第七二三研究所, 扬州, 江苏 225001, 中国.

张富强, 长安大学工程机械学院, 西安, 陕西 710064, 中国.

张超, 西安交通大学机械工程学院, 西安, 陕西 710049, 中国.

电子邮件地址: kding@chd.edu.cn; fqzhang@chd.edu.cn

电子邮件地址: kding@chd.edu.cn; fqzhang@chd.edu.cn

使用次数 (最近 180 天): 1

使用次数 (2013 年至今): 1

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作者: Huang Xin; Wang Guoqing; Ren Pengbo; Hu Yanpeng

作者: 黄鑫; 王国庆; 任鹏博; 胡延鹏

标题: Study on dynamic system of the desktop boxing robot

标题: 桌面型拳击机器人动力学系统研究

来源出版物: 机械设计 卷: 36 期: 11 页: 32-36 出版年: 2019

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文献类型: Article

作者关键词: desktop boxing robot; dynamic characteristic; flexible body; exciting force

作者关键词: 桌面型拳击机器人; 动力学特性; 柔性体; 激振力

摘要: In view of the needs of fitness in small space,a mechanical body system is designed for the desktop boxing robot,and its dynamic characteristics are explored. Firstly,the robot body is designed based on rubber materials and spring damping,with shock absorption as the primary

objective. Then, the dynamic response of the sand bag with impact load is analyzed, which proves that the structural design rationale. Finally, according to the characteristics of the flexible body of the whole machine, the stress curve of the sand bag with impact load is transformed into the exciting force of the whole machine, and the dynamic response characteristics of the spring damping system and the end-support bar with impact load are analyzed. The results show that the robot can be used in small desktop space when it is directly subjected to impact load, and the results also provide basis for the follow-up design of control system.

摘要: 针对小空间健身需求, 设计了桌面型拳击机器人的机械本体系统, 并对系统的动力学特性进行了分析。首先, 以减振为主要目标, 采用橡胶材质和弹簧减振设计了机器人本体; 接着, 对沙袋在冲击载荷下的动力响应做了分析, 证明了结构设计的合理性; 最后, 针对整机柔性体的特征, 以沙袋在冲击载荷下的应力曲线转换为整机的激振力, 分析了弹簧减振系统和末端支撑杆在冲击载荷下的动力学响应特性。计算结果表明, 在机器人直接承受冲击载荷的情况下, 所设计的机器人是可以用于桌面小空间应用的, 计算结果也为下一步的控制系统设计提供了基础。

入藏号: CSCD:6629334

地址: Huang Xin, School of Engineering and Mechanics, Changan University, Xian, 710064.

Wang Guoqing, School of Engineering and Mechanics, Changan University, Xian, 710064.

Ren Pengbo, School of Engineering and Mechanics, Changan University, Xian, 710064.

Hu Yanpeng, School of Engineering and Mechanics, Changan University, Xian, 710064.

地址: 黄鑫, 长安大学工程机械学院, 西安, 陕西 710064, 中国.

王国庆, 长安大学工程机械学院, 西安, 陕西 710064, 中国.

任鹏博, 长安大学工程机械学院, 西安, 陕西 710064, 中国.

胡延鹏, 长安大学工程机械学院, 西安, 陕西 710064, 中国.

电子邮件地址: 1477028212@qq.com; wang_gq@chd.edu.cn

电子邮件地址: 1477028212@qq.com; wang_gq@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Wu Shuqiang; Luan Fei

作者: 吴书强; 栾飞

标题: Optimal allocation method for cloud manufacturing resource based on improved whale optimization algorithm

标题: 基于改进型鲸鱼算法的云制造资源配置研究

来源出版物: 制造业自动化 卷: 41 期: 12 页: 95-98,124 出版年: 2019

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来源出版物: Manufacturing Automation 卷: 41 期: 12 页: 95-98,124 出版年: 2019

文献号: 1009-0134(2019)41:12<95:JYGJXJ>2.0.TX;2-3

语言: Chinese

文献类型: Article

作者关键词: 云制造; 资源配置; 鲸鱼优化算法; 惯性权重

摘要: 针对云制造模式下资源配置问题,提出了一种新的解决方案-鲸鱼优化算法(WOA),旨在解决以时间、成本、质量和服务为目标的优化模型。在基本鲸鱼优化算法的基础之上引入编码解码方式和惯性权重,以增强局部搜索能力,提高收敛精度和加快收敛速度。最后通过实例,将改进的鲸鱼优化算法与传统遗传算法(GA)、基本布谷鸟算法(CS)进行比较分析,验证了改进鲸鱼优化算法的有效性。

入藏号: CSCD:6622479

地址: Wu Shuqiang, 710064.

Luan Fei, ;;; ;;; ;;; ;;; 710064;;710021.

地址: 吴书强, 长安大学工程机械学院, 西安, 陕西 710064, 中国.

栾飞, 长安大学工程机械学院;; 陕西科技大学机电工程学院, ;;; 西安;; 西安, ;;; 710064;;710021.

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作者: Zhang Jing; Chen Zhenxian; Gao Yongchang; Zhang Xuan; Jin Zhongmin

作者: 张静; 陈臻贤; 高永昌; 张烜; 靳忠民

标题: Research status for knee joint secondary kinematics

标题: 膝关节二次运动学研究进展

来源出版物: 中华骨科杂志 卷: 39 期: 18 页: 1157-1164 出版年: 2019

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语言: Chinese

文献类型: Review

作者关键词: 膝关节; 研究进展; 胫骨

摘要: Osteoarthritis are usual disease in middle aged and elderly people. High tibial osteotomy is a common method which performed to treat medial compartment osteoarthritis in varus knees.

Unicondylar knee arthroplasty is an established treatment option for symptomatic osteoarthritis isolated to one compartment, and received remarkably effect. Total knee arthroplasty is the standard treatment of serious knee disease. The knee kinematics have changed after the knee was diseased, and the kinematics after surgery are different from the natural joint. The flexion-extension rotation, anterior-posterior translation and interior-exterior rotation are most important kinematics of tibia-femur joint. The anterior-posterior translation and interior-exterior rotation, which as the secondary kinematics, even are paradoxical after total knee arthroplasty. Secondary kinematics studies played an important role in prosthesis design and postoperative functional assessment. Measurement and description methods of knee joint secondary kinematics were reviewed in this article. The factors influencing secondary kinematics were investigated for natural knee joint, osteoarthritis knee joint and knee joint after total knee replacement separately, and the influence of total knee replacement design was emphasized. At last, the impact of knee secondary kinematics to biomechanics, friction and wear were also introduced. After comparison of multi-research results, the measurement precision was found to need further improvement due to the restrict of measuring technology and description methods. Many factors influence knee secondary kinematics, including activities, measurement environment and individual difference. The anterior-posterior translation was found complex after total knee replacement, and the prosthesis design played an important role. Posterior cruciate ligament-retaining knee replacement lead forward slide of the femoral component during flexion, which paradoxical from natural knee. The anatomical design prosthesis were hopeful to realize more natural kinematics. The component malalignment and soft tissue balance during surgey also have significant role in knee secondary kinematics. The knee secondary kinematics study is of great significance to biomechanics and wear.

摘要: 骨性关节炎是中老年常见的膝关节疾病,胫骨高位截骨、单髁置换是治疗单间室关节的常用方法,全膝关节置换术是治疗严重膝关节疾病的标准手段。膝关节发生病变之后,运动会发生改变,术后无法完全再现正常膝关节运动,前后平移、内旋外旋运动即膝关节二次运动甚至出现方向相反的运动趋势。二次运动研究对于膝关节假体设计、术后功能评估具有重要意义。本文综述膝关节运动测量及运动描述的方法,分别针对自然膝关节、病变膝关节、假体置换之后的二次运动进行描述,着重探讨全膝关节假体设计对二次运动的影响,并简述二次运动研究对生物力学、摩擦磨损性能研究的意义。通过多个文献研究结果对比发现:受测量技术和描述方法限制,膝关节二次运动测量精度尚需进一步提高;膝关节二次运动受到活动步态、测量环境、个体差异等因素影响;全膝关节置换之后前后平移运动测量结果趋势复杂,假体设计影响显著;置换后交叉韧带保留型假体伴随屈曲易导致股骨前移,与自然膝的股骨回滚趋势相悖;解剖学设计假体有望获得接近自然膝关节的运动;手术安装位置、软组织平衡对膝关节运动学、生物力学产生重要影响;膝关节二次运动学研究对生物力学、摩擦磨损具有重要意义。

入藏号: CSCD:6575704

地址: Zhang Jing, School of Mechanical Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Zhenxian, School of Mechanical Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Gao Yongchang, School of Mechanical Engineering, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Xuan, School of Mechanical Engineering, Chang'an University, Xi'an, Shaanxi 710064,

China.

Jin Zhongmin, Xi'an Jiaotong University, State Key Laboratory for Manufacturing System Engineering, Xi'an, Shaanxi 710049, China.

地址: 张静, 长安大学工程机械学院西安, 710064.

陈琪贤, 长安大学工程机械学院西安, 710064.

高永昌, 长安大学工程机械学院西安, 710064.

张烜, 长安大学工程机械学院西安, 710064.

靳忠民, 西安交通大学, 机械制造系统工程国家重点实验室, 710049.

电子邮件地址: zhenxian_chen@yeah.net

电子邮件地址: zhenxian_chen@yeah.net

使用次数 (最近 180 天): 0

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作者: Ding Kai; Zhang Xudong; Zhou Guanghui; Wang Chuang; Yang Haidong; Zhang Fuqiang; Cao Xuepeng

作者: 丁凯; 张旭东; 周光辉; 王闯; 杨海东; 张富强; 曹学鹏

标题: Digital twin-based multi-dimensional and multi-scale modeling of smart manufacturing spaces

标题: 基于数字孪生的多维多尺度智能制造空间及其建模方法

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作者关键词: digital twin; smart manufacturing space; cyber-physical system; multi-dimensional and multi-scale; modeling

作者关键词: 数字孪生; 智能制造空间; 信息物理融合系统; 多维融合; 建模

摘要: With the development of digital twin and Cyber-Physical System(CPS)technologies,how to build the cyber-physical-social space fusion model for the manufacturing industry has been the key factor to implement smart manufacturing mode.Aiming at this problem,a multi-dimensional and multi-scale Smart Manufacturing Space (SMS)model was defined,and the characteristics of SMS were analyzed.Combined with the realization logic of digital twin technology,the cyber-physical mapping modeling method of SMS and the smart manufacturing process and data modeling method were discussed.A case of impeller manufacturing was applied to verify the

feasibility and efficiency of the proposed modeling methods. It was expected that the proposed method would provide the basis for the multi-role, multi-business and multi-process real-time synchronous simulation and cyber-physical interconnected control of SMS.

摘要: 随着数字孪生、信息物理融合系统等新兴技术的发展,如何实现面向制造业应用的物理空间、信息空间与业务空间的多维融合已成为智能制造落地实施的关键。针对该问题,从逻辑关联的视角提出了多维多尺度智能制造空间的内涵与特征,并结合数字孪生技术的实现逻辑,研究了智能制造空间的虚实映射建模方法、复杂多维时空域下智能制造过程及数据建模方法。进一步,结合某叶轮的生产制造案例对所提出的建模方法进行了验证,证明了该建模方法的可行性和有效性,为实现智能制造空间多要素、多业务、多流程的实时同步仿真与虚实联动控制提供了支撑。

入藏号: CSCD:6525012

地址: Ding Kai, Department of Manufacturing Automation, School of Construction Machinery, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Xudong, Department of Manufacturing Automation, School of Construction Machinery, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Fuqiang, Department of Manufacturing Automation, School of Construction Machinery, Chang'an University, Xi'an, Shaanxi 710064, China.

Cao Xuepeng, Department of Manufacturing Automation, School of Construction Machinery, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhou Guanghui, Xi'an Jiaotong University, State Key Laboratory for Manufacturing Systems Engineering, Xi'an, Shaanxi 710054, China.

Wang Chuang, Institute of Internet of Things and IT-based Industrialization, Xi'an University of Posts & Telecommunications, Xi'an, Shaanxi 710061, China.

Yang Haidong, Foshan Nanhai Guangdong University of Technology CNC equipment Cooperative Innovation Institute, Foshan, Guangdong 528225, China.

地址: 丁凯, 长安大学工程机械学院机械制造系, 西安, 陕西 710064, 中国.

张旭东, 长安大学工程机械学院机械制造系, 西安, 陕西 710064, 中国.

张富强, 长安大学工程机械学院机械制造系, 西安, 陕西 710064, 中国.

曹学鹏, 长安大学工程机械学院机械制造系, 西安, 陕西 710064, 中国.

周光辉, 西安交通大学, 机械制造系统国家重点实验室, 西安, 陕西 710054, 中国.

王闯, 西安邮电大学物联网与两化融合研究院, 西安, 陕西 710061, 中国.

杨海东, 佛山市南海区广工大数控装备协同创新研究院, 佛山, 广东 528225, 中国.

电子邮件地址: kding@chd.edu.cn; jack198122@163.com

电子邮件地址: kding@chd.edu.cn; jack198122@163.com

使用次数 (最近 180 天): 0

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第 21 条, 共 24 条

作者: Yan Qiang; Zhang Xiaoli; Zhao Junfeng; Yang Ji; Shen Yanbin

作者: 闫强; 张小丽; 赵俊锋; 杨吉; 申彦斌

标题: QUANTITATIVE DETECTION METHOD OF ASSEMBLY TIGHTNESS OF BOLTED ROTOR BASED ON GHM MULTI-WAVELET

标题: 基于 GHM 多小波的螺栓连接转子装配紧度定量检测方法

来源出版物: 机械强度 卷: 41 期: 2 页: 320-325 出版年: 2019

文献号: 1001-9669(2019)41:2<320:JYGDXB>2.0.TX;2-G

来源出版物: Journal of Mechanical Strength 卷: 41 期: 2 页: 320-325 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: Bolt; Bolted rotor; GHM multiwavelet; Assembly tightness

作者关键词: 螺栓; 螺栓连接转子; GHM 多小波; 装配紧度

摘要: The bolted rotor is a typical rotor structure with light weight, high strength, good rigidity, flexible selection of all kinds of wheel materials, etc., which is formed by pressing and combining several sections of rotors or discs and is widely used in aero-engines and gas turbines. Aiming at blind assembly, trail assembly and inconsistent assembly tightness of bolted rotor, and the degradation and loosening of bolt tightness in service, a quantitative detection method of bolt assembly quality based on GHM multiwavelet was proposed. Using the GHM multiwavelet with excellent characteristics such as symmetry, compactness, orthogonality, vanishing moment and high order vanishing moment, feature extraction of the bolted rotor assembly tightness states was performed. The quantitative detection index of assembly quality was defined by the relative energy band distribution based on multiwavelet. The experimental verification shows that the proposed method can accurately identify six kinds of bolt states from tightness to looseness.

摘要: 螺栓连接转子是由螺栓将若干段转子或轮盘压紧组合而成的一种具有重量轻、强度高、刚性好、各级轮盘材料选择灵活等优点的典型转子结构形式,被广泛应用于航空发动机与燃气轮机。针对螺栓连接转子装配中存在的盲装、试装、装配紧度一致性差、服役中螺栓紧度退化与松动故障,提出了一种基于 GHM 多小波的螺栓装配紧度定量检测方法。采用兼备对称性、紧支性、正交性、高阶消失矩等优良特性的 GHM 多小波对螺栓连接转子螺栓装配状态进行特征提取,通过多小波相对能量分布特征定义了装配紧度定量指标,通过实验验证表明所提出的方法可以准确识别螺栓六种由紧到松的状态。

入藏号: CSCD:6484827

地址: Yan Qiang, School of Construction Machinery, Chang'an University, Key Laboratory of Road Construction Technology and Equipment, Ministry of Education, Xi'an, Shaanxi 710064, China.

Zhang Xiaoli, School of Construction Machinery, Chang'an University, Key Laboratory of Road Construction Technology and Equipment, Ministry of Education, Xi'an, Shaanxi 710064, China.

Zhao Junfeng, School of Construction Machinery, Chang'an University, Key Laboratory of Road Construction Technology and Equipment, Ministry of Education, Xi'an, Shaanxi 710064, China.

Yang Ji, School of Construction Machinery, Chang'an University, Key Laboratory of Road

Construction Technology and Equipment, Ministry of Education, Xi'an, Shaanxi 710064, China.
Shen Yanbin, School of Construction Machinery, Chang'an University, Key Laboratory of Road
Construction Technology and Equipment, Ministry of Education, Xi'an, Shaanxi 710064, China.

地址: 闫强, 长安大学工程机械学院, 道路施工技术与装备教育部重点实验室, 西安, 陕西
710064, 中国.

张小丽, 长安大学工程机械学院, 道路施工技术与装备教育部重点实验室, 西安, 陕西
710064, 中国.

赵俊锋, 长安大学工程机械学院, 道路施工技术与装备教育部重点实验室, 西安, 陕西
710064, 中国.

杨吉, 长安大学工程机械学院, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064,
中国.

申彦斌, 长安大学工程机械学院, 道路施工技术与装备教育部重点实验室, 西安, 陕西
710064, 中国.

电子邮件地址: lilyzhang@chd.edu.cn

电子邮件地址: lilyzhang@chd.edu.cn

使用次数 (最近 180 天): 0

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作者: Yang Bo; Cao Xuepeng

作者: 杨波; 曹学鹏

标题: Energy-efficient Power Matching for Fully Hydraulic Fracturing Truck Based on MFO
Algorithm

标题: 基于 MFO 算法的全液压压裂车功率节能匹配

来源出版物: 西南石油大学学报. 自然科学版 卷: 41 期: 2 页: 167-174 出版年:
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文献号: 1674-5086(2019)41:2<167:JYMSFD>2.0.TX;2-F

来源出版物: Journal of Southwest Petroleum University. Science & Technology Edition 卷: 41
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语言: Chinese

文献类型: Article

作者关键词: fracturing truck; power matching; energy-efficient matching; optimized algorithm;
work-specific fuel consumption

作者关键词: 压裂车; 功率匹配; 节能匹配; 优化算法; 施工比油耗

摘要: To overcome the disadvantages of high fuel consumption and cost of mechanical fracturing truck, a fully hydraulic fracturing truck is proposed. Considering the system power loss, work-specific fuel consumption is proposed to evaluate the actual fuel consumption of fracturing trucks. Global power matching is performed for the fully hydraulic truck, and mathematical models for engine universal characteristics, variable piston pump efficiency, and machine auxiliary power are constructed, respectively. Penalty functions are constructed using the self-adaptive penalty function law, and the objective function is constructed based on the optimal goal of achieving the lowest work-specific fuel consumption. Based on the MFO algorithm and choosing the required output pressure and outflow rate of the fracturing pump as the optimization input parameters, the best output combination of 11 tuning parameters in total, including the number of engines required to start, the revolution speed of each engine, and its piston pump displacement can be optimized. The results show that under all operating conditions, the work-specific fuel consumption of the fully hydraulic fracturing truck is maintained at 4.559.91 L/(60 MPa·m³), which also decreases gradually as the loading pressure and displacement increase. Compared with the original plan, the new proposal can save up to 35.97% of fuel, and the fuel saving rate gradually decreases as the loading pressure increases. The newly proposed fully hydraulic fracturing truck can save up to 53.74% of fuel compared with a mechanical fracturing truck under the same operating conditions.

摘要: 针对机械式压裂车油耗和成本较高的缺点,提出全液压压裂车概念,考虑到系统功率损失,提出使用施工比油耗衡量压裂车实际油耗,对全液压压裂车进行全局功率匹配,分别建立发动机万有特性、变量柱塞泵效率和整机辅助功率的数学模型,采用自适应惩罚函数法构建惩罚函数,以施工比油耗最低为优化目标建立目标函数,基于 MFO 算法,以压裂泵需输出的压力和流量作为优化输入参数,优化输出需启动的发动机数量、各发动机转速及其柱塞泵排量共计 11 个调整参数的最佳组合,结果表明,在全部工况下,全液压压裂车施工比油耗维持在 4.559.91L/(60MPa·m³),且随着负载压力和排量的增加而逐渐降低;与原方案相比,新方案最高可节油 35.97%,且节油率随着负载压力的增大而逐渐减小;与机械式压裂车相比,同等工况下,采用新方案的全液压压裂车最高可节油 53.74%。

入藏号: CSCD:6478031

地址: Yang Bo, School of Construction Machinery, Chang' an University;;College of Mechanical and Electrical Engineering, Xinjiang Agricultural University;;SANY Heavy Energy Machinery Co. Ltd., ;;;, Xi' an;;Urumqi;;, Shaanxi;;Xinjiang;;Beijing 710064;;830052;;102202.

Cao Xuepeng, School of Construction Machinery, Chang' an University, Xi' an, Shaanxi 710064, China.

地址: 杨波, 长安大学工程机械学院;;新疆农业大学机电工程学院;;三一重型能源装备有限公司, ;;;, 西安;;乌鲁木齐;;, 陕西;;新疆;;北京 710064;;830052;;102202, 中国.

曹学鹏, 长安大学工程机械学院, 西安, 陕西 710064, 中国.

电子邮件地址: yangbo.228@163.com; caoxp2011@163.com

电子邮件地址: yangbo.228@163.com; caoxp2011@163.com

使用次数 (最近 180 天): 0

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作者: Cao Xuepeng; Zhou Zhaoqiang; Zeng Zhihao; Wei Changchen

作者: 曹学鹏; 周钊强; 曾致豪; 卫昌辰

标题: Pressure Control Characteristics for Deep-sea Piston Pumps Depend on Variable Viscosity-Elasticity Properties of Hydraulic Oil

标题: 基于介质变黏-弹特征的深海柱塞泵压力控制特性

来源出版物: 工程科学与技术 卷: 51 期: 2 页: 151-159 出版年: 2019

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来源出版物: Advanced Engineering Sciences 卷: 51 期: 2 页: 151-159 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: variable viscosity-dynamic stiffness model; control model; influence mechanism

作者关键词: 变黏度-动刚度模型; 控制模型; 影响机理

摘要: In order to predict the changing rule of pressure control performance of axial piston pump under oceanic environment, the pressure control system model of piston pump was established based on the underwater hydraulic oil viscosity-stiffness model. The system control performance was comprehensively analyzed from the aspects of stability, rapid response and control accuracy, and the results showed that if the variation factor was the viscosity, the parameters of the system phase margin, amplitude margin, rise time, and steady state were increased from the initial values of 59.4°, 8.77 dB, 0.045 s, and 3.4% to 138.4°, 23.4 dB, 0.28 s, and 7.4%, respectively. If the variation factor was stiffness, the parameters of the three characteristics were reduced from initial values to 42.6°, 23.4 dB, 0.038 s, and 1.2%, respectively. When considering the composite effects of viscosity and stiffness, the parameters of the three characteristics were increased from the initial values to 137.6°, 23.1 dB, 0.265 s, and 7.3% respectively. The analysis results showed that when the effects of viscosity and considering the comprehensive effects of viscosity-stiffness, the stability of the system increased with the increase of water depth, meanwhile the rapid response and control precision decreased with the increase of water depth. When considering the effects of stiffness, the changing trend of the three characteristics were quite opposite. It was pointed out that the control systems can be regarded as variable viscosity-dynamic stiffness control systems and variable viscosity-fixed stiffness control systems at the sea level of 0~1 000 m and 1 000~7 000 m, respectively. Finally, the experimental results further confirmed the results of the theoretical analysis.

摘要: 为预测变深环境下柱塞泵压力控制性能变化规律,基于水下动黏度-变刚度介质模型建立深海柱塞泵压力控制系统模型。从稳定性、快速响应性与稳态误差等 3 个方面对系统控制性能进行了综合分析,得出变深环境下,只考虑黏度影响时,系统稳定性指标和动态响应参数由初态值,即相位裕度 59.4°、幅值裕度 8.77 dB、上升时间 0.045 s、稳态误差 3.4%,分别增加至 138.4°、23.4 dB、0.28 s、7.4%;只考虑刚度影响时,各参数由初态值分别减少为 42.6°、23.4

dB、0.038 s、1.2%；考虑黏度-刚度复合作用时，各参数由初态值分别增加至 137.6°、23.1 dB、0.265 s、7.3%。结果表明：变深环境下只考虑黏度影响与考虑黏度-刚度复合作用时，系统稳定性均随水深的增加而增加，快速响应性与稳态误差均随水深的增加而下降；只考虑刚度影响时，相关特性的变化趋势刚好相反；并得出在 0~1 000 m、1 000~7 000 m 两海层下泵压力控制系统可分别视作变黏度-动刚度系统、变黏度-定刚度系统。最后，通过模拟变深环境下泵的动静性能试验，验证了上述理论分析结果的合理性和有效性。

入藏号: CSCD:6452014

地址: Cao Xuepeng, College of Construction Machinery, Chang'an Univ.; National Eng. Lab. for Highway Maintenance Equipment, ; National Eng. Lab. for Highway Maintenance Equipment, Xi'an; Xi'an, ; 710064; 710064.

Zhou Zhaoqiang, College of Construction Machinery, Chang'an Univ.; Zhucheng Ollin Automobile Factory of Beijing Foton Co. Ltd., ; Xi'an; Zhucheng, ; 710064; 262200.

Zeng Zhihao, College of Construction Machinery, Chang'an Univ., Xi'an, Shaanxi 710064, China.

Wei Changchen, College of Construction Machinery, Chang'an Univ., Xi'an, Shaanxi 710064, China.

地址: 曹学鹏, 长安大学工程机械学院; 公路养护装备国家工程实验室, ; 公路养护装备国家工程实验室, 西安; 西安, 陕西; 陕西 710064; 710064, 中国.

周钊强, 长安大学工程机械学院; 北汽福田诸城奥铃汽车厂, ; 西安; 诸城, 陕西; 山东 710064; 262200, 中国.

曾致豪, 长安大学工程机械学院, 西安, 陕西 710064, 中国.

卫昌辰, 长安大学工程机械学院, 西安, 陕西 710064, 中国.

电子邮件地址: caoxp2011@163.com

电子邮件地址: caoxp2011@163.com

使用次数 (最近 180 天): 0

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作者: Zhao Junfeng; Zhang Xiaoli; Yan Qiang; Shen Yanbin; Yang Ji

作者: 赵俊锋; 张小丽; 闫强; 申彦斌; 杨吉

标题: Dynamic Feature Learning and Assembly Tightness Intelligent Monitoring of Bolted Joint Structure

标题: 螺栓连接结构动态特征学习与装配紧度智能监测

来源出版物: 机械科学与技术 卷: 38 期: 3 页: 351-357 出版年: 2019

文献号: 1003-8728(2019)38:3<351:LSLJJG>2.0.TX;2-2

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文献类型: Article

作者关键词: bolt; monitoring; convolution neural network; features extraction

作者关键词: 螺栓; 装配紧度; 卷积神经网络; 特征提取

摘要: Automatic feature extraction plays a crucial role in the intelligent state monitoring of mechanical systems, which can adaptively learn features from raw data and discover new state-sensitive features. This research focuses on the ability of different depth convolution neural network (CNN) models to mine representative information and sensitive features from the excitation response signal without prior knowledge, and combine the feature extraction with assembly tightness classification process of the bolted structure. The effectiveness of the method is verified by excitation test data of car frame test bench bolt connection rotor. The results show that the feature learned adaptively by CNN can represent the complex mapping relationship between response signal and assembly state, and has higher accuracy than other methods.

摘要: 自动特征提取在机械系统智能状态监测中起着至关重要的作用,可以自适应地从原始数据中学习特征并发现新的状态敏感特征。本文重点研究了不同深度的卷积神经网络(CNN)模型在没有先验知识的情况下从激励响应信号中挖掘代表信息和敏感特征的能力,并将螺栓连接结构的特征提取和装配紧度分类过程融合在一起。通过车架试验台螺栓连接转子激振实验数据验证该方法的有效性。结果表明,CNN方法自适应学习的特征可以表示信号与装配状态之间的复杂映射关系,并且比其他方法具有更高的准确率。

入藏号: CSCD:6433326

地址: Zhao Junfeng, School of Construction Machinery, Chang'an University, The Ministry of Education Key Laboratory of Road Construction Technology and Equipment, Xi'an, Shaanxi 710064, China.

Zhang Xiaoli, School of Construction Machinery, Chang'an University, The Ministry of Education Key Laboratory of Road Construction Technology and Equipment, Xi'an, Shaanxi 710064, China.

Yan Qiang, School of Construction Machinery, Chang'an University, The Ministry of Education Key Laboratory of Road Construction Technology and Equipment, Xi'an, Shaanxi 710064, China.

Shen Yanbin, School of Construction Machinery, Chang'an University, The Ministry of Education Key Laboratory of Road Construction Technology and Equipment, Xi'an, Shaanxi 710064, China.

Yang Ji, School of Construction Machinery, Chang'an University, The Ministry of Education Key Laboratory of Road Construction Technology and Equipment, Xi'an, Shaanxi 710064, China.

地址: 赵俊锋, 长安大学工程机械学院, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

张小丽, 长安大学工程机械学院, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

闫强, 长安大学工程机械学院, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

申彦斌, 长安大学工程机械学院, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

杨吉, 长安大学工程机械学院, 道路施工技术与装备教育部重点实验室, 西安, 陕西 710064, 中国.

电子邮件地址: 1017510639@qq.com; lilyzhang@chd.edu.cn

电子邮件地址: 1017510639@qq.com; lilyzhang@chd.edu.cn

使用次数 (最近 180 天): 1

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理学院

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作者: Zheng Qiuya; Su Ningya; Liang Yihua

作者: 郑秋亚; 苏宁亚; 梁益华

标题: High Accuracy Flux Splitting Method for Numerical Solution of Euler Equation

标题: 欧拉方程数值求解的高精度通量分裂方法

来源出版物: 兵工学报 卷: 40 期: 12 页: 2545-2550 出版年: 2019

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作者关键词: Euler equation; flux splitting method; computational fluid dynamics; energy-convective upwind and split pressure scheme; weighted essentially non-oscillatory scheme

作者关键词: 欧拉方程; 通量分裂方法; 计算流体力学; 总能对流迎风 and 分压格式; 加权本质无振荡格式

摘要: A new scheme to couple the energy-convective upwind and split pressure (E-CUSP) scheme with the weighted essentially non-oscillatory (WENO) scheme is proposed for Euler equation. In the spatial direction, the flux of low dissipation E-CUSP scheme is reconstructed using high-precision WENO scheme. Fourth-order total variation reduction Runge-Kutta method is used for propulsion in time direction. On this base, a high accuracy flux splitting method for solving Euler equation is proposed. It is found through numerical simulation of shock tube that the proposed scheme can be used to simulate the shock tube problem and capture the shock wave and contact discontinuity more accurately compared to E-CUSP scheme. The numerical results show that the proposed scheme has higher accuracy and robustness.

摘要: 针对欧拉方程, 提出一种将总能对流迎风 and 分压 (E-CUSP) 格式与加权本质无振荡 (WENO) 格式相耦合的新格式。在空间方向上, 通过对低耗散 E-CUSP 格式的通量, 采用高精度 WENO 格式进行重构; 在时间方向上, 使用 4 阶总变差递减 (TVD) 的 Runge-Kutta 方法进行推进, 由此得到求解欧拉方程的高精度通量分裂方法。考虑 E-CUSP 格式与 WENO 重构进行耦合得到新格式, 使其空间精度进一步提高。通过对激波管问题进行数值模拟发现, 新的格式相对于 E-CUSP 格式对激波和接触间断捕捉的效果更加精准。数值结果表明: 耦合得到的新

格式具有更高的准确性和稳健性。

入藏号: CSCD:6641269

地址: Zheng Qiuya, School of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

Su Ningya, School of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

Liang Yihua, Aeronautics Computing Technique Research Institute, Aeronautical Laboratory of Computational Fluid Dynamics, Xi'an, Shaanxi 710068, China.

地址: 郑秋亚, 长安大学理学院, 西安, 陕西 710064, 中国.

苏宁亚, 长安大学理学院, 西安, 陕西 710064, 中国.

梁益华, 中国航空计算技术研究所, 航空气动力数值模拟重点实验室, 西安, 陕西 710068, 中国.

电子邮件地址: muzizh_2006@126.com; sunny_chd@126.com

电子邮件地址: muzizh_2006@126.com; sunny_chd@126.com

使用次数 (最近 180 天): 0

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第 2 条, 共 12 条

作者: Dong Anguo; Liu Hongchao; Zhang Qian; Liang Miaomiao

作者: 董安国; 刘洪超; 张倩; 梁苗苗

标题: Hyperspectral Remote Sensing Image Classification Based on Auto-Encoder

标题: 基于自动编码器的高光谱遥感图像分类

来源出版物: 激光与光电子学进展 卷: 56 期: 19 出版年: 2019

文献号: 1006-4125(2019)56:19<JYZDBM>2.0.TX;2-F

来源出版物: Laser & Optoelectronics Progress 卷: 56 期: 19 出版年: 2019

文献号: 1006-4125(2019)56:19<JYZDBM>2.0.TX;2-F

语言: Chinese

文献类型: Article

作者关键词: remote sensing; hyperspectral remote sensing image; remote sensing image classification; deep learning; spatial-spectral feature

作者关键词: 遥感; 高光谱遥感图像; 遥感图像分类; 深度学习; 空-谱特征

摘要: Hyperspectral remote sensing image data have characteristics of high dimension, spatial correlation, and feature nonlinearity, based on which a spatial-spectral feature extraction classification method based on deep learning is proposed herein. First, the weight decay is added to a stacked sparse auto-encoder. Next, the principal component analysis method is used to reduce the dimensionality of the image data. Then, neighborhood information is sorted, deleted, reorganized, and stacked according to the difference between the first principal component of all pixels in the principal component image block and the central pixel. Finally, the obtained

spatial-spectral information is input into a stacked sparse auto-encoder combined with the SoftMax classifier for classification. The comparison of two sets of experimental data reveals that the proposed classification algorithm improves the classification accuracy of hyperspectral images.

摘要: 根据高光谱遥感图像数据维度高、空间相关性、特征非线性的特点,提出了一种基于深度学习的空-谱特征提取分类算法。首先在堆栈稀疏自动编码器中加入权重衰减项,再利用主成分分析方法对图像数据进行降维处理,然后根据主成分影像块内所有像元的第一主成分与中心像元间的差距对邻域信息进行排序、删除、重组和堆栈,最后将得到的空-谱信息输入到与 SoftMax 分类器相结合的堆栈稀疏自动编码器中进行分类。通过两组实验数据的对比,验证了所提分类算法可以提高高光谱图像的分类精度。

入藏号: CSCD:6613224

地址: Dong Anguo, School of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

Liu Hongchao, School of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Qian, School of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

Liang Miaomiao, School of Information Engineering, Jiangxi University of Science and Technology, Ganzhou, Jiangxi 341000, China.

地址: 董安国, 长安大学理学院, 西安, 陕西 710064, 中国.

刘洪超, 长安大学理学院, 西安, 陕西 710064, 中国.

张倩, 长安大学理学院, 西安, 陕西 710064, 中国.

梁苗苗, 江西理工大学信息工程学院, 赣州, 江西 341000, 中国.

电子邮件地址: donganguo@chd.edu.cn; 18710866110@163.com

电子邮件地址: donganguo@chd.edu.cn; 18710866110@163.com

使用次数 (最近 180 天): 0

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第 3 条, 共 12 条

作者: Dong Anguo; Zhang Qian; Liu Hongchao; Liang Miaomiao

作者: 董安国; 张倩; 刘洪超; 梁苗苗

标题: Hyperspectral Image Classification Based on TSNE and Multiscale Sparse Auto-Encoder

标题: 基于 TSNE 和多尺度稀疏自编码的高光谱图像分类

来源出版物: 计算机工程与应用 卷: 55 期: 21 页: 177-182,219 出版年: 2019

文献号: 1002-8331(2019)55:21<177:JYTHDC>2.0.TX;2-O

来源出版物: Computer Engineering and Application 卷: 55 期: 21 页: 177-182,219

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语言: Chinese

文献类型: Article

作者关键词: hyperspectral image; deep learning; multiscale spatial feature; manifold learning

作者关键词: 高光谱图像; 深度学习; 多尺度空间特征; 流形学习

摘要: In view of the problem of dimension "disaster", insufficient use of spatial information and features in hyperspectral images, combined with the recent advances in deep learning, manifold learning and multiscale spatial features, a TSNE and multiscale sparse auto-encoder neural network hyperspectral image classification algorithm is proposed. TSNE algorithm is used to reduce the hyperspectral image, and then multiscale spatial information extraction is carried out for each pixel's neighborhood. A sparse auto-encoder network is trained by using the spatial spectrum joint information and classified by softmax classifier, which reduces computational complexity and improves classification accuracy. Experiments on the data of Indian Pines and Pavia University show that the proposed algorithm has better classification results than the other five algorithms.

摘要: 针对高光谱图像存在维数"灾难"、特征以及空间信息利用不足的问题,结合深度学习、流形学习及多尺度空间特征的最新进展,提出了一种 TSNE 和多尺度稀疏自编码网络的高光谱图像分类算法。利用 TSNE 算法对高光谱图像进行降维,再对每个像元的邻域进行多尺度空间特征提取,利用加入空谱联合信息的像元训练稀疏自编码网络模型并通过 softmax 分类器进行分类,减少计算复杂度,提高分类精确度。通过对 Indian Pines 及 Pavia University 两组数据进行实验,结果表明,提出的算法与其他五种算法相比分类效果更好。

入藏号: CSCD:6593269

地址: Dong Anguo, School of Science, Chang' an University, Xi'an, Shaanxi 710064, China.

Zhang Qian, School of Science, Chang' an University, Xi'an, Shaanxi 710064, China.

Liu Hongchao, School of Science, Chang' an University, Xi'an, Shaanxi 710064, China.

Liang Miaomiao, School of Information Engineering, Jiangxi University of Science and Technology, Ganzhou, Jiangxi 341000, China.

地址: 董安国, 长安大学理学院, 西安, 陕西 710064, 中国.

张倩, 长安大学理学院, 西安, 陕西 710064, 中国.

刘洪超, 长安大学理学院, 西安, 陕西 710064, 中国.

梁苗苗, 江西理工大学信息工程学院, 赣州, 江西 341000, 中国.

电子邮件地址: 326585766@qq.com

电子邮件地址: 326585766@qq.com

使用次数 (最近 180 天): 0

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第 4 条, 共 12 条

作者: 柳顺义; 覃忠美

作者: Liu Shunyi; Qin Zhongmei

标题: A note on the coefficients of the A_α -characteristic polynomial of a graph

标题: 图的 A_α -特征多项式系数的一个注记

来源出版物: 浙江大学学报. 理学版 卷: 46 期: 4 页: 399-404 出版年: 2019

文献号: 1008-9497(2019)46:4<399:ANOTCO>2.0.TX;2-W

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文献号: 1008-9497(2019)46:4<399:ANOTCO>2.0.TX;2-W

语言: English

文献类型: Article

作者关键词: A_α -characteristic polynomial; coefficients; eigenvalue; trace

作者关键词: A_α -特征多项式; 系数; 特征值; 迹

摘要: Let G be a graph on n vertices, and let $A(G)$ and $D(G)$ denote the adjacency matrix and the degree matrix of G , respectively. Define $A_\alpha(G) = \alpha D(G) + (1-\alpha)A(G)$ for any real $\alpha \in [0,1]$. The A_α -characteristic polynomial of G is the characteristic polynomial of $A_\alpha(G)$, i.e., $\det(xI_n - A_\alpha(G))$, where I_n is the identity matrix of size n . In this paper, we give a combinatorial expression for the fifth coefficient of the A_α -characteristic polynomial of a graph.

摘要: 设 G 是有 n 个顶点的图, $A(G)$ 和 $D(G)$ 分别表示图 G 的邻接矩阵和度矩阵。定义 $A_\alpha(G) = \alpha D(G) + (1-\alpha)A(G)$, $\alpha \in [0,1]$ 。图 G 的 A_α -特征多项式定义为矩阵 $A_\alpha(G)$ 的特征多项式, 即 $\det(xI_n - A_\alpha(G))$, 其中, I_n 为 n 阶单位矩阵。给出了图的 A_α -特征多项式的第 5 个系数的组合表达式。

入藏号: CSCD:6564147

地址: Liu Shunyi, School of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

Qin Zhongmei, School of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 柳顺义, 长安大学理学院, 西安, 陕西 710064, 中国.

覃忠美, 长安大学理学院, 西安, 陕西 710064, 中国.

电子邮件地址: liu@chd.edu.cn

电子邮件地址: liu@chd.edu.cn

使用次数 (最近 180 天): 0

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第 5 条, 共 12 条

作者: Gao Jianzhong; Zhang Tailei

作者: 高建忠; 张太雷

标题: Qualitative analysis of an SIRI epidemic model with stochastic effects

标题: 一类具有随机效应的 SIRI 传染病模型的定性分析

来源出版物: 山东大学学报. 理学版 卷: 54 期: 7 页: 89-99,105 出版年: 2019

文献号: 1671-9352(2019)54:7<89:YLJYSJ>2.0.TX;2-X

来源出版物: Journal of Shandong University. Natural Science 卷: 54 期: 7 页: 89-99,105 出版年: 2019

文献号: 1671-9352(2019)54:7<89:YLJYSJ>2.0.TX;2-X

语言: Chinese

文献类型: Article

作者关键词: stochastic SIRI model; oscillating behavior; persistence in mean; disease extinction

作者关键词: 随机 SIRI 模型; 振荡行为; 平均持续; 疾病灭绝

摘要: An SIRI bilinear epidemic model with stochastic effects is studied. The global existence, uniqueness and boundedness of its positive solution are proved by using stopping time theory and Lyapunov analysis method. It is also shown that the solution of the stochastic model oscillates around the corresponding deterministic disease-free equilibrium and endemic equilibrium points, and the sufficient conditions for persistence in mean of the solution of the stochastic model and disease extinction are obtained. Finally, numerical simulations are carried out to prove the validity of theoretical results.

摘要: 研究了具有随机效应的 SIRI 双线性传染病模型。利用停时理论及 Lyapunov 分析方法, 证明了随机模型正解的全局存在唯一性和有界性, 讨论了随机模型的解在相应确定性模型的无病平衡点和地方病平衡点附近的振荡行为, 得到了随机模型的解的平均持续和疾病灭绝的充分条件。最后, 数值模拟验证了理论结果的正确性。

入藏号: CSCD:6539072

地址: Gao Jianzhong, School of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhang Tailei, School of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 高建忠, 长安大学理学院, 西安, 陕西 710064, 中国.

张太雷, 长安大学理学院, 西安, 陕西 710064, 中国.

电子邮件地址: gaojianzhong2017@126.com; t.l.zhang@126.com

电子邮件地址: gaojianzhong2017@126.com; t.l.zhang@126.com

使用次数 (最近 180 天): 0

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第 6 条, 共 12 条

作者: Ma Han; Chang Anding; Chen Tong; Li Jiangjie

作者: 马晗; 常安定; 陈童; 李江杰

标题: A hybrid culture algorithm optimization strategy for traveling salesman problem

标题: 基于文化混合优化算法的旅行商问题求解

来源出版物: 计算机工程与科学 卷: 41 期: 7 页: 1273-1278 出版年: 2019

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来源出版物: Computer Engineering and Science 卷: 41 期: 7 页: 1273-1278 出版年: 2019

文献号: 1007-130X(2019)41:7<1273:JYW HHH>2.0.TX;2-J

语言: Chinese

文献类型: Article

作者关键词: traveling salesman problem; genetic algorithm; simulated annealing algorithm; Metropolis criterion; cultural algorithm

作者关键词: 旅行商问题; 遗传算法; 模拟退火算法; Metropolis 准则; 文化算法

摘要: Combining the genetic algorithm and simulated annealing algorithm with the culture algorithm, we design a hybrid culture optimization algorithm to solve the traveling salesman problem (TSP).The strategy contains two parts:the population space and the reliability space.The population space evolves according to the hybrid genetic annealing algorithm and sends optimal individuals to the reliability space.The reliability space extracts the information contained by the optimal individuals to guide population evolution.Experiments on TSP benchmark show that compared with other optimization algorithms,the hybrid cultural optimization strategy can reduce the deviation rate of the result to be 0.6%to 13.01% when obtaining the optimal path.Experiments verify the effectiveness and superiority of the hybrid cultural optimization strategy for solving the TSP.

摘要: 为更好地求解 TSP 问题,将遗传算法与模拟退火算法结合并纳入文化算法体系,提出一种求解旅行商问题的文化混合优化算法。该算法空间可分为独立并行的两部分:种群空间和信度空间。种群空间按照遗传退火混合算法实现进化,并将进化中的较优个体提供给信度空间,信度空间提取并利用较优个体所包含的信息来引导种群进化。通过求解 TSP 标准测试问题,将文化混合优化算法所求得的最优路径与其他优化算法所求结果相比,算法偏差均可降低 0.6%~13.01%,表明了文化混合优化算法求解 TSP 问题的有效性与优越性。

入藏号: CSCD:6534844

地址: Ma Han, College of Mathematical and Physics,Chang'an University, Xi'an, Shaanxi 710064, China.

Chang Anding, College of Mathematical and Physics,Chang'an University, Xi'an, Shaanxi 710064, China.

Chen Tong, College of Mathematical and Physics,Chang'an University, Xi'an, Shaanxi 710064, China.

Li Jiangjie, College of Mathematical and Physics,Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 马晗, 长安大学理学院, 西安, 陕西 710064, 中国.

常安定, 长安大学理学院, 西安, 陕西 710064, 中国.

陈童, 长安大学理学院, 西安, 陕西 710064, 中国.

李江杰, 长安大学理学院, 西安, 陕西 710064, 中国.

电子邮件地址: 410384870@qq.com; chdanding@126.com; 1367839462@qq.com; 2370566423@qq.com

电子邮件地址: 410384870@qq.com; chdanding@126.com; 1367839462@qq.com; 2370566423@qq.com

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作者: Yang Miaomiao; Feng Jianhu; Cheng Xiaohan; Feng Juanjuan

作者: 杨苗苗; 封建湖; 程晓晗; 冯娟娟

标题: Low Dissipation Central-Upwind Scheme for Solving Complex Traffic Flow Model

标题: 求解复杂交通流模型的低耗散中心迎风格式

来源出版物: 计算机工程 卷: 45 期: 6 页: 37-44 出版年: 2019

文献号: 1000-3428(2019)45:6<37:QXFZJT>2.0.TX;2-J

来源出版物: Computer Engineering 卷: 45 期: 6 页: 37-44 出版年: 2019

文献号: 1000-3428(2019)45:6<37:QXFZJT>2.0.TX;2-J

语言: Chinese

文献类型: Article

作者关键词: traffic flow; low dissipation; central-upwind scheme; Central Weighted Essentially Non-Oscillatory(CWENO); shock wave; rarefaction wave

作者关键词: 交通流; 低耗散; 中心迎风格式; 中心加权基本无震荡; 激波; 稀疏波

摘要: To address the multi-class Lightill-Whitham-Richards(LWR) traffic flow model on non-uniform roads,a low-dissipation central-upwind scheme is proposed.Based on the 4th-order Central Weighted Essentially Non-Oscillatory(CWENO) reconstruction and the low dissipation central-upwind numerical flux,the dissipative characteristics of the numerical format are optimized by constructing different forms of global smoothing factors and increasing the nonlinear weights corresponding to non-smooth templates.The Runge-Kutta method discretizes the semi-discrete numerical scheme in the time direction to maintain 4th-order precision.The numerical simulation of the lane number change and traffic signal control problem of multi-class LWR traffic flow model on non-uniform roads shows that the scheme has 4th-order solving accuracy and high resolution.

摘要: 针对非均匀道路上的多车种 LWR 交通流模型,提出一种低耗散中心迎风格式。以 4 阶中心加权基本无震荡重构和低耗散中心迎风数值通量为基础,通过构造不同形式的全局光滑因子及增大非光滑模板对应的非线性权重优化数值格式的耗散特性,并采用 Runge-Kutta 方法对半离散数值格式在时间方向上进行离散使其保持 4 阶精度。对非均匀道路上多车种 LWR 交通流模型的车道数变化和交通信号灯控制问题进行数值模拟,结果表明该格式具有 4 阶求解精度,且分辨率高。

入藏号: CSCD:6513200

地址: Yang Miaomiao, School of Science,Changan University, Xian, 710064.

Feng Jianhu, School of Science,Changan University, Xian, 710064.

Cheng Xiaohan, School of Science,Changan University, Xian, 710064.

Feng Juanjuan, School of Science,Changan University, Xian, 710064.

地址: 杨苗苗, 长安大学理学院, 西安, 陕西 710064, 中国.

封建湖, 长安大学理学院, 西安, 陕西 710064, 中国.

程晓晗, 长安大学理学院, 西安, 陕西 710064, 中国.

冯娟娟, 长安大学理学院, 西安, 陕西 710064, 中国.

电子邮件地址: 307453110@qq.com

电子邮件地址: 307453110@qq.com

使用次数 (最近 180 天): 1

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第 8 条, 共 12 条

作者: Ren Limei

作者: 任丽梅

标题: The First Passage Failure Probabilities of Dynamical Systems Based on the Failure Domain Reconstruction and Important Sampling Method

标题: 基于失效域重构和重要抽样法的结构动力学系统首穿失效概率

来源出版物: 应用数学和力学 卷: 40 期: 4 页: 463-472 出版年: 2019

文献号: 1000-0887(2019)40:4<463:JYSXYZ>2.0.TX;2-Q

来源出版物: Applied Mathematics and Mechanics 卷: 40 期: 4 页: 463-472 出版年: 2019

文献号: 1000-0887(2019)40:4<463:JYSXYZ>2.0.TX;2-Q

语言: Chinese

文献类型: Article

作者关键词: structural dynamics; first passage failure probability; important sampling method; mean high level crossing rate; mutually exclusive domain

作者关键词: 结构动力学; 首穿失效概率; 重要抽样法; 平均上穿率; 互斥基本失效域

摘要: For linear dynamical systems, the system failure domain was reconstructed, an important sampling density function was built with the probability of the basic failure domain and the important sampling simulation method was employed. For the non-linear dynamical system, the equivalent linear system was constructed according to the principle that they have the same mean high level crossing rate for the specified threshold. Two numerical examples were given to demonstrate the accuracy and efficiency of the proposed method.

摘要: 对于线性动力学系统, 重构系统失效域, 利用基本失效域概率构造重要抽样密度函数, 提出了基于重要抽样技术的首穿失效概率估计方法; 对于非线性动力学系统, 构建等效线性系统, 线性化原理为线性与非线性系统对安全域边界具有相同的平均上穿率. 最后给出 Gauss(高斯)白噪声激励的线性与非线性系统的数值算例, 并与 Monte-Carlo(蒙特-卡洛)方法及区域分解方法比较, 结果显示该文方法是正确有效的.

入藏号: CSCD:6483467

地址: Ren Limei, College of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 任丽梅, 长安大学理学院, 西安, 陕西 710064, 中国.

电子邮件地址: renlm1014@126.com

电子邮件地址: renlm1014@126.com

使用次数 (最近 180 天): 0

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作者: Zhang Wenbin; Fang Weixuan; Ma Jianghong

作者: 张文彬; 方玮轩; 马江洪

标题: Evaluation of Production-Living-Ecology Integration Based on Intrinsic Spatial Distance A Case Study of Yangzhong City

标题: 基于内在空间距离的三生融合性估计以扬中市为例

来源出版物: 南京师大学报. 自然科学版 卷: 42 期: 1 页: 132-138 出版年: 2019

文献号: 1001-4616(2019)42:1<132:JYNZKJ>2.0.TX;2-#

来源出版物: Journal of Nanjing Normal University. Natural Science 卷: 42 期: 1 页: 132-138 出版年: 2019

文献号: 1001-4616(2019)42:1<132:JYNZKJ>2.0.TX;2-#

语言: Chinese

文献类型: Article

作者关键词: intrinsic spatial distance; production-living-ecology integration; spatial relationship

作者关键词: 内在空间距离; 三生融合; 空间关系

摘要: In the study of production-living-ecology (PLE) space, PLE integration is still a conceptualized idea. Quantifying the spatial relationship of PLE space is significant to reveal the integration state of PLE space and further promote PLE integration. In this paper, the spatial relationship of PLE space between any two objects is evaluated with intrinsic spatial distance which can capture their PLE structural difference and physical distance at the same time. According to the calculations of intrinsic spatial distance, the spatial relationship between one object and the whole objects is defined as the sum of the spatial relationships between this object and all other object. Then, PLE integration is defined as any object has the same spatial relationship with respect to the whole objects. Finally, the variation of the spatial relationship on each object with respect to the whole objects is quantified to analyze the integration state of PLE space. The experimental results show that the proposed method can effectively evaluate the integration state of PLE space in the study area, and it also has significance for how to further

develop the PLE integration.

摘要: 在三生空间研究中,三生融合一直处于概念定性范畴.如何量化出三生空间背后的空间相关性并估计三生融合状态对于调控各行政单元上的三生发展具有重要的指导意义.本文首先将研究对象间的三生空间关系通过内在空间距离进行估计,其中内在空间距离能够同时刻画出研究对象间的直线距离与三生结构差异.然后根据内在空间距离测算结果将三生融合定义为任意研究对象与研究区域中其余研究对象的空间关系总和相等.最后通过所有研究对象上的空间关系总和的差异程度来量化分析研究区域的三生融合性.实验结果表明,本文的方法能够有效地估计出研究区上的三生融合状态,并对如何进一步提升三生空间融合度具有指导意义.

入藏号: CSCD:6475216

地址: Zhang Wenbin, College of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

Ma Jianghong, College of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

Fang Weixuan, Institute of Future Cities, The Chinese University of Hong Kong, 999077, Hong Kong.

地址: 张文彬, 长安大学理学院, 西安, 陕西 710064, 中国.

马江洪, 长安大学理学院, 西安, 陕西 710064, 中国.

方玮轩, 香港中文大学未来城市研究所, 999077, 香港.

电子邮件地址: ma.jh@126.com

电子邮件地址: ma.jh@126.com

使用次数 (最近 180 天): 0

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第 10 条, 共 12 条

作者: Li Xuan; Yin Guansheng; Yang Hui; Zhao Zhenyu; Hou Xiuhui

作者: 李轩; 尹冠生; 杨辉; 赵振宇; 侯秀慧

标题: Quasi-static compression analysis of 6 * 7 - IWRC wire rope loop

标题: 6 * 7 - IWRC 钢丝绳圈准静态压缩分析

来源出版物: 塑性工程学报 卷: 26 期: 2 页: 293-300 出版年: 2019

文献号: 1007-2012(2019)26:2<293:67IGSS>2.0.TX;2-P

来源出版物: Journal of Plasticity Engineering 卷: 26 期: 2 页: 293-300 出版年: 2019

文献号: 1007-2012(2019)26:2<293:67IGSS>2.0.TX;2-P

语言: Chinese

文献类型: Article

作者关键词: finite element analysis; wire rope loop; quasi-static compression; large deformation; ring compressed between flat plates

作者关键词: 有限元分析; 钢丝绳圈; 准静态压缩; 大变形; 平板对压圆环

摘要: To study the nonlinear characteristics of wire rope isolator under compression, the mechanical properties of the 6 * 7 - IWRC wire rope loop was analyzed by using the explicit finite element method under quasi-static compression. The results show that the wire rope loop has similar failure mode with ring under compression load. Mises stress distributes as layers in the section of wire rope, and each wire has a separate bending neutral layer. Most of the energy is dissipated through plastic deformation, when the syntropy lay wire rope loop is subjected to large deformation, and the frictional energy consumption is smaller. On the basis of quasi-static calculation results and the research of previous scholars, the subsection calculation model of load-deflection of compressed wire rope loop was proposed. The subsection calculation model can describe the load-deflection relationship of the wire rope loop effectively under the compression condition compared with the simulation results.

摘要: 为研究钢丝绳减振装置在压缩状态下的非线性特性, 采用显式有限元方法对 6 * 7 - IWRC 钢丝绳圈的力学性能进行了准静态压缩分析。结果表明, 压缩荷载作用下, 钢丝绳圈与圆环具有类似的失效模式, 钢丝绳截面中 Mises 应力呈层状分布, 且每根钢丝具有单独的弯曲中性层。同向捻钢丝绳圈受压产生大变形时, 大部分能量通过塑性变形耗散, 摩擦耗能较小。在准静态计算结果的基础上, 结合之前学者的研究, 提出受压钢丝绳圈载荷-挠度分段计算模型, 并通过与有限元计算结果对比, 证明提出的分段计算模型可以有效描述钢丝绳圈压缩状态下的载荷-挠度关系。

入藏号: CSCD:6476834

地址: Li Xuan, School of Science, Chang'an University, CCCC Civil Engineering Science & Technology Co., Ltd., Xi'an, Xi'an, 710064, 710075.

Yin Guansheng, School of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

Yang Hui, School of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Zhenyu, Xi'an Jiaotong University, State Key Laboratory for Strength and Vibration of Mechanical Structure, Xi'an, Shaanxi 710065, China.

Hou Xiuhui, School of Mechanics, Civil Engineering and Architecture, Northwestern Polytechnical University, Xi'an, Shaanxi 710072, China.

地址: 李轩, 长安大学理学院; 西安中交土木科技有限公司, 西安, 陕西, 陕西 710064; 710075, 中国.

尹冠生, 长安大学理学院, 西安, 陕西 710064, 中国.

杨辉, 长安大学理学院, 西安, 陕西 710064, 中国.

赵振宇, 西安交通大学, 机械结构强度与振动国家实验室, 西安, 陕西 710065, 中国.

侯秀慧, 西北工业大学力学与土木建筑学院, 西安, 陕西 710072, 中国.

电子邮件地址: lixuan83151@163.com; yings@chd.edu.cn

电子邮件地址: lixuan83151@163.com; yings@chd.edu.cn

使用次数 (最近 180 天): 0

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第 11 条, 共 12 条

作者: Wang Kang

作者: 王康

标题: Rapid Identifying Bitumen Produced by Different Manufacturers with IR and Multidimensional Scaling

标题: 红外光谱法结合多维尺度变换快速识别不同品牌的沥青

来源出版物: 理化检验. B, 化学分册 卷: 55 期: 2 页: 141-146 出版年: 2019

文献号: 1001-4020(2019)55:2<141:HWGPFJ>2.0.TX;2-C

来源出版物: Physical Testing and Chemical Analysis Part B: Chemical Analysis 卷: 55 期: 2 页: 141-146 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: IR; multidimensional scaling; bitumen; identification

作者关键词: 红外光谱法; 多维尺度变换; 沥青; 识别

摘要: 120 bitumen samples from 6 different manufacturers were collected and analyzed by attenuated total reflectance Fourier transform infrared spectrometry. The spectra data were analyzed by pretreatment method and multidimensional scaling(MDS). The MDS scatter plot revealed that the bitumen samples were distributed in 6 different areas, and samples appeared in the same area were the bitumen from the same manufacturer. Based on the data of MDS obtained from a set of known sample, regression model was established, and could be used to identify an unknown sample in the MDS scatter plot by substituting its data into the model.

摘要: 收集了来自6个不同厂家的共120个沥青样品,通过傅里叶变换衰减全反射红外光谱法对其进行分析。所得光谱数据经过预处理方法和多维尺度变换进行解析。由多维尺度变换的散点图可以看出:沥青样品分布于6个不同的区域,每个区域里的沥青样品都归属于同一个品牌。由已知样品的多维尺度变换结果可以建立回归模型,将未知样品代入模型,即可在多维尺度变换散点图中识别其所属品牌。

入藏号: CSCD:6438559

地址: Wang Kang, College of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 王康, 长安大学理学院, 西安, 陕西 710064, 中国.

电子邮件地址: conquer741@163.com

电子邮件地址: conquer741@163.com

使用次数 (最近 180 天): 0

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第 12 条, 共 12 条

作者: Cheng Xiaohan; Feng Jianhu

作者: 程晓晗; 封建湖

标题: Central-upwind scheme based on fifth order CWENO reconstruction

标题: 基于五阶 CWENO 重构的中心迎风格式

来源出版物: 陕西师范大学学报. 自然科学版 卷: 47 期: 2 页: 13-16 出版年: 2019

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作者关键词: fifth order CWENO reconstruction; central-upwind scheme; hyperbolic conservation laws

作者关键词: 五阶 CWENO 重构; 中心迎风格式; 双曲型守恒律

摘要: A new fifth order central-upwind scheme is proposed for solving hyperbolic conservation laws. The scheme is a combination of a fifth order central weighted essentially non-oscillatory reconstruction and a semi-discrete central-upwind numerical flux. This scheme is simple, Riemann-solvers-free and easy to program. Numerical simulations are performed on scalar conservation law equations and Euler equations to illustrate the fifth order accuracy and the high resolution property of the proposed method.

摘要: 提出一种五阶 CWENO 重构, 将其与中心迎风数值通量相结合, 得到一种求解双曲型守恒律方程的五阶中心迎风格式。该格式构造简单, 无需 Riemann 求解器, 易于编程实现。运用该格式求解标量守恒律方程和 Euler 方程组, 数值结果表明, 该格式具有五阶精度, 分辨率高, 能准确计算出解的各种复杂结构。

入藏号: CSCD:6459295

地址: Cheng Xiaohan, School of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

Feng Jianhu, School of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 程晓晗, 长安大学理学院, 西安, 陕西 710064, 中国.

封建湖, 长安大学理学院, 西安, 陕西 710064, 中国.

电子邮件地址: xhcheng@chd.edu.cn

电子邮件地址: xhcheng@chd.edu.cn

使用次数 (最近 180 天): 0

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经济与管理学院

第 1 条, 共 9 条

作者: Wang Yakun; Lu Xinwei; Chen Qiaoli; Liu Ye

作者: 王雅坤; 卢昕玮; 陈巧丽; 刘野

标题: Analysis on influencing factors of public traffic violation behavior in take out delivery

标题: 外卖配送公共交通违法行为影响因素分析

来源出版物: 中国安全生产科学技术 卷: 15 期: 12 页: 169-174 出版年: 2019

文献号: 1673-193X(2019)15:12<169:WMPSGG>2.0.TX;2-N

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语言: Chinese

文献类型: Article

作者关键词: takeout delivery; traffic violation; Logistic regression; grey relational analysis

作者关键词: 外卖配送; 交通违法; Logistic 回归; 灰色关联分析法

摘要: The influencing factors of public traffic violation behavior in the takeout delivery were studied through the questionnaire survey, and the takeout deliverymen were divided into two groups of samples with and without the occurrence of public traffic violation behavior. Through the Logistic regression comparison and analysis, it showed that the factors influencing the takeout deliverymen for whether occurring the public traffic violation behavior were the average monthly food delivery income and the average delivery distance per order. Aiming at one group of samples with the occurrence of public traffic violation behavior, the grey relational analysis method was applied to judge that the main driving factors of public traffic violation behavior in the takeout deliver were the average number of orders per day, the average monthly food delivery income and the average delivery time per order. Finally, the targeted long-term suggestions for solving this problem were put forward according to the influencing factors.

摘要: 通过问卷调查研究外卖配送公共交通违法行为影响因素, 将外卖配送员分为曾经发生过和未发生过公共交通违法行为 2 组样本。通过 Logistic 回归对比分析, 发现影响外卖配送员是否会发生公共交通违法行为的因素为平均每月送餐收入和平均每单配送距离; 接着对其中发生过公共交通违法行为的 1 组样本, 运用灰色关联分析法判断外卖配送员发生公共交通违法行为的主要驱动因素是平均每日接单数量、平均每月送餐收入以及平均每单配送时长, 并根据影响因素提出了解决该问题的针对性长期建议。

入藏号: CSCD:6644769

地址: Wang Yakun, School of Economics and Management, Chang'an University, Xi'an, Shaanxi 710000, China.

Lu Xinwei, School of Economics and Management, Chang'an University, Xi'an, Shaanxi 710000, China.

Chen Qiaoli, School of Economics and Management, Chang'an University, Xi'an, Shaanxi 710000, China.

Liu Ye, School of Surveying and Mapping Science and Technology, Xi'an University of Science and Technology, Xi'an, Shaanxi 710000, China.

地址: 王雅坤, 长安大学经济与管理学院, 西安, 陕西 710000, 中国.

卢昕玮, 长安大学经济与管理学院, 西安, 陕西 710000, 中国.

陈巧丽, 长安大学经济与管理学院, 西安, 陕西 710000, 中国.

刘野, 西安科技大学测绘科学与技术学院, 西安, 陕西 710000, 中国.

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第 2 条, 共 9 条

作者: Wang Yiqi; Li Guoping; Ma Yanran

作者: 王奕淇; 李国平; 马嫣然

标题: Study on watershed ecosystem service value compensation apportionment- Taking the Weihe watershed as an example

标题: 流域生态服务价值补偿分摊研究以渭河流域为例

来源出版物: 干旱区资源与环境 卷: 33 期: 11 页: 83-88 出版年: 2019

文献号: 1003-7578(2019)33:11<83:LYSTFW>2.0.TX;2-Z

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语言: Chinese

文献类型: Article

作者关键词: social utility; watershed ecosystem service value; watershed ecological compensation; apportionment mechanism

作者关键词: 社会效用; 流域生态服务价值; 流域生态补偿; 分摊机制

摘要: The regional mismatch of environmental protection cost and benefit between watershed upstream and downstream seriously affects the efficiency and fairness of the overall development of the watershed in China. How to compensate the ecosystem service value which provided by the upstream, namely, how to apportion the compensation amount between the compensation subject directly affect the realization of the maximization of social utility. Based on the principle of welfare economics and environmental economics, this research determined the apportionment mechanism of compensation based on the share of ecosystem service value in the watershed. Through using the analytic hierarchy process and structure entropy weight method we measured the apportionment weight of each compensation subject according to the ecosystem service value supplied by upstream. Taking the Weihe watershed as an example, the proportion of watershed ecosystem service value compensation of Weihe for the central government, downstream government and downstream residents are 32.65%, 36.92% and 30.43%, respectively.

摘要: 流域上下游间水生态环境保护成本与收益的区域错配问题严重影响我国流域整体发展的效率与公平, 对流域上游因保护水生态环境而提供的生态服务价值如何补偿, 即如何在补

偿主体之间进行补偿份额的分摊直接影响社会整体效用最大化的实现。文中基于福利经济学与环境经济学的原理,依据各补偿主体所享有的流域生态服务价值份额,确定补偿的分摊机制。通过运用层次分析法与结构熵权法,测算各补偿主体因享有上游供给的生态服务价值而应分摊的权重。以渭河流域为例,测算得到中央政府、下游地方政府、下游居民对流域生态服务价值的分摊权重分别为 32.65%、36.92%、30.43%,从而得到能使社会效用提高的各补偿主体的补偿份额。

入藏号: CSCD:6612802

地址: Wang Yiqi, School of Economics and Management, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Guoping, School of Economics and Finance, Xi'an Jiaotong University, Xi'an, Shaanxi 710061, China.

Ma Yanran, School of Management, Northwestern Polytechnical University, Xi'an, Shaanxi 710000, China.

地址: 王奕淇, 长安大学经济与管理学院, 西安, 陕西 710064, 中国.

李国平, 西安交通大学经济与金融学院, 西安, 陕西 710061, 中国.

马嫣然, 西北工业大学管理学院, 西安, 陕西 710000, 中国.

电子邮件地址: wangyiqi17@126.com; frank1787@126.com

电子邮件地址: wangyiqi17@126.com; frank1787@126.com

使用次数 (最近 180 天): 0

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第 3 条, 共 9 条

作者: Sun Qipeng; Wang Dong; Xu Xiaoqing; Ma Fei

作者: 孙启鹏; 王栋; 许晓晴; 马飞

标题: Urban Taxi Quantity Based on Dynamic Game Theory

标题: 基于动态博弈的城市出租车投放量测算研究

来源出版物: 交通运输系统工程与信息 卷: 19 期: 5 页: 193-197,204 出版年: 2019

文献号: 1009-6744(2019)19:5<193:JYDTBY>2.0.TX;2-6

来源出版物: Journal of Transportation Systems Engineering & Information Technology 卷: 19 期: 5 页: 193-197,204 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: urban traffic; quantity; game theory; taxi; benefit relationships

作者关键词: 城市交通; 投放量; 博弈论; 出租车; 利益关系

摘要: Taxi is one of the most important transportation modes in the urban passenger transport system. However, with the development of taxi market and the change of passenger's travel demand, taxi market has accumulated many problems, the fundamental reason is that the interests among various stakeholders in the taxi market is difficult to coordinate, which leads to the unbalanced supply-demand relationship in the taxi market, and need to promote the harmonious development of various stakeholders by adjusting the urban taxi quantity. Therefore, using the perspective of game theory, analyses the main stakeholders and the relationships in the taxi industry, constructs the game equilibrium and carries out the solution, calculates the reasonable quantity range of the urban taxi. And through the empirical calculation of the taxi market in Xi'an, China, and when the number of taxis increased in the short term does not exceed 1 908, the contradiction of interests among the stakeholders is the smallest; in the long term, when the number of taxis increased to 1 223, the long-term game equilibrium can be reached.

摘要: 出租车是城市客运交通体系中的重要组成部分,但随着出租车市场的发展和乘客出行需求的变化,出租车行业积累了大量问题,其根本原因还是出租车市场中各利益主体之间利益矛盾难以协调,供需关系不平衡,需要通过调整出租车投放规模来促进各利益主体的和谐发展.因此,从博弈的视角出发,分析出租车行业中的主要利益关系,构建博弈均衡,并进行博弈均衡解析,结合出租车市场的发展规律和博弈均衡条件,测算出投放规模的合理数量范围.通过对西安市出租车市场的实证测算,当短期内增加的出租车数量不超过 1 908 辆时,各利益主体间利益矛盾最小;从长期来看,当增加的出租车数量为 1 223 辆时,能够达成长期的博弈均衡.

入藏号: CSCD:6599959

地址: Sun Qipeng, School of Economics and Management, Chang' an University;; Center of Comprehensive Transportation Economic Management, Chang' an University, ;; Xi'an; Xi'an, ;; 710064;; 710064.

Wang Dong, School of Economics and Management, Chang' an University, Xi'an, Shaanxi 710064, China.

Xu Xiaoqing, School of Economics and Management, Chang' an University, Xi'an, Shaanxi 710064, China.

Ma Fei, School of Economics and Management, Chang' an University, Xi'an, Shaanxi 710064, China.

地址: 孙启鹏, 长安大学经济与管理学院;; 长安大学综合运输经济管理研究中心, ;; 西安;; 西安, ;; 710064;; 710064.

王栋, 长安大学经济与管理学院, 西安, 陕西 710064, 中国.

许晓晴, 长安大学经济与管理学院, 西安, 陕西 710064, 中国.

马飞, 长安大学经济与管理学院, 西安, 陕西 710064, 中国.

电子邮件地址: 314419738@qq.com

电子邮件地址: 314419738@qq.com

使用次数 (最近 180 天): 0

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第 4 条, 共 9 条

作者: Peng Zhimin; Wu Qunqi

作者: 彭志敏; 吴群琪

标题: Analysis on Growth Characteristics and Influencing Factors of Total Factor Productivity of Chinese Transportation Industry

标题: 我国交通运输业全要素生产率的增长特征及影响因素分析

来源出版物: 公路交通科技 卷: 36 期: 9 页: 129-139 出版年: 2019

文献号: 1002-0268(2019)36:9<129:WGJTYS>2.0.TX;2-4

来源出版物: Journal of Highway and Transportation Research and Development 卷: 36 期: 9 页: 129-139 出版年: 2019

文献号: 1002-0268(2019)36:9<129:WGJTYS>2.0.TX;2-4

语言: Chinese

文献类型: Article

作者关键词: DEA-Malmquist; transport economics; transportation industry; total factor productivity (TFP); DEA-Malmquist; convergence; influencing factor

作者关键词: 运输经济; 交通运输业; 全要素生产率; 收敛性; 影响因素

摘要: Improving TFP is an effective way and a significant indication for transforming economic growth mode and improving economic growth quality. Under the new historical development background of China's transportation industry, especially in the process of transportation supply side reform, the key to transform the development mode and promote the high-quality development lies in the improvement of the TFP of Chinese transportation industry. Comprehensive using DEA-Malmquist index method, sigma convergence test and panel data regression analysis, a research framework of index measurement, convergence test and influencing factor analysis for the TFP of Chinese transportation industry is constructed. The growth characteristics and the influencing factors of the TFP of Chinese transportation industry during 2001-2015 are analysed. The result shows that (1) During the research period, the average annual growth rate of TFP of Chinese transportation industry is 4.0%, the cumulative growth rate is 78.6%, the technological progress is the principally factor causing the TFP growth; (2) the TFP growth in transportation industry in the main regions of China shows the following spatial pattern: eastern region > western region > central region; (3) the development of Chinese transportation industry is driven by factor input (mainly capital) and TFP growth, however, compared to the factor input, the contribution rate of TFP growth is lower; (4) the TFP of transportation industry in Chinese 3 main regions does not show the sigma convergence characteristics; (5) factor quality and industrial structure have positive effects on Chinese transportation industry, and the trend variation of the related factors leads to the divergent pattern of the TFP of Chinese transportation industry.

摘要: 提高全要素生产率是转变经济增长方式、提高经济增长质量的有效途径和显著标志。在我国交通运输业进入新的历史发展背景下,尤其是我国交通运输供给侧改革过程中,要转变我国交通运输发展方式,推动我国交通运输业高质量发展,关键在于我国交通运输行业全要素生产率的提高。综合运用 DEA-Malmquist 指数法、sigma 收敛性检验和面板数据回归分析等方法,构建了我国交通运输业全要素生产率(TFP)指数测算-收敛性检验-影响因素分析的研究

框架,对 2001 至 2015 年间我国交通运输业全要素生产率的增长特征及影响因素进行了分析。研究表明:(1)在考察期内,我国交通运输业 TFP 年均增长率为 4.0%,累积增长率为 78.6%,技术进步是推动 TFP 增长的主要源泉;(2)我国区域间交通运输业 TFP 增长呈现出东部地区>西部地区>中部地区的空间格局;(3)我国交通运输业发展表现出要素投入(主要为资本)和 TFP 增长双重驱动的特点,但相比要素投入,TFP 增长的贡献率较低;(4)我国三大区域间交通运输业 TFP 并未表现出 sigma 收敛特征;(5)要素质量和产业结构两类因素对我国交通运输业 TFP 具有正向作用,相关因素的趋势性变化致使我国交通运输业 TFP 呈现出发散格局。

入藏号: CSCD:6562790

地址: Peng Zhimin, School of Economy and Management,Changan University;;Center of Comprehensive Transport Economic Management,Changan University, ;; Xian;;Xian, Shaanxi;;Shaanxi 710064;;710064.

Wu Qunqi, School of Economy and Management,Changan University;;Center of Comprehensive Transport Economic Management,Changan University, ;; Xian;;Xian, Shaanxi;;Shaanxi 710064;;710064.

地址: 彭志敏, 长安大学经济与管理学院;;长安大学综合运输经济管理研究中心, ;; 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

吴群琪, 长安大学经济与管理学院;;长安大学综合运输经济管理研究中心, ;; 西安;;西安, 陕西;;陕西 710064;;710064, 中国.

电子邮件地址: cadxpzm@163.com

电子邮件地址: cadxpzm@163.com

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第 5 条, 共 9 条

作者: Wang Yiqi; Li Guoping; Yan Buqing

作者: 王奕淇; 李国平; 延步青

标题: Sharing of watershed ecosystem service value horizontal compensation burden by downstream cities

标题: 流域生态服务价值横向补偿分摊研究

来源出版物: 资源科学 卷: 41 期: 6 页: 1013-1023 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: ecosystem service value; horizontal compensation; social utility; share of burden;

analytic hierarchy process; structural entropy weight method; Weihe River watershed

作者关键词: 生态服务价值; 横向补偿; 社会效用; 分摊份额; 层次分析法; 结构熵权法; 渭河流域

摘要: Horizontal ecological compensation as an important institutional arrangement for achieving ecological protection and promoting coordinated development between upstream and downstream areas can realize both socioeconomic and environmental benefits in a win-win situation. Based on the principles of welfare economics and environmental economics, this study constructed a theoretical model for horizontal compensation of watershed ecological service value that can maximize social utility. It is found that only when downstream local governments transfer funds to an upstream area in a fair amount can upstream area's reduction in utility caused by protecting ecosystem services be reasonably compensated for. By combining analytic hierarchy process with structural entropy weight method, we calculated weights of horizontal compensation that should be shared by local governments in a downstream area. Taking the Weihe River watershed as an example, it is estimated that the proportions of the horizontal compensation for the upstream area by Baoji, Xianyang, Xi'an, and Weinan city governments of the Weihe River watershed downstream area are 27.11%, 22.24%, 29.82%, and 20.83%. Thereby, the horizontal compensation share of the downstream local governments that can improve social utility is obtained. In the proposed burden-sharing scheme, the proportion of compensation burden to be borne by Xi'an, Baoji, Xianyang, and Weinan governments decreases successively, in line with the economic development level of the four cities. The assessment results quantitatively determine the responsibility of the local governments of the downstream area, which not only gives consideration to efficiency and fairness, but also helps strengthen the sense of responsibility of the local governments in the downstream area to protect and build the ecological environment of the watershed.

摘要: 横向生态补偿作为实现绿水青山就是金山银山、促进流域上下游间协调发展的重要制度保障,可实现社会效益和生态环境效益的双赢。本文基于福利经济学与环境经济学原理,构建了能实现社会效用最大化的流域生态服务价值横向补偿的理论模型,发现只有下游各地方政府给予上游公平合理的补偿,才能弥补上游由于实施生态保护而导致的效用的减少。然后通过层次分析法与结构熵权法相结合,测算下游各地方政府应分摊的横向补偿的权重。并以渭河流域为例,测算得到渭河流域下游的宝鸡市政府、咸阳市政府、西安市政府与渭南市政府对流域上游横向补偿的分摊比例分别为 27.11%、22.24%、29.82%、20.83%,该分摊方案定量划分了下游各地方政府应承担的责任,而且分摊比例与上述 4 市的经济发展情况相匹配,兼顾效率与公平,也利于强化下游各地方政府保护与建设流域生态环境的责任感和使命感。

入藏号: CSCD:6525239

地址: Wang Yiqi, School of Economics and Management, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Guoping, School of Economics and Finance, Xi'an Jiaotong University, Xi'an, Shaanxi 710061, China.

Yan Buqing, School of Economics and Finance, Xi'an Jiaotong University, Xi'an, Shaanxi 710061, China.

地址: 王奕淇, 长安大学经济与管理学院, 西安, 陕西 710064, 中国.

李国平, 西安交通大学经济与金融学院, 西安, 陕西 710061, 中国.

延步青, 西安交通大学经济与金融学院, 西安, 陕西 710061, 中国.

电子邮件地址: wangyiqi17@126.com

电子邮件地址: wangyiqi17@126.com

使用次数 (最近 180 天): 0

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第 6 条, 共 9 条

作者: Yuan Changwei; Liu Ke; Rui Xiaoli

作者: 袁长伟; 刘珂; 芮晓丽

标题: Spatial Analysis on Traffic Carbon Emissions and Energy Consumption Based on Grey Relational Model

标题: 基于灰色关联的交通碳排放与能耗空间分析

来源出版物: 环境科学与技术 卷: 42 期: 3 页: 158-164 出版年: 2019

文献号: 1003-6504(2019)42:3<158:JYHSG>2.0.TX;2-4

来源出版物: Environmental Science and Technology 卷: 42 期: 3 页: 158-164 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: transport; carbon emission; grey relational analysis; degree of association

作者关键词: 交通运输; 碳排放; 灰色关联理论; 关联度

摘要: To identify the correlates between transport carbon emissions with comprehensive energy consumption structure of Chinese provinces and provide the basis for the differential design of low-cost carbon-abatement policies, the gray correlation model has been built. The result shows that the absolute correlation degrees of transport carbon emissions and comprehensive energy consumption structure of Chinese provinces have few differences, but relative correlation degree does. Provinces of Yunnan, Heilongjiang and south-east littoral have higher synthetic correlation degree. For the region of high correlation degrees, controlling energy consumption and optimizing energy structure are the useful method to curb carbon emissions.

摘要: 为明晰中国省域交通碳排放强度与综合能耗结构之间的关联关系,为差异化碳减排政策的设计提供依据,文章基于灰色关联理论,构建了交通碳排放强度与综合能耗结构之间的灰色关联模型,并对其结果进行空间差异化分析。结果表明:各省交通碳排放强度与综合能耗结构间的绝对关联度数值差异较小,相对关联度的跨度差异较大,综合关联度大的地区分布在云南、黑龙江以及东南沿海等地。对于关联程度较高的省份,可通过调整能耗量、优化能耗结构等途径控制碳排放。

入藏号: CSCD:6485096

地址: Yuan Changwei, School of Economics and Management, Changan University, Xi'an, Shaanxi 710064, China.

Liu Ke, School of Economics and Management, Changan University, Xi'an, Shaanxi 710064, China.

Rui Xiaoli, School of Economics and Management, Changan University, Xi'an, Shaanxi 710064, China.

地址: 袁长伟, 长安大学经济与管理学院, 西安, 陕西 710064, 中国.

刘珂, 长安大学经济与管理学院, 西安, 陕西 710064, 中国.

芮晓丽, 长安大学经济与管理学院, 西安, 陕西 710064, 中国.

电子邮件地址: yuanchangwei@126.com; lkechn@126.com

电子邮件地址: yuanchangwei@126.com; lkechn@126.com

使用次数 (最近 180 天): 0

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作者: Wang Yiqi; Li Guoping

作者: 王奕淇; 李国平

标题: The evaluation of the watershed ecological compensation standard of ecosystem service value: a case of Weihe watershed upstream

标题: 流域生态服务价值供给的补偿标准评估--以渭河流域上游为例

来源出版物: 生态学报 卷: 39 期: 1 页: 108-116 出版年: 2019

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作者关键词: ecosystem service value; watershed ecological compensation; compensation standard; Weihe watershed

作者关键词: 生态服务价值; 流域生态补偿; 补偿标准; 渭河流域

摘要: The report of the 19th National Congress clearly states that we should improve the system of recuperation of rivers and lakes, and establish a diversified ecological compensation mechanism. The determination of watershed ecological compensation standards is a key element in establishing a scientific watershed ecological compensation mechanism. For the calculation, few scholars consider that the compensation standards should eliminate the consumption of the region based on the ecological service supply from a fair perspective. Firstly, the article makes an assessment on the basis of the supply behavior of the watershed ecological service providers and the ecological compensation standard of watershed, proposing that the watershed ecological

compensation standard should be based on the ecological environment value, and compensating for the ecological spillover environmental value of ecological protection behavior. Secondly, taking Weihe watershed as an example, based on the theoretical analysis, the ecosystem service value supply from 2006 to 2015 in the Weihe upstream was calculated by using equivalent factor method, and the water footprint method was used to calculate and remove the ecosystem service value from 2006 to 2015, which the upper Weihe have consumed. Finally, the compensation standard that Weihe upstream should obtain, increased from 1.282 billion yuan in 2006 to 4.409 billion yuan in 2015; thus, showing an overall growth trend, indicating that the upstream has continuously made efforts to protect the watershed ecological environment, and continuously increasing the remaining ecological service value supply for the downstream.

摘要: 十九大报告明确提出,健全河流湖泊休养生息制度,建立多元化的生态补偿机制,而准确核算流域生态服务价值供给的补偿标准是建立科学的流域生态补偿机制的关键要素。对于补偿标准的核算,鲜有学者从公平的视角出发,考虑补偿标准应在生态服务价值供给的基础上剔除本地区的自身消费。首先对流域生态服务供给方的供给行为与流域生态补偿标准的评估依据进行理论探讨,提出流域生态补偿标准应以生态环境价值为依据,对生态保护行为的生态外溢环境价值进行补偿;其次,在理论分析的基础上以渭河流域为例,构建当量因子模型测算渭河上游 2006-2015 年供给的生态服务价值,并结合水足迹法测算并剔除 2006-2015 年渭河上游自身消费的生态服务价值;最后,测得渭河上游应获得的补偿标准由 2006 年的 12.82 亿元上升至 2015 年的 44.09 亿元,总体呈增长趋势,说明上游为保护流域生态环境不断付出努力,不断增加对下游的剩余生态服务价值供给。

入藏号: CSCD:6409754

地址: Wang Yiqi, School of Economics and Management, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Guoping, School of Economics and Finance, Xi'an Jiaotong University, Xi'an, Shaanxi 710061, China.

地址: 王奕淇, 长安大学经济与管理学院, 西安, 陕西 710064, 中国.

李国平, 西安交通大学经济与金融学院, 西安, 陕西 710061, 中国.

电子邮件地址: wangyiqi17@126.com

电子邮件地址: wangyiqi17@126.com

使用次数 (最近 180 天): 1

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作者: Li Wuqiang; Ni Guanqun; Xu Xiaoqing

作者: 李武强; 倪冠群; 许晓晴

标题: Policy of customer-intensive service for customers with heterogeneous waiting cost

标题: 基于等待成本差异的顾客密集型服务策略研究

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作者关键词: Customer-intensive service; M/M/1 queuing model; Heterogeneous customers; Service time; Pricing

作者关键词: 顾客密集型服务; M/M/1 排队模型; 异质性顾客; 服务时间; 定价

摘要: The customer-intensive services mainly refer to the services required at a high level of diligence and attention. In comparison with traditional manufacturing industries, the customer of customer-intensive service is not only a consumer. Moreover, the customer (self, belongings, information, etc.) is also a significant part to the service process and output, but does not control most service production means. In reality, many service industries have these properties, especially in the face-to-face service industry. The typical examples of customer-intensive service are financial consulting, personal care and medical diagnosis. In customer-intensive services, the service quality and the value provided by the service increase with the time the service provider spends with the customer, and the waiting time customers extends. Meantime, the value provided by the service decreases when the service time is shorter and it makes the service worthless. As in many studies, the waiting cost considered as a key factor of service selection is influenced by personal situations, such as whether the customer is on vacation, busy or not. How can the provider's revenue by designing service speed and price be maximized when customers have heterogeneous waiting cost? The M/M/1 queuing model is introduced to solve this problem. To simplify our study, the heterogenous customers are divided into H customers (with high unit time waiting cost) and L customers (with low unit time waiting cost). The customer assumed as economic man would decide whether to join the service queue based on the perceived value of the service, the expected waiting cost and the price. Four effective policies are designed for service provider based on the customers' service decision in the queue equilibrium situation, such as the policy 1 S (all customers choose the service) and 2 S (partial H customers and all L customers choose the service) designed based on H customers, the policy 3 S (only all L customers choose the service) and 4 S (only partial L customers choose the service) designed based on L customers. Because of the high waiting cost of H customer, the net-value of L customer is higher than that of H customer when they are in the same queue. So, if the provider selects the policy based on H customer, all L customers will join in the queue, and no H customer will join in the queue when the policy designed based on L customer is selected. From another point of view, the policies designed based on H customer are actually to serve more customers. The policies designed based on L customer, to a certain extent, discriminate against H customer and are to receive more revenue from every serviced customer. The optimal service speed, price and provider's revenue of the four policies are given, respectively. We find that along with the increase of potential customer arriving rate, the provider's optimal decision, in turn, designs the policy based on H customer, policy 3 S ,policy 4 S . The provider's revenue will increase to the fixed maximum when the policy 4 S with fixed optimal service speed and price is adopted. Moreover, as the potential

arriving rate is low, the provider's revenue is more susceptible to the potential customer structure (e.g., the L customer's proportion) and the gap of unit time waiting cost between heterogenous customers. Thus, it is uncertain to know which policy is optimal in low potential arriving rate. Finally, when customer structure remains unchanged, the applicable scope of the policy designed based on H customer increases with the narrowing gap of customers' unit time waiting cost.

摘要: 在顾客密集型服务中,服务效果同服务速度成反比,服务效率的提高受到限制,等待难以避免。而等待成本往往是顾客考虑是否选择服务的重要因素,且因人而异,因此当服务商面对单位时间等待成本不同的顾客时,该如何制定服务速度与价格才能使得收益最大化?基于 M/M/1 排队系统针对服务商面对单位时间等待成本不同的两类顾客情景进行研究,根据队列均衡状态下顾客对于服务的选择情况提出了四种有效策略,通过对比分析发现:当顾客潜在到达速率较小时,以单位时间等待成本较高的顾客(H 顾客)为基准制定服务策略最优;而当潜在到达速率较大时,则应该以单位时间等待成本较低的顾客为基准制定策略;且随着两类顾客等待成本差距的缩小,以 H 顾客为基准所制定策略的适用范围也相对扩大。

入藏号: CSCD:6414818

地址: Li Wuqiang, School of Economics and Management, Chang'an University, Xi'an, Shaanxi 710064, China.

Xu Xiaoqing, School of Economics and Management, Chang'an University, Xi'an, Shaanxi 710064, China.

Ni Guanqun, School of Management, Fujian Agriculture and Forestry University, Fuzhou, Fujian 350002, China.

地址: 李武强, 长安大学经济与管理学院, 西安, 陕西 710064, 中国.

许晓晴, 长安大学经济与管理学院, 西安, 陕西 710064, 中国.

倪冠群, 福建农林大学管理学院, 福州, 福建 350002, 中国.

使用次数 (最近 180 天): 0

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作者: Sun Qipeng; Guo Xin; Ma Fei

作者: 孙启鹏; 郭鑫; 马飞

标题: Modeling and Simulation of Inter-City Passenger Travel Service Flow Based on Petri Net

标题: 基于 petri 网的城际旅客出行服务流程建模与仿真

来源出版物: 系统仿真学报 卷: 31 期: 2 页: 189-198 出版年: 2019

文献号: 1004-731X(2019)31:2<189:JYPWDC>2.0.TX;2-A

来源出版物: Journal of System Simulation 卷: 31 期: 2 页: 189-198 出版年: 2019

文献号: 1004-731X(2019)31:2<189:JYPWDC>2.0.TX;2-A

语言: Chinese

文献类型: Article

作者关键词: Visual Object Net++; inter-city travel chain; passenger service process; Petri net; visual object net++

作者关键词: 城际出行链; 旅客服务流程; Petri 网

摘要: On the basis of inter-city passenger travel chain,the inter-city passenger transport service process is studied;the Petri net language is used for establishing and simulating the model of inter-city passenger transport service process based on the Visual Object Net++;and the simulation results are used for verifying the reliability of the established model with the theory of petri net,while the model is transformed into a homogeneous Markov chain with the process.The detailed analysis on the city subway of the inter-city passenger transport service process was carried out.By modeling and simulating,the derived value of city subways average service time is 18 minutes,while the quantitative analysis focused on the improvement of the links of process,so as to further optimize the inter-city passenger transport service process.

摘要: 在对城际旅客出行链分析的基础上,对城际旅客出行服务流程进行研究,采用 Petri 网语言进行数学表示,利用 Visual Object Net++ 仿真平台,构建和仿真了城际旅客出行服务流程 Petri 网模型,并结合 Petri 网理论验证所建 Petri 网模型的可靠性,同时将模型转化为与马尔可夫链同构的过程。对城际旅客出行服务流程中的市内交通地铁出行子环节进行了详细的分析,通过建模与仿真确定市内地铁出行子网的平均服务时间为 18 分钟,定量分析出此流程中需重点改进的环节,以便进一步优化城际旅客出行服务流程。

入藏号: CSCD:6436397

地址: Sun Qipeng, College of Economics and Management,Changan University, Xian, 710064.

Guo Xin, College of Economics and Management,Changan University, Xian, 710064.

Ma Fei, College of Economics and Management,Changan University, Xian, 710064.

地址: 孙启鹏, 长安大学经济与管理学院, 西安, 陕西 710064, 中国.

郭鑫, 长安大学经济与管理学院, 西安, 陕西 710064, 中国.

马飞, 长安大学经济与管理学院, 西安, 陕西 710064, 中国.

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建筑学院

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作者: Ding Hua; Zhang Maosheng; Gou Qingqing; Dong Ying; Sun Pingping; Lu Yan

作者: 丁华; 张茂省; 苟青青; 董英; 孙萍萍; 吕艳

标题: Characteristics and Sustainable Development &Utilization of Geological Relics in Guanzhong Basin Urban Agglomeration

标题: 关中盆地城市群地质遗迹特征及可持续开发利用

来源出版物: 西北地质 卷: 52 期: 2 页: 37-45 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: Guanzhong Basin urban agglomeration; geological relics type; spatial distribution characteristics; geological tourism zoning; sustainable development and utilization

作者关键词: 关中盆地城市群; 地质遗迹类型; 空间分布特征; 地质旅游区划; 可持续开发利用

摘要: Geological relics have become as an indispensable factor in the planning and development of economic zones and urban agglomerations, livable cities construction, ecological civilization, rural revitalization, poverty alleviation and the construction of geological and cultural villages. Through carrying out the special survey of geological relics in the Guanzhong Basin urban agglomeration, a total of 429 geological relics have been found, among which 146 ones are valuable. On the whole, these geological relics have various types and unique connotations, mainly including stratigraphic sections, paleontological fossils, geological landforms and water landscapes. They have extensive spatial distribution, their spatial structure type presents a condensed non-uniform distribution, and the neotectonic activities have a good consistency with the spatial distribution and changes of geomorphology, water system, quaternary sedimentation, hot springs, earthquakes and geological disasters. According to the principles of resource occurrence attribute, geological relic integrity and traffic convenience, these geological relics have been divided into 3 geological relic landscape zones, 10 geological relic landscape subzones and 22 geological relic landscape area. Aiming at the problems existing in economic zones and urban agglomerations, livable cities, ecological civilization, rural revitalization construction and geological heritage development and utilization, it is necessary to build a number of national and provincial geological parks, research bases, tourist resorts, tourist scenic spots, characteristic towns and the geological and cultural villages, forming a multi-level and diversified development and utilization and protection path.

摘要: 地质遗迹已成为经济区和城市群规划发展、宜居城市建设、生态文明、乡村振兴、脱贫攻坚以及地质文化村建设中不可或缺的因素。通过关中盆地城市群地质遗迹专项调查,共发现地质遗迹点 429 处,其中具有价值的地质遗迹 146 处;整体上类型多样、内涵独特,以地层剖面、古生物化石、地质地貌、水体景观等为主;空间分布范围广泛,空间结构类型呈现凝聚型不均匀分布,新构造活动与地貌、水系、第四纪沉积、温泉、地震和地质灾害的空间分布及其变化具有良好的一致性。根据资源赋存属性、地质遗迹完整性及交通便捷性等原则,将地质遗迹区域划分为 3 个地质遗迹景观带、10 个地质遗迹景观亚带、22 个地质遗迹景观区。针对经济区和城市群、宜居城市、生态文明、乡村振兴建设与地质遗迹开发利用及保护中存在的问题,应建设一批国省地质公园、研学基地、旅游度假区、旅游风景道、特色小镇以及地质文化村,形成多层次、多样化的开发利用和保护路径。

入藏号: CSCD:6515823

地址: Ding Hua, Chang'an University, Xi'an, Shaanxi 710061, China.

Gou Qingqing, Chang'an University, Xi'an, Shaanxi 710061, China.

Lu Yan, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Maosheng, Xi'an Center of China Geological Survey/Northwest China Center for Geoscience Innovation, Key Laboratory for Geo-hazards in Loess Area, MNR, Xi'an, Shaanxi 710054, China.

Dong Ying, Xi'an Center of China Geological Survey/Northwest China Center for Geoscience Innovation, Key Laboratory for Geo-hazards in Loess Area, MNR, Xi'an, Shaanxi 710054, China.

Sun Pingping, Xi'an Center of China Geological Survey/Northwest China Center for Geoscience Innovation, Key Laboratory for Geo-hazards in Loess Area, MNR, Xi'an, Shaanxi 710054, China.

地址: 丁华, 长安大学, 西安, 陕西 710061, 中国.

苟青青, 长安大学, 西安, 陕西 710061, 中国.

吕艳, 长安大学, 西安, 陕西 710061, 中国.

张茂省, 中国地质调查局西安地质调查中心/西北地质科技创新中心, 自然资源部黄土地质灾害重点实验室, 西安, 陕西 710054, 中国.

董英, 中国地质调查局西安地质调查中心/西北地质科技创新中心, 自然资源部黄土地质灾害重点实验室, 西安, 陕西 710054, 中国.

孙萍萍, 中国地质调查局西安地质调查中心/西北地质科技创新中心, 自然资源部黄土地质灾害重点实验室, 西安, 陕西 710054, 中国.

电子邮件地址: 1426493648@qq.com; xazms@126.com

电子邮件地址: 1426493648@qq.com; xazms@126.com

使用次数 (最近 180 天): 0

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第 2 条, 共 8 条

作者: Liu Ling; Liu Jiaping

作者: 刘凌; 刘加平

标题: Applied Analysis of Wall Asymmetric Insulation Design Principle Based on Comprehensive Outdoor Temperature

标题: 基于室外空气综合温度的墙体非对称式保温设计原理的应用分析研究

来源出版物: 建筑科学 卷: 35 期: 8 页: 65-68,75 出版年: 2019

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作者关键词: wall asymmetric insulation design; comprehensive outdoor temperature; wall radiation; thermal sensing; applied analysis

作者关键词: 墙体非对称式保温设计; 室外空气综合温度; 壁面辐射; 热感受; 应用分析

摘要: Wall asymmetric heating design principle is a wall insulation design method to achieve the same radiant heat sensing of the walls at different orientations. Based on the climatic conditions in the cold area, this research used theoretical analysis and numerical simulation analysis to verify that the wall asymmetric heating design method has two advantages compared with the traditional thermal insulation design method, that is, it can reduce the use of external insulation materials while ensuring the indoor thermal environment and reduce energy consumption based on the constant use of exterior insulation materials.

摘要: 墙体非对称式保温设计原理是基于室外空气综合温度对于建筑不同朝向的影响下,为了使不同朝向外墙具有相同壁面辐射热感受而提出的一种墙体保温设计方法。本文以寒冷地区气候条件为例,运用理论分析和数值模拟分析的方法,分别验证了与传统保温设计方法相比墙体非对称式保温设计方法具有两方面的优势,即在保证建筑室内热环境不变的情况下,减少建筑外墙保温材料的用量;以及在建筑外墙保温材料用量不变的基础上,建筑能耗的降低。

入藏号: CSCD:6562900

地址: Liu Ling, Chang'an university, Xi'an, Shaanxi 710061, China.

Liu Jiaping, Xi'an Architecture & Technology university, Xi'an, Shaanxi 710055, China.

地址: 刘凌, 长安大学, 西安, 陕西 710061, 中国.

刘加平, 西安建筑科技大学, 西安, 陕西 710055, 中国.

电子邮件地址: apple60521@163.com

电子邮件地址: apple60521@163.com

使用次数 (最近 180 天): 0

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作者: Li Chen; Xu Wenping; Meng Xianfeng; Li Yu; Pan Biao

作者: 李琛; 徐文平; 孟宪锋; 李宇; 潘彪

标题: Seismic Energy Response Analysis of Simple Supported Beam Bridge

标题: 公路简支梁桥的地震能量响应分析

来源出版物: 震灾防御技术 卷: 14 期: 3 页: 555-563 出版年: 2019

文献号: 1673-5722(2019)14:3<555:GLJZLQ>2.0.TX;2-I

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文献号: 1673-5722(2019)14:3<555:GLJZLQ>2.0.TX;2-I

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文献类型: Article

作者关键词: Simple-supported beam bridge; Seismic energy response; Input seismic energy; Hysteretic energy dissipation; Damping energy dissipation

作者关键词: 公路简支梁桥; 地震能量响应; 地震输入能; 滞回耗能; 阻尼耗能

摘要: SAP2000 is used to build the finite-element analysis (FEA) model of one simple supported beam bridge. By inputting seven typical ground motions, the seismic energy response and its distribution are analyzed based on seismic energy response equation. The results are obtained as followings: ① Effect of flexible foundation on seismic energy response and its distribution of simple supported beam bridge is less. ② As site become soften, the input seismic energy, hysteretic energy dissipation and hysteretic energy dissipation ratio increases, but damping energy dissipation and damping energy dissipation ratio decreases. It is because that damping is increased along with the foundation soil which can share part of inelastic deformation. ③ With increasing of PGA, input seismic energy increases. As the result, the inelastic deformation of plastic hinge increases. It suggests that the hysteretic energy dissipation and damping energy dissipation increases too.

摘要: 利用有限元软件 SAP2000 建立了某公路简支梁桥的有限元模型,以 7 条典型强震记录为输入,研究了公路简支梁桥的地震能量响应及其分配规律。结果表明:①地基柔性效应对公路简支梁桥的地震能量响应及其分配规律的影响较小;②当场地土质变软时,地震总输入能、结构阻尼耗能比和结构滞回耗能比均呈递增趋势,而结构滞回耗能和结构滞回耗能比则不断减小,即地基土体作为桥梁动力系统的一部分,增大了系统阻尼,并分担了部分非弹性变形;③随着 PGA 增大,输入结构的地震能量也增加,导致塑性铰的非弹性变形增加,即结构滞回耗能和结构阻尼耗能增大。

入藏号: CSCD:6649555

地址: Li Chen, School of Architecture, Chang'an University, Xi'an, Shaanxi 710064, China.

Xu Wenping, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Yu, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.

Meng Xianfeng, China Airport Planning & Design Institute Co., Ltd., Beijing 100029, China.

Pan Biao, T.Y.Lin International Engineering Consulting (China) Co., Ltd., Chongqing 401121.

地址: 李琛, 长安大学, 建筑学院, 西安, 陕西 710064, 中国.

徐文平, 长安大学, 公路学院, 西安, 陕西 710064, 中国.

李宇, 长安大学, 公路学院, 西安, 陕西 710064, 中国.

孟宪锋, 民航机场规划设计研究总院有限公司, 北京 100029, 中国.

潘彪, 林同棧国际工程咨询(中国)有限公司, 重庆 401121, 中国.

电子邮件地址: 306387188@qq.com; liyu@chd.edu.cn

电子邮件地址: 306387188@qq.com; liyu@chd.edu.cn

使用次数 (最近 180 天): 0

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第 4 条, 共 8 条

作者: Liu Jiaping; Dong Xiao

作者: 刘加平; 董晓

标题: Architectural Innovation and New Architectural Civilization:On the Development of Green Building and the Revision of Architectural Policy in the New Period

标题: 建筑创新与新建筑文明---兼论新时期绿色建筑发展与建筑方针

来源出版物: 城市发展研究 卷: 26 期: 11 页: 1-4 出版年: 2019

文献号: 1006-3862(2019)26:11<1:JZCXYX>2.0.TX;2-S

来源出版物: Urban Studies 卷: 26 期: 11 页: 1-4 出版年: 2019

文献号: 1006-3862(2019)26:11<1:JZCXYX>2.0.TX;2-S

语言: Chinese

文献类型: Article

作者关键词: Green Building; Architectural Policy; Architectural Culture; Architectural Civilization

作者关键词: 绿色建筑; 建筑方针; 建筑文化; 建筑文明

摘要: Chinese society has entered a new era of green development. Low-carbon and smart cities,green buildings are the permanent theme of the development of urban and rural construction industry in the new era. In the long history of Chinese history and civilization,traditional architectural civilization occupies an extremely important position,only because it measures the advanced degree of many cities and architectural culture. The regional traditional architecture inherited from dynasties to dynasties,which Chinese people are proud of today,is not only the carrier of multi-ethnic architectural culture in different regions of our country,but also contains the construction wisdom and experience accumulated by our ancestors in the agricultural era. We should protect and inherit these precious architectural cultural heritage,and create a new architectural civilization that represents the development level of today's society. " Low carbon" and " green" should be the " source" power of urban and architectural development in the new era,and also the connotation of future cities and buildings. The author makes a preliminary discussion from the revision of the architectural policy in the new period to the technical route of the development of low-carbon cities and green buildings.

摘要: 中国社会已经进入绿色发展新时期,低碳与智慧城市、绿色建筑是新时期城乡建设行业发展的核心主题。在中华历史文明的长河中,因传统建筑文明可以衡量城市与建筑文化先进的程度而占有极其重要的地位。国人如今引以自豪的历朝历代传承下来的地域性传统建筑,既是我国不同地域多民族建筑文化的载体,也蕴含着我国先民们在农耕时代积淀的建造智慧和经验。我们应该保护和传承这些宝贵的建筑文化遗产,还应该创造代表当今社会发展水平的新的建筑文明。低碳、绿色应该成为新时期城市与建筑发展的源动力,也将是未来城市与建筑的内涵。从新时期建筑方针的思考,到低碳城市与绿色建筑发展的技术路线等方面,做了初步的论述。

入藏号: CSCD:6622102

地址: Liu Jiaping, 710064.

Dong Xiao, 710064.

地址: 刘加平, 长安大学建筑学院, 西安, 陕西 710064, 中国.

董晓, 长安大学建筑学院, 西安, 陕西 710064, 中国.

电子邮件地址: 564939518@qq.com

电子邮件地址: 564939518@qq.com

使用次数 (最近 180 天): 1

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作者: Fan Yujiang; Yu Binshan; Xiong Ergang; Miao Xiaoyu

作者: 樊禹江; 余滨杉; 熊二刚; 苗晓瑜

标题: Seismic damage evaluation on interior joints of frame constructed of enhanced recycled aggregate concrete

标题: 性能增强再生混凝土框架中节点地震损伤评估

来源出版物: 世界地震工程 卷: 35 期: 2 页: 123-131 出版年: 2019

文献号: 1007-6069(2019)35:2<123: XNZQZS>2.0.TX;2-U

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语言: Chinese

文献类型: Article

作者关键词: enhanced recycled aggregate concrete; ductile damage model; park-ang damage model; damage evaluation

作者关键词: 性能增强再生混凝土; 延性损伤模型; Park-Ang 损伤模型; 损伤评估

摘要: Three full-scale interior joints of the enhanced recycled aggregate concrete(EC-RAC) frame were tested with low-cyclic loading. Its damage evolution and accumulation were analyzed by traditional Ductile Damage Model (single parameter) and Improved Park-Ang Damage Model (double parameters): When the characteristic displacement of each specimen reached 20 mm,damage occurred in the specimen,but the calculated results according to the Ductile Damage Model was negative. When the characteristic displacement exceeded 100 mm,the calculated results based on the Improved Park-Ang Damage Model shown that: each specimen had been completely destroyed with no load-carrying capacity. However,it is shown from the test results that they still had a certain loadcarrying and energy-consuming capacity. Therefore,it is necessary to revise the aforementioned damage models for the enhanced recycled aggregate concrete structure. Based on the above experimental results,the fiber term coefficient, displacement term coefficientand energy term coefficient were proposed for the Improved Park-Ang Damage Model. Then,a modified Park-Ang Damage Model was established. Taking specimen HF-RAC2 as an example, the error of the damage index for the model was analyzed. The results show that the average error was within 6%, which means the damage model can be applied to the EC-RAC frame joints for seismic damage evaluation.

摘要: 通过对 3 个足尺性能增强再生混凝土框架中节点进行低周反复加载试验,按照传统延性损伤模型(单参数)、改进的 Park-Ang 损伤模型(双参数)对其损伤演化与累积进行分析:各试件特征位移等于 20 mm 时,试件已经出现损伤,但按照延性损伤模型计算结果为负;当特征位移超过 100 mm 时,改进的 Park-Ang 损伤模型计算结果表明各试件已经完全破坏,无法继续

承载,但试件实际结果却仍表现出一定的承载能力与耗能能力。因而有必要对前述损伤模型进行修正,使其能够适用于性能增强再生混凝土结构之中。基于前述试验结果,针对改进的 Park-Ang 损伤模型,提出并拟合了纤维项系数、位移项系数和能量项系数 3 种修正系数,并建立了相应的修正的 Park-Ang 损伤模型。最后,利用所提出的损伤模型,以 HF-RAC2 为例进行了损伤指标误差分析,结果表明:平均误差在 6% 以内,即:所提出双参数损伤模型能够应用于性能增强再生混凝土框架节点地震损伤与评估分析之中。

入藏号: CSCD:6538571

地址: Fan Yujiang, Chang'an University School of Architecture;;Chang'an University School of Civil Engineering, ;; Xi'an;;Xi'an, ;; 710061;;710061.

Yu Binshan, Northwestern Polytechnical University School of Mechanics, Civil Engineering and Architecture, Xi'an, Shaanxi 710072, China.

Xiong Ergang, Chang'an University School of Civil Engineering, Xi'an, Shaanxi 710061, China.

Miao Xiaoyu, Chang'an University School of Civil Engineering, Xi'an, Shaanxi 710061, China.

地址: 樊禹江, 长安大学建筑学院;;长安大学建筑工程学院, ;; 西安;;西安, 陕西;;陕西 710061;;710061, 中国.

余滨杉, 西北工业大学力学与土木建筑学院, 西安, 陕西 710072, 中国.

熊二刚, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

苗晓瑜, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: fanyujiangchd@163.com

电子邮件地址: fanyujiangchd@163.com

使用次数 (最近 180 天): 0

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第 6 条, 共 8 条

作者: Luo Jing; Zhang Wei; Hu Zhiping; Cui Wenwen; Wang Jihao

作者: 罗婧; 张炜; 胡志平; 崔雯雯; 王吉豪

标题: Studies of indoor environmental characteristics of and design ideas for urban underground space:taking the Xi'an SAGA International Shopping Center as an example

标题: 浅析城市地下空间室内环境特点及设计思路:以西安赛格国际购物中心为例

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语言: Chinese

文献类型: Article

作者关键词: urban underground space; environmental characteristics; interior design; Xi'an

SAGA International Shopping Center

作者关键词: 城市地下空间; 环境特点; 室内设计; 西安赛格国际购物中心

摘要: Rapid urbanization in China has led to the continuing expansion of urban space and population, causing growing problems of urban traffic congestion, environmental pollution and increasingly scarce land resources. Since urban underground space is an important part of urban resources, proper development of underground cities may alleviate these problems to some extent. In this report, we briefly described the current status of urban underground space development and utilization in China and the types of urban underground space applications, and analyzed the characteristics of the internal environment of underground space such as constant temperature, heat insulation, high humidity, poor air circulation, insufficient natural lighting, lack of natural landscape and ecological support, etc. Taking the Xi'an SAGA International Shopping Center as an example, we then summarized the key concepts and procedures in underground complex interior design using natural and artificial lighting, plant water and interface design. Finally, we proposed the following optimization ideas on urban underground commercial space interior design: (1) Design clear spatial layout that conforms to human spatial cognition habit; (2) Introduce natural lighting through entrance expansion or modern technology; (3) Use artificial lighting that simulates natural lighting; (4) Introduce natural elements to achieve natural transition between indoor and outdoor environments and create open and vibrant underground space to alleviate human psychological and physiological barriers; (5) Design variable dimensions of underground space conforming to human scale to avoid discomfort; (6) Pay attention to people of reduced mobility and set up no-barrier access ways; (7) Set up ample rest areas; and (8) Encourage local design ideas to reflect regional cultural characteristics.

摘要: 随着中国城镇化进程的迅猛发展,城市规模不断扩大,人口不断增长,城市交通拥堵、环境污染、土地资源日益紧缺等问题日益凸显。城市地下空间作为城市资源的重要组成部分,适当的城市地下化发展可以在一定程度上缓解这些问题。文章简要叙述了目前我国城市地下空间开发利用的现状及应用类型,分析了地下空间的恒温性、隔热性、湿度较大、环境封闭空气流通性差、天然光线不足、缺乏自然景观、没有外部形态等内部环境特点。以西安赛格国际购物中心为例,从自然采光、人工照明、植物水体和界面设计的角度概述了地下综合体室内设计的核心理念和关键步骤。最后提出了如下关于城市地下商业空间室内设计的优化思路:(1)空间布局明确,符合人的空间认知习惯;(2)通过扩大建筑入口和先进的技术手段,引入天然光;(3)运用照明模拟自然光;(4)引入自然元素,使室内外环境自然过渡,增加地下空间的活力,改善封闭感,缓解人的心理和生理障碍;(5)地下空间的各类尺度应符合人体尺度,避免产生不适感;(6)注重行动不便的人群,设置人性化的无障碍设施;(7)设计充足的休憩场所;(8)注重设计本土化,展现地域文化特色。

入藏号: CSCD:6520124

地址: Luo Jing, School of Architecture, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Wei, School of Architecture, Chang'an University, Xi'an, Shaanxi 710061, China.

Cui Wenwen, School of Architecture, Chang'an University, Xi'an, Shaanxi 710061, China.

Wang Jihao, School of Architecture, Chang'an University, Xi'an, Shaanxi 710061, China.

Hu Zhiping, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

地址: 罗婧, 长安大学建筑学院, 西安, 陕西 710061, 中国.

张炜, 长安大学建筑学院, 西安, 陕西 710061, 中国.

崔雯雯, 长安大学建筑学院, 西安, 陕西 710061, 中国.

王吉豪, 长安大学建筑学院, 西安, 陕西 710061, 中国.

胡志平, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: 609183819@qq.com; huzhping@chd.edu.cn

电子邮件地址: 609183819@qq.com; huzhping@chd.edu.cn

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作者: Dong Xiao; Liu Jiaping; Huo Xiaoping

作者: 董晓; 刘加平; 霍小平

标题: Analysis of Street Valley Space and Physical Environment of Ancient Town in Qinling Mountains Region

标题: 秦岭山地古镇街谷空间与物理环境解析

来源出版物: 建筑科学 卷: 35 期: 6 页: 155-162 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: Qinling Mountains; ancient town; street valley space; wind environment; sunshine; physical environment

作者关键词: 秦岭山地; 古镇; 街谷空间; 风环境; 日照; 物理环境

摘要: With the development of economic construction,the height of new buildings along the streets in Qinling Mountain Town,which has both ecological and cultural characteristics,gradually rises,and the comfort degree of physical environment such as sunshine and ventilation gradually decreases,and the spatial pattern of traditional street valleys gradually loses.Based on the measurement of the spatial scale of buildings on both sides of traditional streets and the current wind environment,the spatial scale and wind environment of traditional street valleys in Qinling Ancient Town are mastered. Combined with the characteristics of human scale sense,the specific control index of new street Valley space with comfortable sunshine and ventilation physical environment is studied by using the method of CFD software simulation and sunshine software analysis.It is hoped that this study will continue the traditional spatial pattern of street valleys in ancient towns in Qinling Mountains,create a comfortable physical environment of street Valley space,and provide design basis for the newly built building space along the street.

摘要: 随着经济建设发展,兼具生态和文化特色的秦岭山地古镇新建沿街建筑高度逐渐升高,相对日照、通风等物理环境舒适度逐渐降低,传统街谷空间格局也逐渐丧失.通过对传统街道两侧建筑空间尺度及现状风环境的实测,掌握秦岭古镇传统街谷空间尺度及风环境现状,并结

合人的尺度感特征,运用计算流体动力学(CFD)软件模拟及日照软件分析的方法,研究具有舒适日照、通风物理环境的新建街谷空间具体控制指标.希望通过本研究,延续秦岭山地古镇的传统街谷空间格局,营造具有舒适物理环境的街谷空间,对新建沿街建筑空间提供设计依据.

入藏号: CSCD:6519554

地址: Dong Xiao, Changan University,School of Architecture;;XiAn City Planning & Design Institute, ;; Xian;;Xian, ;; 710061;;710082.

Liu Jiaping, Xian University of Architecture And Technology, School of Architecture, Xian, 710055.

Huo Xiaoping, Changan University,School of Architecture, Xian, 710061.

地址: 董晓, 长安大学建筑学院;;西安市城市规划设计研究院, ;; 西安;;西安, ;; 710061;;710082.

刘加平, 西安建筑科技大学, 西安, 陕西 710055, 中国.

霍小平, 长安大学建筑学院, 西安, 陕西 710061, 中国.

电子邮件地址: 564939518@qq.com

电子邮件地址: 564939518@qq.com

使用次数 (最近 180 天): 0

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作者: Dong Xiao; Liu Jiaping; Huo Xiaoping

作者: 董晓; 刘加平; 霍小平

标题: STUDY ON STREETS SPACE WIND ENVIRONMENT OF HISTORICAL AND CULTURAL TOWNS OF QINLING MOUNTAINS

标题: 秦岭山地历史文化名镇街巷空间风环境研究

来源出版物: 工业建筑 卷: 49 期: 5 页: 46-52 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: Qinling Mountain; famous town; street scale; wind environment

作者关键词: 秦岭山地; 名镇; 街巷尺度; 风环境

摘要: Through the investigation of the historical and cultural towns in the Qinling Mountains and the actual measurement of the street wind environment,it was found that the wind speed in streets was low,the wind speed distribution is uneven,and the overall wind environment was poor. According to the characteristics of the building interface on both sides of the street,the width of

the street and the height of the buildings on both sides of the street, the relationship between the street scale and the wind environment was analyzed. Using the Computational Fluid Dynamics simulation software, the wind conditions of different high-width streets were simulated by using the upper and lower wind speed limit and the average wind speed of the human comfort wind speed as the initial conditions. The summer wind comfort speed ratio, winter wind comfort speed ratio, static wind ratio, and wind speed uniformity were used to analyze and evaluate the internal wind environment of the street from different angles. The street scale with a comfortable wind environment has been determined, in the process of the spatial extension of the historical and cultural towns in the Qinling Mountains.

摘要: 通过对秦岭山地历史文化名镇调查及街巷风环境实测,发现街巷风速较小、风速分布不均匀、总体风环境较差等现状问题。针对街巷两侧建筑界面形态、街巷宽度及街巷两侧建筑高度等要素,剖析了街巷尺度与风环境的作用关系。应用计算流体动力学模拟软件,分别以人感觉舒适风速的上下两个极限值及平均风速为初始条件,对不同高宽街巷进行风环境模拟。并采用夏季舒适风速比率、冬季舒适风速比率、静风区比率及风速均匀度等多个量化指标从不同角度对街巷内部风环境进行分析评价,确定了在秦岭山地历史文化名镇空间延展过程中具有舒适风环境的街巷尺度。

入藏号: CSCD:6504725

地址: Dong Xiao, School of Architecture, Chang'an University, Xi'an, Shaanxi 710061, China.

Liu Jiaping, School of Architecture, Xi'an University of Architecture and Technology, Xi'an, Shaanxi 710055, China.

Huo Xiaoping, Xi'an City Planning & Design Institute, Xi'an, Shaanxi 710082, China.

地址: 董晓, 长安大学建筑学院, 西安, 陕西 710061, 中国.

刘加平, 西安建筑科技大学建筑学院, 西安, 陕西 710055, 中国.

霍小平, 西安市城市规划设计研究院, 西安, 陕西 710082, 中国.

电子邮件地址: 564939518@qq.com

电子邮件地址: 564939518@qq.com

使用次数 (最近 180 天): 0

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公共管理与法学院

第 1 条, 共 2 条

作者: Cai Jie; Xia Xianli

作者: 蔡洁; 夏显力

标题: Can Land Transfer Ease or Aggravate the Multidimensional Poverty of Households?

标题: 农地转出: 缓解还是加剧了农户的多维贫困?

来源出版物: 长江流域资源与环境 卷: 28 期: 12 页: 2971-2979 出版年: 2019

文献号: 1004-8227(2019)28:12<2971:NDZCHJ>2.0.TX;2-R

来源出版物: Resources and Environment in the Yangtze Basin 卷: 28 期: 12 页: 2971-2979 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: land transfer behavior; multidimensional poverty; endogenous switching regression; concentrated contiguous areas of Liupan Mountain

作者关键词: 农地转出行为; 多维贫困; ESR 模型; 六盘山集中连片区

摘要: Based on the survey data of rural households in the contiguous area of Liupan Mountain, the paper comprehensively considers the bias and heterogeneity of sample selection, and analyzes the transfer decision to the household poverty index and the per income. The results show that: 52.97% of households participated in the transfer of agricultural land. The land transfer can significantly reduce the multidimensional poverty index of peasant households. Through further counterfactual hypothesis research, it was found that if the households who rent out the land do not rent out of farmland, the household's multidimensional poverty index will increase by 22.16%. If the non-transferred households have the opportunity to rent out the land, the household's multidimensional poverty index will drop by 30.22%. Although land transfer can reduce the family's multidimensional poverty index, it is constrained by the ideological consciousness of relying on the land for the livelihood. Concentrated farmers in contiguous destitute areas cannot make reasonable decisions.

摘要: 基于六盘山集中连片区的 1 112 户农户调研数据,在综合考虑样本选择偏差和异质性的基础上,通过构建内生转换模型分析了农户农地转出行为对多维贫困指数的影响。结果表明:农户农地转出行为能够显著地降低多维贫困指数。通过进一步的反事实假设研究,发现农地转出户如果不转出农地,多维贫困指数将提高 22.16%;未转出户如果有机会转出农地,多维贫困指数将下降 30.22%。尽管农地转出行为能够降低农户的多维贫困指数,但受制于以地为生思想意识的制约,集中连片区农户并不能做出合理的决策。

入藏号: CSCD:6637927

地址: Cai Jie, School of Public Administration and Law, Chang'an University, Xi'an, Shaanxi 710064, China.

Xia Xianli, College of Economics and Management, Northwest A & F University, Yangling, Shanxi 712100, China.

地址: 蔡洁, 长安大学公共管理与法学院, 西安, 陕西 710064, 中国.

夏夏力, 西北农林科技大学经济管理学院, 杨凌, 陕西 712100, 中国.

电子邮件地址: wh_caijie@126.com

电子邮件地址: wh_caijie@126.com

使用次数 (最近 180 天): 0

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第 2 条, 共 2 条

作者: Liu Lanjian; Li Huixu

作者: 刘兰剑; 李洄旭

标题: Is the policy effect equivalent? A comparative analysis based on ownership

标题: 政策效应是否等同? 基于所有制的比较分析

来源出版物: 科研管理 卷: 40 期: 10 页: 96-105 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: direct government subsidies; tax incentives; ownership; impulse response

作者关键词: 直接资助; 税收优惠; 所有制; 脉冲响应

摘要: Technological innovation is the key to realizing economic transformation and development. Enterprise research and development(R&D) activities are the central link to achieve technological innovation and an important driving force for economic transformation and development, but due to the externalities of corporate R&D activities. It is often necessary for the government to encourage innovation activities of enterprises through research and development subsidies and tax reductions. At the same time, with the establishment and improvement of the socialist market economic system, the ownership structure of Chinese enterprises has developed in a diversified direction, forming a mixed structure of state-owned and state-controlled enterprises, private enterprises, Hong Kong, Macao and Taiwan investment enterprises, and foreign-funded enterprises. Because of the nature of property rights and the operating environment, companies of different ownership types often exhibit different behavior patterns and organizational characteristics. So how efficient is the innovation of these companies when they use government-provided technology funding? For companies with different ownership systems, will the same innovation resources input achieve the same effect? The study of these issues can make the influence of ownership form on innovation efficiency more clear, provide reference for the government to formulate relevant science and technology policies, and improve the efficiency of innovation resource allocation. From the perspective of enterprise innovation performance and government-funded resource input, this paper empirically analyzes the effectiveness of innovative resources of state-owned and state-owned holding companies, private enterprises, joint ventures, limited liability companies, and foreign-funded enterprises, and uses pulses. The response function and variance decomposition methods are used to study the impact of R&D investment such as government subsidies and tax incentives on innovation performance and the differences among different ownership enterprises. Since the quality and quantity of enterprise innovation output cannot be directly measured, and the patent reflects the level of technological innovation of the enterprise at a certain level, the previous research usually adopts the number of patent applications or the number of patent grants as the innovation output indicators of the enterprise. In addition, relevant scholars believe that because patent authorization is interfered by more human

factors,there is certain uncertainty,and the number of patent applications using patent applications instead of patent grants can better reflect the true level of innovation,therefore,this paper selects the patent application amount as the patent output index,which can better reflect the technological innovation achievements of the enterprise.In order to test the impact of different government funding methods on corporate innovation,we use the governments direct subsidies and tax incentives as independent variables,and use the funds from the governments science and technology activities from the government funds and the government to enjoy the technology.The tax reduction developed is used as a proxy variable.Other influencing factors are used as control variables.Considering that human resource ownership is an important factor affecting enterprise innovation,enterprises with more human capital are usually more willing to carry out R&D and innovation activities.Therefore,using R&D personnels full-time equivalent manpower as the agent control variable of human capital,the previous research is used.The introduction,digestion and absorption of technology is an important way for enterprises to improve technology and improve innovation productivity.

摘要: 政府资助是企业创新活动的重要资金来源,不同所有制的企业在政府资助下的绩效是否表现出差异性?本文建立回归函数与向量自回归(VAR)模型,研究政府直接资助和税收优惠两种资助方式对不同所有制企业创新产出的影响。结果发现,政府直接资助对我国内陆企业的创新产出未表现出明显促进作用;国有企业的创新产出与政府直接资助和税收优惠的关系不显著;私营企业等的创新产出对税收优惠表现出更大的响应。

入藏号: CSCD:6591097

地址: Liu Lanjian, School of Public Administration and Law,Changan University, Xian, Shaanxi 710064, China.

Li Huixu, School of Public Administration and Law,Changan University, Xian, Shaanxi 710064, China.

地址: 刘兰剑, 长安大学公共管理与法学院, 西安, 陕西 710064, 中国.

李涸旭, 长安大学公共管理与法学院, 西安, 陕西 710064, 中国.

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其他

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作者: 王磊; 余功新; 王朝辉; 杨国林; 闫兆柏

作者: Wang Lei; Yu Gongxin; Wang Chaohui; Yang Guolin; Yan Zhaobai

标题: Determining thresholds of traffic volume and skid resistance to reduce pavement's wet accident ratio

标题: 面向降低路面湿滑事故率的交通量与抗滑阈值确定

来源出版物: 长安大学学报. 自然科学版 卷: 39 期: 5 页: 106-114 出版年: 2019

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语言: English

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作者关键词: road engineering; wet pavement accident ratio; skid number; sideway force coefficient; annual average daily traffic; thresholds values

作者关键词: 道路工程; 路面湿滑事故率; 抗滑值; 横向力系数; 年均日交通量; 阈值

摘要: Amid at current research on wet pavement accidents primarily focused on the qualitative or simple quantitative effects of skid resistance and traffic volume, however, recommended values of skid resistance and traffic volume have not been explicitly proposed. As a result, the potential safety hazard of vehicles on wet and slippery roads was higher, and threat to traffic safety. To analyze the impact of these two main factors on wet pavement accidents and to reduce the frequency of accidents on rainy days, firstly, the wet accident ratio (WAR) was determined. Then, the influence of the pavement's skid resistance under different traffic grades, using statistical principles and analysis methods, as well as the traffic volume under different skid resistance grades on the WAR, were analyzed by MATLAB. Three regression models for the annual average daily traffic (AADT), skid number (SN), and sideway force coefficient (SFC) on the WAR were established. The effects of the AADT, SN, and SFC on the WAR were analyzed quantitatively with those models. Finally, the coupling effect of skid resistance and traffic volume was considered, and the thresholds of the two factors were determined to ensure highway safety. The results show that the threshold of the AADT ranges from 6 500 to 15 000, and the ranges of the skid resistance number and wet accident ratio are 27 to 53 and 0.529 to 11.930, respectively. To achieve the zero-accident goal, the maintenance value of the skid resistance should be improved to 52 when traffic is heavy, to ensure driving safety in rainy days. The recommended thresholds have an important role in defining the optimum time for the skid resistance maintenance of asphalt pavement, which can also lay a foundation for establishing a more effective preventive maintenance system for highways.

摘要: 针对目前关于路面抗滑性能与交通量和湿滑事故的相关性主要为定性或简单定量研究,未提出明确的抗滑值与交通量推荐值,导致雨天湿滑路面对道路行车安全造成较大隐患,严重威胁交通安全,为分析抗滑性与交通量 2 个主要影响因素对湿滑路面事故的影响,解决雨天湿滑导致事故频发这一问题,首先,定义路面湿滑事故率(WAR);然后,运用统计学原理及分析方法,借助 MATLAB 分别分析不同交通量等级下路面抗滑性能或不同路面抗滑等级下交通量对路面湿滑事故率的影响,分别建立年均日交通量(AADT)、路面抗滑值(SN)、路面横向力系数(SFC)与路面湿滑事故率的 3 种回归模型,定量分析交通量、路面抗滑值、路面横向力系数对路面湿滑事故率的影响;最后综合分析了抗滑值和交通量的耦合效应,并基于道路行车安全,推荐了两者阈值。研究表明:年平均日交通量阈值为 6 500~15 000,抗滑值、湿滑事故率范围分别为 27~53、0.529~11.930;为实现零事故目标,在重交通路段应将抗滑值提高到 52,以保证雨天行车安全。该推荐阈值为控制交通量或路面抗滑性能以减小路面湿滑事故率提供了参考,同时明确了沥青路面抗滑养护最佳时机,为建立更完善的公路预防性养护体系奠定了基础。

入藏号: CSCD:6600079

地址: Wang Lei, Magazines Office, Chang'an University, Xi'an, Shaanxi 710064, China.
Yu Gongxin, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.
Wang Chaohui, School of Highway, Chang'an University, Xi'an, Shaanxi 710064, China.
Yang Guolin, China Merchants Expressway Network & Technology Holdings Co., Ltd.;;Zhejiang
Wenzhou Yongtaiwen Expressway Co., Ltd., ;, ;;Wenzhou, Beijing;;Zhejiang 100022;;325000.
Yan Zhaobai, Zhejiang Wenzhou Yongtaiwen Expressway Co., Ltd., Wenzhou, Zhejiang 325000,
China.

地址: 王磊, 长安大学杂志社, 西安, 陕西 710064, 中国.

余功新, 长安大学公路学院, 西安, 陕西 710064, 中国.

王朝辉, 长安大学公路学院, 西安, 陕西 710064, 中国.

杨国林, 招商局公路网络科技控股股份有限公司;;浙江温州甬台温高速公路有限公司, ;, ;;温
州, 北京;;浙江 100022;;325000, 中国.

闫兆柏, 浙江温州甬台温高速公路有限公司, 温州, 浙江 325000, 中国.

电子邮件地址: 76589444@qq.com; wchh0205@163.com

电子邮件地址: 76589444@qq.com; wchh0205@163.com

使用次数 (最近 180 天): 1

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作者: Wang Su; Zhao Junhai; Jiang Zhilin; Zhu Qian

作者: 王苏; 赵均海; 姜志琳; 朱倩

标题: Solution of Ultimate Bearing Capacity for a Double-Layered Thick-Walled Cylinder with
Different Tension and Compression Characteristics

标题: 不同拉压特性的双层厚壁圆筒极限承载力解答

来源出版物: 力学季刊 卷: 40 期: 3 页: 603-612 出版年: 2019

文献号: 0254-0053(2019)40:3<603:BTLYTX>2.0.TX;2-6

来源出版物: Chinese quarterly of mechanics 卷: 40 期: 3 页: 603-612 出版年:
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文献号: 0254-0053(2019)40:3<603:BTLYTX>2.0.TX;2-6

语言: Chinese

文献类型: Article

作者关键词: double-layered thick-walled cylinder; unified strength theory; tensile-compressive
strength ratio; tension-compression modulus coefficient; layered radius

作者关键词: 双层厚壁圆筒; 统一强度理论; 拉压强度比; 拉压模量系数; 分层半径

摘要: On the basis of the unified strength theory, stress formulations of a double-layered
thick-walled cylinder with uniform internal pressure were derived by considering different
material elastic moduli under tension and compression. Then, elastic and plastic limit solutions of

uniform internal pressure were obtained. Finally, influences of the tensile-compressive strength ratio, the tension-compression modulus coefficient, the unified strength theory parameter and the radius ratio as well as the layered radius on the elastic and plastic limit internal pressures were discussed. It is found herein that the elastic and plastic limit internal pressures decrease with the increase of the tensile-compressive strength ratio, but increase with the increase of the unified strength theory parameter and the radius ratio. With the increase of the layered radius, the elastic limit internal pressure increases first and then decreases; meanwhile, the elastic limit internal pressure decreases with an increasing tension-compression modulus coefficient. The plastic limit internal pressure is independent of the tension-compression modulus coefficient and the layered radius. For practical engineering applications, reasonable wall thicknesses and layered radii can be selected using the obtained results, and other parameters can be determined from the material properties, to more accurately calculate the structural stress conditions.

摘要: 采用统一强度理论并考虑材料拉伸与压缩弹性模量的差异性, 建立均匀内压作用下双层厚壁圆筒的应力表达式, 获得了其内压相应的弹性极限解答、塑性极限解答, 并分析拉压强度比、拉压模量系数、统一强度理论参数、半径比及分层半径对弹性、塑性极限内压的影响规律. 研究表明: 弹性、塑性极限内压随拉压强度比的增加而减小, 但随统一强度理论参数、半径比的增加而增大; 弹性极限内压随分层半径的增加呈现先增大后减小变化, 随拉压模量系数的增加而一直减小; 塑性极限内压与拉压模量系数、分层半径无关. 应用于实际工程时, 可根据所得结果选择合理的壁厚及分层半径, 再根据材料特性确定其他参数, 以便更加准确地计算结构的受力状况.

入藏号: CSCD:6590130

地址: Wang Su, Department of Infrastructure Construction, Changan University;; School of Civil Engineering, Changan University, ;; Xian;; Xian, Shaanxi;; Shaanxi 710064;; 710061.

Zhao Junhai, School of Civil Engineering, Changan University, Xian, Shaanxi 710061, China.

Jiang Zhilin, School of Civil Engineering, Changan University, Xian, Shaanxi 710061, China.

Zhu Qian, School of Civil Engineering, Changan University, Xian, Shaanxi 710061, China.

地址: 王苏, 长安大学基建处;; 长安大学建筑工程学院, ;; 西安;; 西安, 陕西;; 陕西 710064;; 710061, 中国.

赵均海, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

姜志琳, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

朱倩, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

电子邮件地址: wangsuchd@126.com; zhuqianhd@126.com

电子邮件地址: wangsuchd@126.com; zhuqianhd@126.com

使用次数 (最近 180 天): 0

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第 3 条, 共 4 条

作者: Sun Xin; Li Lin

作者: 孙鑫; 李林

标题: Free-space Coherent Optical Communication System Using Irradiance Modulation with Dynamic Detection Threshold

标题: 基于动态门限的幅度调制空间相干光通信系统

来源出版物: 发光学报 卷: 40 期: 9 页: 1200-1206 出版年: 2019

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语言: Chinese

文献类型: Article

作者关键词: free-space optical communications; dynamic detection threshold; coherent detection

作者关键词: 自由空间光通信; 动态门限; 相干探测

摘要: Free-space coherent optical communication system using irradiance modulation(IM/CD) with dynamic detection threshold is proposed. Compared with traditional irradiance modulation and direct detection(IM/DD) systems, the system we proposed can detect the signal without requiring the knowledge of instantaneous channel state information (CSI) and the probability density function (pdf) of the turbulence model and achieve better average bit error rate (BER) just by only improving the LO power. Analytical expressions are derived for the average bit error rate of the system. Numerical studies show that the proposed system can achieve comparable performance to the idealized adaptive detection system,with a signal-to-noise ratio performance loss of only 1.4 dB at a BER of 10^{-9} for a lognormal turbulence channel with $\sigma = 0.25$ and phase noise with $\sigma_{\phi} = 0.07$ when the local oscillator(LO) amplitude and transmitting amplitude are assumed to be unity.

摘要: 提出了基于动态门限的幅度调制空间相干光通信(IM/CD)系统。与传统的幅度调制/直接检测(IM/ DD)光通信系统相比,我们提出的系统无需瞬时信道状态信息(CSI)和大气湍流模型的概率密度函数(pdf)就可以实现对信号的高精度检测,与此同时该系统能通过提高本振激光器的功率来获取更好的误码率(BER)性能。此外,本文还推导了该系统平均误码率的表达式。仿真实验表明,当本振激光器和发射信号的归一化幅度为 1、平均误码率为 10^{-9} 时,该系统在归一化大气闪烁标准差 $\sigma = 0.25$ 、归一化相位噪声标准差 $\sigma_{\phi} = 0.07$ 的对数正态湍流信道条件下,与理想的自适应探测门限光通信系统相比,其信噪比性能损失仅为 1.4 dB。

入藏号: CSCD:6567196

地址: Sun Xin, Modern Engineering Training Center, Chang'an University, Xi'an, Shaanxi 710064, China.

Li Lin, Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences;;University of Chinese Academy of Sciences, ;; Changchun;;, ;Beijing 130033;;100049.

地址: 孙鑫, 长安大学现代工程训练中心, 西安, 陕西 710064, 中国.

李林, 中国科学院长春光学精密机械与物理研究所;;中国科学院大学, ;; 长春;;, 吉林;;北京 130033;;100049, 中国.

电子邮件地址: sunxin0529@163.com

电子邮件地址: sunxin0529@163.com
使用次数 (最近 180 天): 0
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作者: Wu Sai; Zhao Junhai; Zhang Dongfang; Wang Juan

作者: 吴赛; 赵均海; 张冬芳; 王娟

标题: Numerical analysis of explosion wave in free air

标题: 自由空气中爆炸冲击波的数值分析

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文献类型: Article

作者关键词: explosion wave; numerical analysis; free air; proportional distance

作者关键词: 爆炸冲击波; 数值分析; 自由空气; 比例距离

摘要: In order to accurately simulate the blast load and its characteristics in free air, the explosive model of TNT with different dosages were established based on the finite element analysis software ANSYS/LS-DYNA. And the results were compared with formula TM5-1300、Henrych and Baker. The principle of selecting the size of finite element mesh for the air, which based on proportional distance, was obtained according to the results of numerical analysis. The applicability of the cube root expression for blasting similarity theory was analyzed and the application conditions were obtained. A formula for calculating the peak of overpressure in free air at a proportional distance between 0.1 and 3 was given by the numerical results. The numerical results can provide an accurate and convenient method for the blast load determination.

摘要: 为准确模拟自由空气中的爆炸荷载及其特性, 采用软件 ANSYS/LS-DYNA 建立了多组不同药量 TNT 的爆炸模型, 并将结果与 TM5-1300、Henrych 公式以及 Baker 公式计算结果进行比较分析。通过多次试算分析, 给出了自由空气中建立 TNT 爆炸模型时由比例距离选用网格尺寸的依据, 分析了爆炸相似律立方根表达式的适用性及适用条件, 并得到了比例距离为 $0.1 \leq z \leq 3$ 时自由空气中 TNT 炸药超压峰值的简便计算公式。结果可为自由空气中爆炸荷载的准确数值模拟以及简便计算提供依据。

入藏号: CSCD:6531999

地址: Wu Sai, Department of Infrastructure Management, Chang'an University, Xi'an, Shaanxi 710064, China.

Zhao Junhai, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Zhang Dongfang, School of Civil Engineering, Chang'an University, Xi'an, Shaanxi 710061, China.

Wang Juan, School of Science, Chang'an University, Xi'an, Shaanxi 710064, China.

地址: 吴赛, 长安大学基建处, 西安, 陕西 710064, 中国.

赵均海, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

张冬芳, 长安大学建筑工程学院, 西安, 陕西 710061, 中国.

王娟, 长安大学理学院, 西安, 陕西 710064, 中国.

电子邮件地址: wusaichd@126.com

电子邮件地址: wusaichd@126.com

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