



1004-2954
Q K 2 2 4 3 1 0 5 1-2987/U

铁道标准设计

RAILWAY STANDARD DESIGN

主办：中铁工程设计咨询集团有限公司

2022年

第66卷

第10期

京张高铁崇礼铁路



万方数据

目次

本刊特稿

能量开放场地中地层相对位移模型研究 杜修力,周楠,赵密,黄景琦,刘鹏程,苏驰翔 1

规划/运输

网络化条件下城际铁路列车开行方案分层优化 王智鹏 8
都市圈综合轨道交通枢纽节点一体化布局研究 吕颖 13
铁路货运量预测研究综述 孟建军,陈鹏芳,李德仓,胥如迅 18

线路/路基/轨道

高铁轨道-桥梁系统地震损伤轨道不平顺谱述评 冯玉林,高鹤,蒋丽忠,韩建平,张云泰 27
艰险山区铁路桥隧工程技术接口信息交换水平评价 王朋利,王琳,刘佳 34
基于功率流法的城市高架轨道振动能量传递特性研究 姜秀杰,刘艳,李秋彤,刘欢,袁冀浦 41
CRTSⅢ型无砟轨道板智能精调系统研发 李路遥 48
CRTSⅡ型板式无砟轨道道床板修复方案优化研究 黄自鹏,何越磊,路宏遥,赵彦旭 52
45t轴重重载铁路扣件系统刚度分析 薄栋乾,韦凯,宋卓西,郭恭兵,王显 58
BIM+AR技术在高铁无砟轨道监测中的应用研究 曹志强,何越磊,路宏遥,赵彦旭 64

桥梁工程

中国、欧洲、日本钢桥设计规范中疲劳双系数计算方法对比研究 赵会东,阎武通 69
节段预制拼装桥梁研究综述 彭华春,张康康,时松,何伟 75
高铁拱桥斜拉桥跨运营铁路主梁顶推控制分析 施洲,钟美玲,周勇聪,刘振标,周刚 84
高速铁路简支箱梁运架一体机的发展与创新 何建华 90
列车荷载作用下轨道箱梁结构TMD减振效果研究 张新亚,雷晓燕,罗锐 98
高速铁路高低塔斜拉桥抗震性能研究 王栋 104

隧道/地下工程

隧道工程数字化施工关键技术及应用 智鹏,解亚龙,史天运 112
复合地层泥水平衡盾构刀具磨损情况分析 朱牧原,魏力峰,陈奥,方勇 117
基于重庆岩层的复合式TBM刀盘中心滚刀布置形式及受荷规律研究 汪平,张康健,李进,张志强,李小伟 123
天津软土地层重叠盾构隧道施工地表变形规律研究 杨鑫康,漆伟强,江玉生,何擎 130
起降与滑移荷载作用下道面-地层结构动力特性与损伤分析 郭治岳,陈文字,张翼翔,陈行,晏启祥 137
基于PSO-RBF神经网络模型的铁路隧道突水危险性评价 张鑫,新春玲,贡力,魏晓悦,杜秀萍 143

通信/信号

城轨列车对列车通信的多天线Rake接收技术研究 李茂青,郑锋贺,高云波,阳长琼 149
基于领域驱动与微服务的高铁列控仿真测试系统业务中台设计 陈江远 155
京沪高铁沿线LTE网络切换性能分析 董兴芝,李平,孙华龙,王忠峰 162
5G-R和GSM-R网络列车调度通信业务平滑过渡方案研究 张馨丹,李辉,郭强亮 166

铁路客站/地铁车站

VR体验情境下的地下铁路站台空间舒适性研究 李锋,张利剑,曹金铭,方恒堃 172

电力/电气化

考虑温度作用的浸金属碳滑板磨耗量预测方法研究 谢宝志,何志江,邓磊,殷成凤,倪子然,林光华,杨泽峰 179

机务/车辆

欧盟技术标准体系铁路限界计算方法研究 李俊岭,杨汝春 185

暖通/空调

地铁设备用房VAV变风量系统控制特性研究 王艳,李焱池,蓝杰,夏三县,严清,余伟之,肖云婷,严天,徐新华 191

TIEDAO BIAOZHUN SHEJI

铁道标准设计

(月刊)

2022年第66卷第10期(总第731期)

1957年创刊

中文核心期刊
RCCSE中国核心学术期刊
美国EBSCO学术数据库收录期刊
日本科学技术振兴机构数据库(JST)收录期刊
中国学术期刊影响因子年报统计源期刊
中国学术期刊综合评价数据库来源期刊
CNKI中国学术期刊网络出版总库收录期刊
中国学术期刊(光盘版)全文收录期刊
中国核心期刊(遴选)数据库收录期刊
万方数据-数字化期刊群收录期刊
VIP中文科技期刊数据库收录期刊
超星域出版平台全文收录期刊

编委会名单

顾问: 孙永福 何华武 卢春房 周镜
邓文忠(美国) 江欢成 梁文灏
聂建国 杜彦良 陈政清 王复明
冯夏庭 李术才 郑健 仲建华
刘汉龙

名誉主任: 孔遁
主任委员: 王洪宇
副主任委员: 安国勇 巫伟军
委员:

于兴义	马庭林	王玉泽	王平	王东辉
王争鸣	王进	王星华	王修华	王俊峰
王清明	勾红叶	文望青	方勇	邓运清
石先明	田四明	田志军	白宝英	冯青松
冯威	朱丹	朱永全	朱颖	乔俊飞
乔健	伍军	刘学毅	刘宗峰	刘家锋
闫斌	许三平	许玉德	负虎	孙立
孙树礼	苏国明	杜文山	李文江	李团社
李兆平	李红侠	李远富	李带	李汶京
李邵军	李国良	李岩辉	肖广智	肖明清
吴麦奎	吴明友	汪吉健	汪胜	沈建明
张顶立	张忠良	张学伏	陈良江	周江天
周诗广	赵勇	赵旭旭	胡所亭	姚令侃
姚楚峰	倪光斌	徐升桥	高宗余	高亮
郭皓	黄足平	曹永刚	龚彦峰	盛黎明
董勇	辜小安	喻雷	雷慧峰	蔡小培
颜华	薛吉岗	薛春晓	戴公连	魏宏伟

(以姓氏笔画排序)

主管: 中国铁路工程集团有限公司
主办: 中铁工程设计咨询集团有限公司
主编: 刘家锋
副主编: 赵敬芬 王婷

编辑出版:《铁道标准设计》编辑部
地址:北京市丰台区广安路15号中铁设计大厦
邮编:100055
电话:(010)51830166 52696303(主编)
51830168 51830167 51831099
52696305(编辑)
在线投稿: <http://www.tdbs.cbpt.cnki.net>
E-mail: tdbsb@263.net

国内总发行: 中国邮政集团公司
北京市报刊发行局
订购处: 全国各地邮局

ISSN 1004-2954
中国标准连续出版物号: CN 11-2987/U

邮发代号: 82-765
国外总发行: 中国国际图书贸易集团有限公司
国外发行代号: M1777
广告许可证: 京丰工商广登字第0082号
印刷: 天津中铁物资印业有限公司
出版日期: 2022年10月20日
定价: 国内 50.00元 国外 10.00美元
本期文章总篇数: 31

CONTENTS

Special Contribution

Study on Relative Displacement Model of Strata in Energy Open Site ... DU Xuuli, ZHOU Nan, ZHAO Mi, HUANG Jingqi, LIU Pengcheng, SU Chuxiang 1

Planning/Transport

Hierarchical Optimization of Train Operation Scheme for Intercity Railway under Network Conditions WANG Zhipeng 8

Research on Integration of Rail Transit Hub Node Layout in Metropolitan Area LYU Ying 13

Summary of Research on Railway Freight Volume Forecast MENG Jianjun, CHEN Pengfang, LI Decang, XU Ruxun 18

Route/Subgrade/Track

Review on Track Irregularity Spectrum of High-speed Railway Track-bridge System Damage by Earthquake FENG Yulin, GAO Ge, JIANG Lizhong, HAN Jianping, ZHANG Yuntao 27

Evaluation of Technical Interface Information Exchange Level of Railway Bridge and Tunnel Project in Dangerous Mountainous Regions WANG Pengli, WANG Lin, LIU Jia 34

Research on Vibration Energy Transmission Characteristics of Urban Viaduct Rail Transit Based on Power Flow JIANG Xiuqie, LIU Yan, LI Qutong, LIU Huan, YUAN Xianpu 41

Research and Development of Intelligent Fine Adjustment System for CRTSⅢ Slab LI Luyao 48

Research on CRTSⅡ Slab Ballastless Track Planting Bar Restoration Scheme Optimization ... HUANG Zipeng, HE Yuelei, LU Hongyao, ZHAO Yanxu 52

Analysis of the Stiffness of Fastener System on Heavy-Haul Railway Running 45 t Axle-load Trains BO Dongqian, WEI Kai, SONG Zhuoxi, GUO Gongbing, WANG Xian 58

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

Research on the Application of BIM+AR Technology in High-speed Railway Ballastless Track Monitoring CAO Zhuqiang, HE Yuelei, LU Hongyao, ZHAO Yanxu 64

RAILWAY STANDARD DESIGN (Monthly)

Vol. 66, No. 10, 2022 (Serial No. 731) (Since 1957)

Competent Authority:

China Railway Engineering Group Co., Ltd

Sponsor:

China Railway Engineering Design and Consulting Group Co., Ltd

Chief Editor: Liu Jiafeng

Edited & Published by:

The Editorial Office of Railway Standard Design
Address: No. 15, Guang'an Road, Fengtai District
Beijing China

Post Code: 100055

Tel: (86-10) 51830168 51830166 51831099

Http://www.tdbs.cbpt.cnki.net

E-mail:tdbsb@263.net

Subscribing Place:

The Editorial Office of Railway Standard Design

ISSN 1004-2954

Publishing Code: CN 11-2987/U

Domestic Distributing Code: 82-765

General Distributor for Foreign Subscribers:

China International Book Trading Group Co., Ltd.

Foreign Service Distribution Code: M1777

Advertising License Number:

Jing-Feng-Gong-Shang 0082

Publishing Date: October 20, 2022

Price: ¥50.00 Domestic

\$10.00 Abroad

芜湖市跨座式单轨交通



中铁工程设计咨询集团有限公司设计

封面、封底摄影：罗春晓

万方数据

RAILWAY STANDARD DESIGN

铁道标准设计

2022年第10期

ISSN 1004-2954
CN 11-2987/U

定价：50元