

# 地下空间与工程学报

第 20 卷增刊 1

(总第 158 期) 双月刊

2024 年 9 月

## 目 次

### · 地下空间开发利用 ·

- 基于 AHP 的郑州工程建设与地下空间适宜性评价 ..... 姜炎涛, 贺瑞霞, 赵迷军, 吉建华, 常龙(1)
- 基于大型基础设施建设的多级空间管控区划定方法 ..... 张政(11)
- 浅析北京中心城区地下空间更新利用策略 ..... 张明子, 胡斌, 郝冉(19)
- 上海市地下空间开发利用现状、问题与应对策略 ..... 钱昊, 何耀淳(25)

### · 理论与试验研究 ·

- 隧道衬砌结构可靠度分析的三阶矩方法 ..... 李志鹏, 伦培元(33)
- 基于 M-C 准则的任意角度隧道掌子面稳定性分析 ..... 单生彪, 谭子安(41)
- 对围岩-支护共同作用原理的讨论 ..... 蔡晓柄, 喻勇(54)
- 基于混合深度学习算法的盾构运动轨迹实时预测 ..... 王宇超, 谢雄耀, 黄昌富, 肖中林(59)
- 高原沼泽相泥炭土物理力学特性试验研究 ..... 郭延辉, 马蕊, 毛石林, 付小兵, 刘星辰(70)
- 热力加固对压实黄土工程性质影响的试验研究 ..... 张路, 倪晓逸, 樊恒辉, 高策, 杜宇航(77)
- 不同浸水作用下煤岩损伤及力学性质劣化规律 ..... 吴宝杨, 宋佳辉, 李鹏, 李志轩, 王雁冰(84)
- 不同应力波形下饱水红砂岩动力学特性 ..... 解北京, 石嘉煜, 梁天宇, 陈铭进, 李晓旭(94)
- 离子侵蚀环境中砂浆锚固体锚固性能试验研究 ..... 张凯程, 杨文东, 王英男, 刘德军, 马鹏程(102)
- 改性水玻璃加固细砂层暗挖隧道现场注浆试验 ..... 徐厚庆, 刘生, 亢佳伟, 邓国华(111)
- 黏土-砂混合物三轴压缩超声波特性研究 ..... 刘桃根, 李玲, 王伟, 谢敬礼, 刘造保(119)
- 软土地区大型沉井下沉阻力分布特征研究 ..... 邵风行, 叶嘉庭, 池奥博, 欧金辉, 尹骏(128)
- 挖井基础在上黏下砂地层中的多维承载特性 ..... 袁宇(134)
- 管片锈裂对盾构隧道结构承载性能的影响 ..... 孙博旭, 金浩, 余朔(148)
- 反应位移法中剪切波速的确定研究 ..... 王铭欣, 黄成麟, 牛永昌, 孙维吉(155)
- 陆相页岩油藏三维空间应力场动态演化规律 ..... 张亚洲, 韦世明, 金衍, 王迪(163)
- 堆载下深厚软土侧移分析及响应面预测方法研究 ..... 宋旭明, 郑梦洋, 唐冕, 王绍雄(172)
- 基于群井抽水试验的承压含水层水文参数反演分析 ..... 徐中华, 宗露丹, 王卫东, 罗建军(180)
- 低净空环境旋喷静压复合桩的试验研究 ..... 王曙光, 段启伟, 王浩宇, 李湛, 李钦锐(188)

### · 设计、施工、监测 ·

- 盾构隧道密封垫的气密性能及设计优化研究 ..... 赵翌川, 刘芳, 刘桂荣(196)
- 圆形截面隧道式储气库群布局参数研究 ..... 周小松, 闫磊, 黄康康, 孙高博, 刘卫(205)
- 超长电力隧道通风设计运行参数计算方法 ..... 王亮, 汪雄平, 成瑾, 钟珂(213)
- 铁路上下重叠隧道施工力学特性研究 ..... 袁枫杰, 王昊乾, 阳东廷, 徐前卫(220)
- 半成岩隧道波纹钢初支结构施工力学特性研究 ..... 王丽军, 王秋懿, 张清照, 雷明林, 黄焯博(229)
- 盾构法联络通道施工对始发端隧道的影响分析 ..... 闫伟, 宋彦杰, 程雪松, 岳彬, 周胜(236)

|                                     |                          |
|-------------------------------------|--------------------------|
| 深大基坑有限跨结构抗侧力的计算分析 .....             | 范冠博,周鼎,常林越(247)          |
| 软土地区基于建筑超长平移技术的基坑实例分析 .....         | 冯翠霞,陈思奇(255)             |
| 临江高水位涉京广线基坑工程地下水控制设计 .....          | 廖翔,张杰青,汪彪,施木俊,万鑫(265)    |
| 坑中坑基坑主体结构施工换撑方案研究 .....             | 崔向阳,王佳豪,李兆平,刘腾,吕金彪(273)  |
| 紧邻基坑群坑开挖相互影响三维数值模拟 .....            | 冯仲文,杨红坡,温科伟(283)         |
| 基坑开挖引起下方地铁隧道上浮控制方法研究 .....          | 张艺帆,唐亮,孔祥勋,丛晟亦,唐文冲(290)  |
| 深大基坑支护结构力学行为的温度效应分析 .....           | 姬繁,施劭矗(298)              |
| 超深竖井封底混凝土浇筑温度效应研究 .....             | 贺腾飞,王文渊,郭鑫淼(310)         |
| 牂牁江特大桥重力锚承载机制与稳定性研究 .....           | 韩洪举,刘新华,吴文涛,宗昕,王成汤(316)  |
| 上软下硬地层中大直径竖井机械化施工方法 .....           | 薛永涛,赵修旺,贾正文,朱毅,马啸天(324)  |
| 地下空间斜柱受力置换过程的监测及数值模拟 .....          | 艾鹏鹏,朱雄涛,黄永虎,耿大新(335)     |
| 盐渍土路基含盐量的演化规律研究 .....               | 李飞,于振涛(344)              |
| 深厚土层内部沉降监测新装置的研制 .....              | 孙荣,于永堂,马勃,韩文斌,曹静远(350)   |
| <b>防灾与环境</b>                        |                          |
| 人员通行角度下城市内涝地下工程韧性评价 .....           | 张冬梅,魏川尧,黄忠凯,张吾渝,陈海霞(358) |
| 特大断面小净距公路隧道爆破动力响应研究 .....           | 杜佳骏,汪洋,高进,晏启祥,郭治岳(369)   |
| 潮汐对海底隧道工作面稳定性的影响研究 .....            | 邢增良,张乐,谭明伦,周鸣亮,黄宏伟(381)  |
| 隧道施工引发粉土地面沉降模拟与分析 .....             | 顾展飞,魏海龙,刘之葵(391)         |
| 顾及植物生态劣化的山岭隧道控制排水量计算方法 .....        | 周军,张鹏,府金宇,纪玉峰,陈浩(403)    |
| 高瓦斯长大公路隧道施工通风优化研究 .....             | 喻兴洪,黄才明,杨智成,来显杰,石广斌(411) |
| 地铁站台轨顶排热风机对隧道温度的影响研究 .....          | 唐明赞,熊小慧,张朵朵,王凯文(420)     |
| 基于离散元的垂直顶升诱发上覆地层破坏响应分析 .....        | 徐世杨,王一兆,杨春山,张荣辉(429)     |
| 饱和黏性土地基中邻近圆形基坑相互影响分析 .....          | 谢万东,李建宇,赖俊珊(440)         |
| 基于 CRITIC-TOPSIS 的深基坑风险分区动态评价 ..... | 杨逸枫,廖少明,徐伟忠,蔡群群(446)     |
| 临江富水地区深基坑旋喷桩加固效果研究 .....            | 王正振,陈政旭,周勇,戴国亮,戴康乐(456)  |
| 大断面矩形顶管下穿管线 MJS 加固效果研究 .....        | 徐平,张昂然,张瑞铎,王祥亮(463)      |
| 河北宁晋超深盐穴储气库建设地质可行性分析 .....          | 侯秉仁,王续学,牛耀辉,于长富,李志强(472) |
| 人防工程活门槛防护密闭门门框荷载分布研究 .....          | 郝鲁波,杨海平,王会杰,柴永生(482)     |
| 某地下人防工程的空气质量与感知评价 .....             | 渠美楠,李玉星,苏璞,裴晶晶(488)      |
| 二氧化碳地质封存技术研究进展综述 .....              | 廖志伟,羊俊敏,钟翔宇,刘云乾,张景宇(497) |
| TBM 隧道岩石可掘性评价指标及其应用研究综述 .....       | 李子琛,朱杰兵,张宜虎,汪斌,徐栋栋(508)  |

## CONTENTS

|   |   |
|---|---|
| Suitability Evaluation of Zhengzhou Engineering Construction and Underground Space Based on the AHP Method .....                | Jiang Yantao, He Ruixia ,Zhao Mijun, Ji Jianhua, Chang Long(1)            |
| A Delineation Method of Multi-Level Control Area Based on Large-Scale Infrastructure Construction .....                         | Zhang Zheng( 11)  |
| Analyze the Strategy of Underground Space Renewal and Utilization of the Central Urban Area of Beijing .....                    | Zhang Mingzi, Hu Bin, Hao Ran( 19)  |
| The Current Situation, Problems and Countermeasures of Underground Space Development and Utilization in Shanghai .....          | Qian Hao, He Yaochun( 25)   |
| Reliability Analysis of Tunnel Lining Structure Using Third-Moment Method .....   | Li Zhipeng, Lun Peiyuan( 33)  |
| Stability Analysis of Arbitrary Angle Tunnel Palm Faces Based on Mohr-Coulomb Criterion .....                                   | Shan Shengbiao, Tan Zian( 41)   |
| Discussion on the Interaction of Surrounding Rock and Support .....   | Cai Xiaorui, Yu Yong( 54)   |
| Real Time Prediction of Shield Tunneling Trajectory Based on Hybrid Deep Learning Algorithm .....                               | Wang Yuchao, Xie Xiongyao, Huang Changfu, Xiao Zhonglin( 59)              |
| Test Study on Physical and Mechanical Properties of Plateau Bog Phase Peat Soil .....   | Guo Yanhui, Ma Rui, Mao Shilin, Fu Xiaobing, Liu Xingchen( 70)            |
| Experimental Study on the Effect of Thermal Reinforcement on the Engineering Properties of Compacted Loess .....                | Zhang Lu, Ni Xiaoyi, Fan Henghui, Gao Ce, Du Yuhang( 77)                  |
| Damage and Mechanical Property Deterioration of Coal Rocks Under Different Water Flooding .....                                 | Wu Baoyang, Song Jiahui, Li Peng, Li Zhixuan, Wang Yanbing( 84)           |
| Dynamic Characteristics of Saturated Water Red Sandstone Under Different Stress Waveforms .....                                 | Xie Beijing, Shi Jiayu, Liang Tianyu, Chen Mingjin, Li Xiaoxu( 94)        |
| Experimental Study on Anchorage Performance of Mortar Anchorage Body in Ion Erosion Environment .....                           | Zhang Kaicheng, Yang Wendong, Wang Yingnan, Liu Dejun, Ma Pengcheng( 102) |
| Field Grouting Test of Modified Water Glass Reinforced Fine Sand Layer in Bored Tunnel .....                                    | Xu Houqing, Liu Sheng, Kang Jiawei, Deng Guohua( 111)                     |
| Investigation on Ultrasonic Wave Properties of Clay-Sand Mixture under Triaxial Compression Condition .....                     | Liu Taogen, Li Ling, Wang Wei, Xie Jingli, Liu Zaobao( 119)               |
| Study on Distribution Characteristics of Sinking Resistance of Open Caisson Foundation in Soft Soil Area .....                  | Shao Fengxing, Ye Jiating, Chi Aobo, Ou Jinhui, Yin Jun( 128)             |
| Capacity of Cutting Caisson Foundations in Clay-over-Sand under General Loadings .....  | Yuan Yu( 134)   |
| Influence of Segment Rust Crack on Bearing Performance of Shield Tunnel Structure .....   | Sun Boxu, Jin Hao, Yu Shuo( 148)  |
| Research on Determination of Shear Wave Velocity Based on Reaction Displacement Method .....                                    | Wang Mingxin, Huang Chenglin, Niu Yongchang, Sun Weiji( 155)              |
| 3D Dynamic Stress Evolution of the Continental Shale Oil Reservoirs .....   | Zhang Yazhou, Wei Shiming, Jin Yan, Wang Di( 163)                         |
| Research on Lateral Shift Analysis of Deep Soft Soil under Pile Loading and Prediction Method of Response Surface .....         | Song Xuming, Zheng Mengyang, Tang Mian, Wang Shaoxiong( 172)              |
| Back Analysis of Hydrogeological Parameters of Confined Aquifer Based on Multi Well Pumping Test .....                          | Xu Zhonghua, Zong Ludan, Wang Weidong, Luo Jianjun( 180)                  |
| Experimental Investigation of Jet Grouting Jacked Composite Piles in Low-Clearance Environments .....                           | Wang Shuguang, Duan Qiwei, Wang Haoyu, Li Zhan, Li Qinrui( 188)           |
| Gas-Proof Performance of Gaskets for Shield Tunnels and Design Optimization .....   | Zhao Yichuan, Liu Fang, Liu Guirong( 196)                                 |
| Study on Layout Parameters of Circular Section Tunnel Gas Storage .....   | Zhou Xiaosong, Yan Lei, Huang Kangkang, Sun Gaobo, Liu Wei( 205)          |
| Determination Method for Ventilation Design and Operational Parameters in Extra-Long Power Tunnel .....                         | Wang Liang, Wang Xiongping, Cheng Jin, Zhong Ke( 213)                     |
| Research on the Mechanical Characteristics of Overlapping Tunnel Construction on Railways .....                                 | Yuan Fengjie, Wang Haoqian, Yang Dongting, Xu Qianwei( 220)               |
| Study on the Mechanical Characteristics of the Construction of Corrugated Steel Initial Support in Semi-Diagenetic Tunnel ..... | Wang Lijun, Wang Qiuyi, Zhang Qingzhao, Lei Minglin, Huang Xuanbo( 229)   |
| Analysis of the Influence of Shield Contact Channel Construction on the Beginning Tunnel .....                                  | Yan Wei, Song Yanjie, Cheng Xuesong, Yue Bin, Zhou Sheng( 236)            |

|   |   |
|---|---|
| Computational Analysis of Lateral Force Resistance Design for Multi-Span Structures in Deep and Large Foundation Construction .....                         | Fan Guanbo, Zhou Ding, Chang Linyue(247)                                  |
| Case Analysis of Foundation Pit in Soft Soil Areas Based on Building Remote Translation Technology .....  | Feng Cuixia, Chen Siqi(255)   |
| Design of Groundwater Control for the Foundation Pit Engineering Adjacent to the Beijing-Guangzhou Railway in High Water Pressure Area Near the River ..... | Liao Xiang, Zhang Jieqing, Wang Biao, Shi Mujun, Wan Xin(265)             |
| Study on the Selection of Support Replacement Scheme and Deformation Control of the Main Structure of the Special-Shaped Pit in Pit .....                   | Cui Xiangyang, Wang Jiahao, Li Zhaoping, Liu Teng, Lü Jinbiao(273)        |
| Three-dimensional Numerical Simulation on Interaction among the Adjacent Group Excavation .....   | Feng Zhongwen, Yang Hongpo, Wen Kewei(283)                                |
| Research on the Control Method of Subway Tunnel Uplift Caused by the Excavation of Foundation Pit .....   | Zhang Yifan, Tang Liang, Kong Xiangxun, Cong Shengyi, Tang Wenchong(290)  |
| Temperature Effect Analysis of Mechanical Behavior of Deep Foundation Pit Supporting Structure .....  | Ji Fan, Shi Shaochu(298)  |
| Research on Temperature Effect of Bottoming Concrete Pouring in Ultra-deep Shaft .....  | He Tengfei, Wang Wenyuan, Guo Xinmiao(310)                                |
| Study on the Bearing Mechanism and Stability of the Gravity Anchorage of Zangkejiang River Super Large Bridge .....   | Han Hongju, Liu Xinhua, Wu Wentao, Zong Xin, Wang Chengtang(316)          |
| Mechanized Construction Method of Large-Diameter Vertical Shafts in Upper-Soft and Lower-Hard Strata .....  | Xue Yongtao, Zhao Xiuwang, Jia Zhengwen, Zhu Yi, Ma Xiaotian(324)         |
| Monitoring and Numerical Simulation of Structural System Transform Process of the Steel Reinforced Concrete Inclined Column in Underground Space .....      | Ai Pengpeng, Zhu Xiongtao, Huang Yonghu, Geng Daxin(335)                  |
| Study on the Evolution Law of Salt Content in Saline Soil Subgrade .....  | Li Fei, Yu Zhentao(344)   |
| Development of A New Monitoring Device for Sub-Surface Settlement in Deep Soil Layer .....  | Sun Mo, Yu Yongtang, Ma Bo, Han Wenbin, Cao Jingyuan(350)                 |
| Resilience Evaluation of Urban Waterlogging Underground Engineering from the Perspective of Personnel Passage .....   | Zhang Dongmei, Wei Chuanyao, Huang Zhongkai, Zhang Wuyu, Chen Haixia(358) |
| Study on Blasting Dynamic Response of Super-Large Section Small Clear Distance Tunnel .....   | Du Jiajun, Wang Yang, Gao Jin, Yan Qixiang, Guo Zhiyue(369)               |
| Research on the Influence of Tide on the Stability of Subsea Tunnel Face .....  | Xing Zengliang, Zhang Le, Tan Minglun, Zhou Mingliang, Huang Hongwei(381) |
| Simulation and Analysis of Silt Land Subsidence Caused by Tunnel Construction .....   | Gu Zhanfei, Wei Hailong, Liu Zhikui(391)                                  |
| Calculation Method on Drainage Control of Mountain Tunnel Considering Plant Ecological Degradation .....  | Zhou Jun, Zhang Peng, Fu Jinyu, Ji Yufeng, Chen Hao(403)                  |
| Research on Optimization of Construction Ventilation for Long and Large Highway Tunnel with High Gas .....  | Yu Xinghong, Huang Caiming, Yang Zhicheng, Lai Xianjie, Shi Guangbin(411) |
| Research on Influence of Exhaust Fan on Tunnel Temperature in Subway Platform .....   | Tang Mingzan, Xiong Xiaohui, Zhang Duoduo, Wang Kaiwen(420)               |
| Failure Response Analysis of Overlying Strata with Shield Shaft Vertical Pipe Jacking Based on Discrete Element .....                                       | Xu Shiyang, Wang Yizhao, Yang Chunshan, Zhang Ronghui(429)                |
| Analysis on the Interaction between Neighboring Circular Excavations in Saturated Cohesive Ground .....   | Xie Wandong, Li Jianyu, Lai Junshan(440)                                  |
| CRITIC-TOPSIS-based Construction Risk Dynamic Assessment for Sub-zones of Deep Excavation .....   | Yang Yifeng, Liao Shaoming, Xu Weizhong, Cai Qunqun(446)                  |
| Research on Reinforcement Effect of Jet Grouting Pile for Deep Foundation Pit in Riverside and Water-Rich Area .....  | Wang Zhengzhen, Chen Zhengxu, Zhou Yong, Dai Guoliang, Dai Kangle(456)    |
| Research on MJS Reinforcement Effect of Large Section Rectangular Pipe Jacking Underpass Pipeline .....   | Xu Ping, Zhang Angran, Zhang Ruiduo, Wang Xiangliang(463)                 |
| Geological Feasibility Analysis of the Construction of Super Deep Salt Cave Gas Storage in Ningjin, Hebei Province .....                                    | Hou Bingren, Wang Xuxue, Niu Yaohui, Yu Changfu, Li Zhiqiang(472)         |
| Study on Load Distribution of Doorframe for Airtight Blast Door with Movable Threshold in Civil Air Defense Works .....                                     | Hao Lubo, Yang Haiping, Wang Huijie, Chai Yongsheng(482)                  |
| Indoor Air Quality and Perceptual Evaluation in an Underground Civil Air Defense Projects .....   | Qu Meinan, Li Yuxing, Su Pu, Pei Jingjing(488)                            |
| Review on Research Progress of Carbon Dioxide Geological Sequestration Technology .....   | Liao Zhiwei, Yang Junmin, Zhong Xiangyu, Liu Yunqian, Zhang Jingyu(497)   |
| A Review of Rock Boreability Evaluation Index and Its Application in TBM Tunnel Construction .....  | Li Zichen, Zhu Jiebing, Zhang Yihu, Wang Bin, Xu Dongdong(508)            |