

# 建模与仿真

## Modeling and Simulation

Jian Mo Yu Fang Zhen

2024年7月13卷4期



ISSN: 2324-8696



<https://www.hanspub.org/journal/mos>

# Editorial Board

## 编委名单

ISSN: 2324-8696 (Print) ISSN: 2324-870X (Online)

<https://www.hanspub.org/journal/mos>

---

### 主编

罗坤教授 浙江大学

### Editor-in-Chief

Prof. Kun Luo Zhejiang University

### 副主编

赵海波教授 华中科技大学

### Associate Editor

Prof. Haibo Zhao Huazhong University of Science and Technology

### 编委会（按字母排序）

曹伟教授	郑州大学	Prof. Wei Cao	Zhengzhou University
陈斌教授	西安交通大学	Prof. Bin Chen	Xi'an Jiaotong University
程永光教授	武汉大学	Prof. Yongguang Cheng	Wuhan University
高乃平教授	同济大学	Prof. Naiping Gao	Tongji University
黄廷祝教授	电子科技大学	Prof. Tingzhu Huang	University of Electronic Science and Technology of China
菅永军教授	内蒙古大学	Prof. Yongjun Jian	Inner Mongolia University
李道亮教授	中国农业大学	Prof. Daoliang Li	China Agricultural University
李军辉教授	中南大学	Prof. Junhui Li	Central South University
孟祥宁副教授	东北大学	Dr. Xiangning Meng	Northeastern University
邵志强教授	福州大学	Prof. Zhiqiang Shao	Fuzhou University
沈厚发教授	清华大学	Prof. Houfa Shen	Tsinghua University
王铮教授	华东师范大学	Prof. Zheng Wang	East China Normal University
魏进家教授	西安交通大学	Prof. Jinjia Wei	Xi'an Jiaotong University
朱庆勇教授	中山大学	Prof. Qingyong Zhu	Sun Yat-sen University

**TABLE OF CONTENTS****目 录****阀控马达系统反步滑模控制研究****Research on Backstepping Sliding Mode Control of Valve-Controlled Motor System**

- 陈丁翔 ..... 4059

**基于滑模运动控制算法的变量泵优化控制****Optimal Control of Variable Displacement Pump Based on Sliding Mode Motion Control Algorithm**

- 郑益平, 林银宁 ..... 4067

**ABS-HDL: 基于 BIASRU 的中文医学命名实体识别模型****ABS-HDL: Chinese Medical Named Entity Recognition Model Based on BIASRU**

- 盛萱妍, 邵清 ..... 4075

**基于下采样交互时空注意力网络的交通流量预测****Traffic Flow Prediction Based on Downsampled Interactive Spatio-Temporal Attention Network**

- 季熙来, 黄雨彤, 冷爽, 张爱华 ..... 4090

**基于多关系感知和自监督学习的超图增强会话推荐模型****A Hypergraph-Enhanced Session Recommendation Model Based on Multi-Relationship Awareness and Self-Supervised Learning**

- 王益飞, 翟雨欣 ..... 4104

**融合注意力机制的残差双通道多尺度的胰腺囊性肿瘤分割模型****Pancreatic Cystic Tumor Segmentation with Fusion Attention Mechanism and Residual Dual-Channel Multi-Scale Approach**

- 何聪, 戴俊龙, 武杰, 边云 ..... 4120

**椭球度对层状球形液滴光学焦散结构的影响****Influence of Aspect Ratio on Optical Caustic Structure of Layered Spherical Droplets**

- 吕胜杰 ..... 4128

**基于人工神经网络对荧光偶极子空间方位的高精度识别****High Precision Identification of Fluorescent Dipole Spatial Orientation Based on Artificial Neural Network**

- 黄梓浩, 王祺, 张启明, 蔚浩义 ..... 4139

**高斯光束入射椭球形气泡的光散射特性研究****Study on Light Scattering Characteristics of Spheroidal Bubble with Gaussian Light Incidence**

- 徐冰倩 ..... 4150

**基于机器视觉的水果腐烂度检测系统设计**

**Design of a Fruit Decay Detection System Based on Machine Vision**

刘乙人, 李银, 虞文川 ..... 4161

**鲁棒张量主成分分析的非凸框架**

**The Nonconvex Framework for Robust Tensor Principal Component Analysis**

唐开煜, 樊亚莉 ..... 4171

**基于大场景下识别动态物体的视觉 SLAM 研究**

**Visual SLAM Research Based on Recognizing Dynamic Objects in Large Scenes**

李兴州, 何锋, 余国宽 ..... 4180

**基于 Simulink 的拖拉机 PTO 动力分配模型研究**

**Research on Tractor PTO Power Distribution Model Based on Simulink**

郝家乐 ..... 4195

**基于孤立森林算法贝叶斯优化的 Bi-LSTM 交通流量预测**

**Traffic Flow Prediction Based on Isolated Forest Algorithm and Bayesian Optimization of Bi-LSTM**

黄书林, 韩印 ..... 4205

**三级自复叠制冷系统模拟研究**

**Simulation Study of Three-Stage Auto-Cascade Refrigeration System**

张昌东, 范胜军, 刘阳, 贺滔 ..... 4217

**肩部康复外骨骼顺应性研究**

**Study on the Compliance of Shoulder Rehabilitation Exoskeleton**

刘选民 ..... 4225

**超表面对于垂直入射 s、p 偏振的操控**

**Metasurface Manipulation of Vertical Incidence s and p Polarization**

李灵姣 ..... 4236

**基于卷积神经网络加速的计算鬼成像物体识别仿真**

**Simulation of Computational Ghost Image Object Recognition Accelerated by Convolutional Neural Networks**

陈耀东, 华怡林 ..... 4249

**基于“双碳”目标的电力供需预警与碳排放预警研究**

**Research on Power Supply and Demand Early Warning and Carbon Emission Early Warning Based on the Carbon Peaking and Carbon Neutrality Goals**

李文琦 ..... 4258

**基于 XGBoost 算法的出血性脑卒中患者血肿扩张风险预测**

**Risk Prediction of Hematoma Expansion in Hemorrhagic Stroke Patients Based on XGBoost Algorithm**

钟玮琦, 曾海涛 ..... 4271

**基于深度学习的翻译洗稿抄袭检测算法**

**Deep Learning-Based Translation Laundering Plagiarism Detection Algorithm**

贺小玲, 周元鼎 ..... 4279

**易腐品智能补货与定价模型**

**Intelligent Replenishment and Pricing Model for Perishables**

邓加妍, 曹春萍, 杨景骞, 黄正 ..... 4289

**腕手康复训练器的机构设计与仿真分析**

**Mechanism Design and Simulation Analysis of a Wrist-Hand Rehabilitation Trainer**

高兴, 郭坤伦, 张宇玲 ..... 4305

**基于注意力机制与卷积神经网络的不均衡多标签心电图分类方法研究**

**Attention-Based Convolutional Neural Network for Imbalanced Multi-Label Electrocardiogram**

张诗雨, 孙占全, 顾浩丞, 陈骏立 ..... 4317

**硫酸盐侵蚀下超高性能混凝土连接预制梁受弯性能研究**

**Study on the Bending Performance of Precast Beams with Ultra-High Performance Concrete Joints under Sulfate Erosion**

王玮哲, 袁世伟, 宁静, 陈刚 ..... 4335

**池沸腾加热器换热优化设计**

**Optimized Heat Exchange Design for Pool Boiling Heaters**

王恺文, 魏亚明, 马震, 廖必成, 王明骏, 娄钦 ..... 4348

**基于 BP 神经网络对上海纤维加筋土体强度仿真预测**

**Simulation Prediction of Strength of Shanghai Fiber-Reinforced Soil Based on BP Neural Network**

戴锦坤 ..... 4361

**基于瑞丽索末菲衍射的逆向设计实现光学全息**

**Realization of Optical Holography by Reverse Design Based on Riley-Sommerfeld Diffraction**

王祺, 张启明, 蔚浩义 ..... 4373

**磁控溅射沉积 Ni-DLC 涂层摩擦磨损性能研究及预测**

**Research and Prediction of Friction and Wear Properties of Magnetron Sputtering Deposition Ni-DLC Coatings**

石青松, 徐红玉, 王晓强 ..... 4381

**风荷载作用下气膜模板变形的数值仿真模拟**

**Numerical Simulation of Deformation of Inflatable Membrane Formwork under Wind Load**

杨斌, 郭晓, 凌雨 ..... 4395

**基于传播概率熵的重要节点识别方法**

**Identifying Vital Nodes Based on Epidemic Spreading Probability Entropy**

叶梦梦 ..... 4405

**基于 RBF、GRNN 和 GA-BP 神经网络的电动车空调能耗预测模型****Prediction Model of Air Conditioning Energy Consumption of Electric Vehicle Based on RBF, GRNN and GA-BP Neural Network**

贺浩然, 叶立, 叶志鹏, 王译增, 张绮冬 ..... 4416

**数字经济对制造业企业创新能力的影响研究****Research on the Impact of Digital Economy on the Innovation Capability of Manufacturing Enterprises**

宋周周, 罗鄂湘 ..... 4425

**制动盘仿生表面热 - 结构耦合研究****Study on Bionic Surface Thermal and Structural Coupling of Brake Disc**

杨祖孝, 卢曦, 刘迎冬 ..... 4437

**一种自适应的分布式深度神经网络推理框架****An Adaptive Distributed Deep Neural Network Inference Framework**

吴宾宾, 杨桂松 ..... 4449

**视动反应中 PF-PC 突触钙级联机制: 物质状态预测****Calcium Cascade of PF-PC Synapses in Optokinetic Response: Prediction of Material State**

陈彦东 ..... 4460

**融合变分和深度先验的非均匀图像分割算法****Heterogeneous Image Segmentation Algorithm Combining Variational and Depth Prior**

王宏伟, 闵莉花 ..... 4471

**石油集输管道缩径式球阀内部流场研究****Study on Internal Flow Field of Reduced-Diameter Ball Valve in Oil Gathering and Transportation Pipeline**

陈豪, 陈青, 王斌, 丁朱波, 纪如鹏, 顾金彤 ..... 4487

**含裂纹结构拘束相关断裂韧性预测程序研究****A Study on Constraint-Related Fracture Toughness Prediction Program for Cracked Structures**

张应华, 刘芳, 崔元元, 王晓晓, 杨杰 ..... 4498

**一种自适应系统规模的联邦深度学习方法****A Federated Deep Learning Method for Adaptive System Scale**

吴宾宾, 杨桂松 ..... 4507

**基于 CART 决策树的乘客疏散行为决策影响因素研究****Research on Influencing Factors of Passenger Evacuation Behavior Decision Making Based on CART Decision Tree**

齐若星 ..... 4515

**基于 IEKF 的空间探测车月面定位与建图****Lunar Surface Positioning and Mapping of Space Rover Based on IEKF**

牟建宏, 苏庆华, 秦振波, 吴昊 ..... 4522

<b>基于 ANSYS Workbench 的涡轮减速器箱体有限元分析</b> <b>Finite Element Analysis of the Turbine Reducer Housing Based on ANSYS Workbench</b>	
侯重阳, 王海, 张钊瑜 .....	4534
<b>基于 ICEPAK 的一种散热器散热性能分析</b> <b>Analysis of the Heat Dissipation Performance of a Heat Sink Based on ICEPAK</b>	
俞聪 .....	4542
<b>基于数值模拟的双隧道净距对地表沉降的影响分析</b> <b>Analysis of the Effect of the Clear Distance between Two Tunnels on Surface Subsidence Based on Numerical Simulation</b>	
王帅, 苏哲阳, 于王成, 李佩青 .....	4549
<b>基于劈裂环的光学天线研究</b> <b>Research on Optical Antenna Based on Split Ring Resonator</b>	
张锦华, 张益华, 田汶翔 .....	4558
<b>基于改进灰色模型的变压器绝缘故障预测</b> <b>Transformer Insulation Fault Prediction Based on the Improved Grey Model</b>	
黄惠琼, 李军成, 杨磊 .....	4566
<b>基于改进 StyleGAN 的高分辨率可控肖像视频风格迁移网络</b> <b>High Resolution Controllable Portrait Video Style Transfer Network Based on Improved StyleGAN</b>	
钱洋洋 .....	4577
<b>分数阶金融混沌系统的自适应模糊滑模同步</b> <b>Adaptive Fuzzy Sliding Mode Synchronization for Fractional-Order Financial Chaos Systems</b>	
崔晓萌, 王丹 .....	4591
<b>动态注意力语义特征增强的人脸风格迁移方法研究</b> <b>Research on Facial Style Transfer Method for Dynamic Attention Semantic Feature Enhancement</b>	
潘海燕, 孙刘杰, 王文举 .....	4602
<b>多波束测深中测线设计模型研究</b> <b>Research on the Design Model of Survey Lines in Multi-Beam Bathymetry</b>	
毛俊超, 马文博, 张驰, 刘子涵 .....	4614
<b>基于改进 BP 神经网络的设备管理与维修人员培训效果评估方法</b> <b>Improved BP Neural Network-Based Training Effect Assessment Method for Equipment Management and Maintenance Personnel</b>	
刘昭, 刘彬, 程中华, 艾艳松, 曹彦宁, 马维宁, 李明雨 .....	4625
<b>基于遗传算法的塔式光热电站功率优化</b> <b>Power Optimization of Tower-Type Solar Thermal Power Plants Based on Genetic Algorithm</b>	
刘映伶, 贺峰, 唐培铭 .....	4639

**燃气轮机封严倒角对气动和冷却性能影响的数值研究****Numerical Study on the Impact of Seal Chamfering on Aerodynamic and Cooling Performance of Gas Turbines**

金恺宸, 薛飞, 郑子行, 刘鑫宇 ..... 4655

**基于 Mixup 数据增强的可再生能源场景生成方法****Renewable Energy Scenario Generation Method Based on Mixup Data Enhancement Technology**

贺誉, 江聪美, 张良恒 ..... 4664

**基于改进 RRT 算法的机械臂路径规划仿真****Simulation of Robotic Arm Path Planning Based on Improved RRT Algorithm**

范彦清 ..... 4674

**机场填方高边坡稳定性设计计算理论及算法分析****Design Calculation Theory and Algorithm Analysis for the Stability of High-Fill Slopes in Airport Earthworks**

陈凯, 朱美宣, 李巍逍 ..... 4681

**双层球对称热传导问题的解及数值验证****The Solution and Numerical Verification of the Two-Layer Spherical Symmetric Heat Conduction Problem**

白宇龙 ..... 4694

**基于 Transformer 的增强局部特征的细粒度图像分类模型****Fine-Grained Image Classification Model Based on Transformer and Enhanced Local Features**

李烨, 蔡家麒 ..... 4702

**发动机悬置安装点动刚度分析****Dynamic Stiffness Analysis of Engine Suspension Mounting Points**

曹佳奇 ..... 4715

**低倍聚光光伏充电站设计及仿真研究****Design and Simulation of Low-Power Concentrating Photovoltaic Charging Station**

王宁, 谢应明, 翁盛乔, 俞钱程, 舒胜 ..... 4724

**非平直下壁面对辐射吸收引发的对流影响研究****Study on the Influence of Non-Uniform Lower Wall on Convection Induced by Radiation Absorption**

周秋凤, 周瑞睿 ..... 4737

**考虑风光不确定性和调峰主动性的多能互补系统优化调度****Optimization Scheduling of Multi-Energy Complementary Systems Considering Wind and Solar Uncertainty and Peak Shaving Initiative**

刘阳, 姚磊, 李天皓, 钱添玺 ..... 4753

**基于蝠鲼的仿生四鳍游动结构设计及其流体仿真****Biomimetic Quadrifin Locomotion Structure Design and Fluid Simulation Based on Batoid Fish**

刘一祯, 沈景凤, 仲梁维 ..... 4767

**基于二次分解重构的股指预测研究****Stock Index Prediction Based on Quadratic Decomposition and Reconstruction**

吉如沁, 秦江涛 ..... 4780

**基于 THz-TDS 图像数据集的 CT 算法仿真验证****Simulation Validation of CT Algorithm Based on THz-TDS Image Dataset**

郎旺, 袁英豪 ..... 4792

**基于 ABAQUS 的预制混凝土柱 - 钢梁节点抗震性能分析****Seismic Performance Analysis of Precast Concrete Column Steel Beam Joints Based on ABAQUS**

袁世伟, 王玮哲, 宁静, 陈刚 ..... 4802

**基于 Simulink 的卡车电动空调系统仿真研究****Simulation Research of Truck Electric Air Conditioning System Based on Simulink**

马千骏, 罗兵 ..... 4811

**金字塔凹表面构成通道内超临界 CO<sub>2</sub> 流动二次流特性研究****Characterization of Secondary Vortices in Supercritical CO<sub>2</sub> Flow in a Channel Formed by a Concave Surface of a Pyramid**

高利军, 林志敏 ..... 4826

**基于机器学习的出血性脑卒中后病况预测研究****A Machine Learning Based Study on the Prediction of Disease Status after Haemorrhagic Stroke**

杨珂, 檀健, 秦一天, 蔡涛 ..... 4840

**地基加固模拟与仿真****Foundation Reinforcement Simulation and Modeling**

刘洛含 ..... 4853

**基于改进 YOLOv8 的室内火情检测****Indoor Fire Detection Based on Improved YOLOv8**

杨明, 钱松荣 ..... 4863

**LED 车灯风冷散热器基板与肋片结构的优化设计与性能分析****Optimal Design and Performance Analysis of Air-Cooled Radiator Substrate and Fin Structure for LED Headlights**

何宏升, 胡卓煥, 罗睿 ..... 4872

**基于温度损伤的红砂岩本构模型****A Constitutive Model of Red Sandstone Based on Temperature Damage**

蔡海涛, 李亚娟 ..... 4886

**PR U-Net: 工业缺陷分割中的特征融合和渐进监督策略****PR U-Net: Feature Fusion and Progressive Supervision Strategy in Industrial Defect Segmentation**

王新宇 ..... 4893

**基于游客收益的极高峰期间景区游线优化**

**Optimization of Tourist Routes in Scenic Spots during Peak Seasons Based on Tourists' Benefits**

丁子航, 董洁霜 ..... 4904

**混合改进麻雀算法解决柔性车间调度问题**

**A Hybrid Improved Sparrow Algorithm for Solving Flexible Job-Shop Scheduling Problems**

刘泳棋, 刘媛华 ..... 4912

**基于 IB-UNet 的零参考低照度图像增强方法**

**A Zero Reference Low Illumination Image Enhancement Method Based on IB-UNet**

何天歌 ..... 4927

**车辆荷载引起隧道地表沉降数值模拟研究**

**Numerical Simulation of Tunnel Surface Settlement Due to Vehicle Loading**

潘夸世, 于王成, 苏哲阳, 李佩青 ..... 4934

**基于熵权 - 云的数学建模竞赛创新人才评价体系研究**

**Research on Evaluation System of Innovative Talents in Mathematical Contest in Modeling Based on Entropy Weight and Cloud**

周涛, 王倩, 姚依辰, 杨真真 ..... 4943

**基于多元线性回归的食用油掺假检测模式识别算法设计与优化**

**Design and Optimization of Edible Oil Adulteration Detection Mode Recognition Algorithm Based on Multiple Linear Regression**

丁宇航 ..... 4953

**计及需求响应的有源配电网储能优化调度**

**Overview of Multi-Source Distribution Network Optimization Operation Considering Energy Storage and Demand Response**

陈鑫瑞, 蒙昌州, 潘邦勇 ..... 4962

**语义一致性大孔洞图像空间频率修复方法**

**Semantic Consistency Large Mask Image Inpainting in Spatial Frequency**

刘倩倩, 孙刘杰, 王文举 ..... 4976

**基于递进优化策略的医院疏散仿真研究**

**Research on Hospital Evacuation Simulation Based on Progressive Optimization Strategy**

黄中意, 张典, 赵曼曼, 房志明, 李晓恋 ..... 4987

**数学建模方法对碳排放、碳达峰问题的研究**

**Research on Carbon Emissions and Carbon Peaking by Mathematical Modeling Methods**

李伟, 梁旭, 王宇峰 ..... 5001