



Ei Compendex核心期刊  
RCCSE中国权威学术期刊

ISSN 1005-3026  
CN 21-1344/T  
CODEN DDXKEZ

# 东北大学学报

## 自然科学版

Vol.40 No.12



JOURNAL OF  
NORTHEASTERN UNIVERSITY  
NATURAL SCIENCE

ISSN 1005-3026



中国·沈阳  
Shenyang China

12  
2019

# 东北大学学报(自然科学版)

Dongbei Daxue Xuebao (Ziran Kexue Ban)

第 40 卷 第 12 期 (总第 351 期) 2019 年 12 月

## 目 次

### 信息与控制

- 基于 GM-ELM 的有杆泵抽油井故障诊断 ..... 侯延彬, 陈炳均, 高究文(1673)
- 基于改进 GAN 算法的电机轴承故障诊断方法 ..... 徐 林, 郑晓彤, 付 博, 田 歌(1679)
- 考虑风险态度的多属性逆向拍卖模型及机制设计 ..... 陈德艳, 汪定伟(1685)
- 基于双互信息准则的雷达自适应波形设计方法 ..... 辛凤鸣, 汪晋宽, 王 彬, 李梅梅(1690)
- 基于 Lognormal 函数的脉搏波分解可行性研究 ..... 王 璐, 陈雪玮, 郝丽玲, 徐礼胜(1695)

### 材料与冶金

- 两相区退火温度对高铝低硅 TRIP 钢组织性能的影响 ..... 黄慧强, 邱洪双, 张天宇, 闫 宁(1700)
- 两相区轧制后淬火引入马氏体降低钢板屈强比 ..... 沈鑫珺, 李德志, 唐 帅, 王国栋(1707)
- 高渗透轧制对 SA738 Gr.B 厚板变形渗透性的影响 ..... 李艳梅, 杨梦奇, 张舒展, 张 田(1711)
- $x\text{CeO}_2-y\text{WO}_3-\text{TiO}_2$  脱硝催化剂的制备与性能 ..... 边 雪, 胡 吕, 彭 朋, 刘思洋(1716)
- 基于双效催化剂的生物油吸附强化重整实验 ..... 谢华清, 袁佳伟, 蓝碧兰, 李 蜜(1721)

### 机械工程

- 反向回转双机驱动振动系统的倍频控制同步 ..... 刘云山, 贾 磊, 闻邦椿(1726)
- 分段线性刚度非线性能量阱的参数优化方法 ..... 姚红良, 张 钦, 杨沛然, 闻邦椿(1732)
- 滚珠丝杠螺母副载荷分布的计算方法 ..... 刘 畅, 赵春雨, 韩彦龙, 闻邦椿(1739)
- 直行截割下采煤机截割部齿轮箱动态特性实验分析 ..... 张 睿, 朱丽莎, 张义民(1744)
- 基于 PC-Kriging 模型与主动学习的齿轮热传递误差可靠性分析 ..... 于震梁, 孙志礼, 曹汝男, 张毅博(1750)
- 基于 Newmark- $\beta$  法的非线性体系动载荷识别 ..... 范玉川, 黄清云, 鲁 艳, 赵春雨(1755)
- 基于实测响应反推标定非接触磁场激励器激励力 ..... 孙 伟, 王 进(1760)
- 基于混合循环算法的复杂装配体装配序列智能规划 ..... 曲兴田, 张 昆, 王学旭, 王宏一(1767)

### 资源与土木工程

- 充填体应力分布理论分析及数值模拟对比研究 ..... 闫保旭, 朱万成, 侯 晨, 贾瀚文(1773)
- 大型基础下基底层状土的变形性状分析 ..... 修占国, 李 纯, 王斐笠, 齐 佳(1779)
- 振动拌和对混凝土强度及其抗冻性能的影响 ..... 贾 蓬, 杜功成, 任云阳, 吴振东(1784)
- 沈阳城市地铁站域地下空间开发的适宜性 ..... 齐锡晶, 樊传召, 邓李杰(1790)

### 管理科学

- 基于  $q$  指数贴现函数的反按揭支付偏好研究 ..... 陆 阳, 王 健, 庄新田(1796)
- 城镇居民用电直接回弹效应分析——考虑局部和全局空间溢出效应 ..... 石建华, 韩 颖, 寇 坡(1800)

# JOURNAL OF NORTHEASTERN UNIVERSITY (NATURAL SCIENCE)

Volume 40 Number 12 (Sum 351) December 2019

## CONTENTS

### Information & Control

- Fault Diagnosis of Sucker Rod Pumping Wells Based on GM-ELM ..... *HOU Yan-bin, CHEN Bing-jun, GAO Xian-wen*(1673)
- Fault Diagnosis Method of Motor Bearing Based on Improved GAN Algorithm ..... *XU Lin, ZHENG Xiao-tong, FU Bo, TIAN Ge*(1679)
- Multi-attribute Reverse Auction Model and Mechanism Design Under the Consideration of the Risk Attitude .....  
..... *CHEN De-yan, WANG Ding-wei*(1685)
- Adaptive Radar Waveform Design Based on Dual Mutual Information Criterion .....  
..... *XIN Feng-ming, WANG Jin-kuan, WANG Bin, LI Mei-mei*(1690)
- Feasibility Research of Pulse Wave Decomposition Based on Lognormal Function .....  
..... *WANG Lu, CHEN Xue-wei, HAO Li-ling, XU Li-sheng*(1695)

### Materials & Metallurgy

- Effect of Intercritical Annealing Temperature on Microstructure and Mechanical Property of High Al-Low Si TRIP Steel .....  
..... *HUANG Hui-qiang, DI Hong-shuang, ZHANG Tian-yu, YAN Ning*(1700)
- Introducing Martensite to Reduce Yield Ratio of Steel Plates Rolled in Dual-Phase Region by Quenching .....  
..... *SHEN Xin-jun, LI De-zhi, TANG Shuai, WANG Guo-dong*(1707)
- Effect of High Permeability Rolling Process on Deformation Permeability of SA738 Gr.B Thick Plate .....  
..... *LI Yan-mei, YANG Meng-qi, ZHANG Shu-zhan, ZHANG Tian*(1711)
- Preparation and Properties of  $x\text{CeO}_2$ - $y\text{WO}_3$ - $\text{TiO}_2$  Denitration Catalyst ..... *BIAN Xue, HU Lyu, PENG Peng, LIU Si-yang*(1716)
- Experimental Study on Bio-oil Adsorption Enhanced Reforming by Using Double-effect Catalysts .....  
..... *XIE Hua-qing, YUAN Jia-wei, LAN Bi-lan, LI Mi*(1721)

### Mechanical Engineering

- Multi-frequency Controlled Synchronization of a Vibrating System with Two-Motor Drives Rotating in Opposite Directions .....  
..... *LIU Yun-shan, JIA Lei, WEN Bang-chun*(1726)
- Optimization Method of Nonlinear Energy Sinks with Piecewise Linear Stiffness .....  
..... *YAO Hong-liang, ZHANG Qin, YANG Pei-ran, WEN Bang-chun*(1732)
- Calculation Method for Load Distribution of Ball Screw Nut Pairs .....  
..... *LIU Chang, ZHAO Chun-yu, HAN Yan-long, WEN Bang-chun*(1739)
- Experimental Research of Dynamic Characteristics for Long Wall Shearer Cutting Unit Gearbox in Straight Line Cutting .....  
..... *ZHANG Rui, ZHU Li-sha, ZHANG Yi-min*(1744)
- Reliability Analysis of Gear Heat Transfer Error Based on PC-Kriging Model and Active Learning .....  
..... *YU Zhen-liang, SUN Zhi-li, CAO Ru-nan, ZHANG Yi-bo*(1750)
- Dynamic Load Identification of a Nonlinear System Based on Newmark- $\beta$  Method .....  
..... *FAN Yu-chuan, HUANG Qing-yun, LU Yan, ZHAO Chun-yu*(1755)
- Inverse Identification and Calibration of the Excitation Force of Non-contact Magnetic Field Exciter Based on Measured Response .....  
..... *SUN Wei, WANG Jin*(1760)
- Hybrid Cycle Algorithm-based Intelligent Assembly Sequence Planning of Complex Assembly .....  
..... *QU Xing-tian, ZHANG Kun, WANG Xue-xu, WANG Hong-yi*(1767)

### Resources & Civil Engineering

- A Comparative Study on the Stress Distribution in Mine Backfill Through Theoretical and Numerical Analysis .....  
..... *YAN Bao-xu, ZHU Wan-cheng, HOU Chen, JIA Han-wen*(1773)
- Investigation on the Deformation Behavior of Multi-layered Soils Under a Large Foundation .....  
..... *XIU Zhan-guo, LI Chun, WANG Fei-li, QI Jia*(1779)
- Strength and Frost-Resistance Properties of the Vibration-Mixed Concrete .....  
..... *JIA Peng, DU Gong-cheng, REN Yun-yang, WU Zhen-dong*(1784)
- The Suitability of Underground Space Development in Terms of Subway Station in Shenyang City .....  
..... *QI Xi-jing, FAN Chuan-zhao, DENG Li-jie*(1790)

### Management Science

- Research on Payment Preferences for Reverse Mortgage Based on  $q$ -Exponential Discount Function .....  
..... *LU Yang, WANG Jian, ZHUANG Xin-tian*(1796)
- Analysis on the Direct Rebound Effect of Urban Residents' Electricity Consumption—Considering Local and Global Spatial Spillover Effects .....  
..... *SHI Jian-hua, HAN Ying, KOU Po*(1800)