

ISSN 0258 - 8013  
CODEN ZDGXER

# 中国电机工程学报

半月刊

第 41 卷 第 13 期

## Proceedings of the CSEE

SEMIMONTHLY

Vol.41 No.13

中国电机工程学报

第四十一卷 第十三期 二〇二一年七月

Proceedings of the CSEE Vol.41 No.13 July 2021



7月  
2021  
2021-07-05 出版

ISSN 0258-8013



中国电机工程学会主办  
THE CHINESE SOCIETY FOR ELECTRICAL ENGINEERING



# 中国电机工程学报

ZHONGGUO DIANJI GONGCHENG XUEBAO

第 41 卷

第 13 期 (总第 672 期)

2021 年 7 月 5 日

## 目 次

(论文电子版 <http://www.pcsee.org/CN/volumn/home.shtml>)

### · 国家重点研发计划 ·

- 基于线性松弛最优潮流的电力市场日前出清及节点电价分解 ..... 肖遥, 别朝红, 刘凡, 高晓松, 李更丰, 李雨茜 (4363)
- 数据与知识联合驱动方法研究进展及其在电力系统中应用展望 ..... 李峰, 王琦, 胡健雄, 汤奕 (4377)
- 考虑  $N-1$  准则的配电网与分布式储能联合规划 ..... 林哲, 胡泽春, 宋永华 (4390)
- 计及需求响应与火-储深度调峰定价策略的电力系统双层优化调度 ..... 崔杨, 修志坚, 刘闯, 赵钰婷, 唐耀华, 柴旭峥 (4403)
- 基于局部复阻抗模型的 LCL 型并网变换器相位重塑控制策略 ..... 王祺, 秦文萍, 张宇, 任春光, 王磊, 韩肖清, 王鹏 (4415)
- 微电网多逆变器并联分散动态扰动补偿控制策略 ..... 胡长斌, 石向一, 罗珊娜, 周京华, 马瑞, 范辉 (4425)

### · 智能电网 ·

- 基于生成对抗网络的后备保护在线整定快速计算方案 ..... 凌谢津, 李银红 (4439)
- 考虑多重不确定性的电-气-交通网络耦合系统数据驱动鲁棒优化调度 ..... 张亚超, 郑峰, 舒胜文, 乐健, 朱蜀 (4450)
- 考虑区域源-荷均衡的电磁环网开环分区方案生成方法研究 ..... 杨楠, 刘俊豪, 陈道君, 刘颂凯, 覃涛, 赵天翊, 韩璟琳 (4462)
- 面向频率稳定提升的虚拟同步化微电网惯量阻尼参数优化设计 ..... 王淋, 巨云涛, 吴文传, 陈希 (4479)
- 需求侧综合能源站实时市场竞标与能量管理协同优化策略 ..... 殷爽睿, 艾芊, 姜子卿, 孙东磊, 李雪亮 (4490)
- 多端口直流断路器研究综述 ..... 张烁, 邹贵彬, 魏秀燕, 张成泉 (4502)
- 基于非线性准零刚度理论设计的变电站机柜用隔震装置试验研究 ..... 程永锋, 朱光楠, 刘振林, 卢智成, 高坡, 朱祝兵, 曹庆杰 (4516)
- 基于行波相位特性的三端混合直流线路行波保护原理 ..... 梁远升, 黄泽杰, 李海锋, 王钢, 江链涛 (4525)

### · 发电 ·

- 燃煤锅炉劣质煤数字化智能深度掺烧系统研发与应用 ..... 李皓宇 (4543)
- 旋流煤粉燃烧器低负荷稳燃技术探讨 ..... 宋民航, 黄云, 黄骞, 李水清 (4552)
- 燃煤机组烟气余热和水协同回收系统多参数优化及运行策略 ..... 杨凯旋, 封又琳, 刘明, 严俊杰 (4566)
- 串联式干气密封对超临界二氧化碳轴流透平气动性能的影响 ..... 杜秋晚, 张荻, 谢永慧 (4576)
- 碳纳米管-氮化硼/肉豆蔻酸复合相变材料的蓄热性能研究 ..... 张仲彬, 朱长林 (4585)
- 冷凝除雾器分级除尘效率影响因素模拟研究 ..... 厉雄峰, 葛春亮, 刘文桦, 蒋楠, 刘嘉恒, 唐飞翔 (4594)

### · 电力电子与电力传动 ·

- 三电平 ANPC-DAB 的零电压软开关特性与损耗均衡方法 ..... 关清心, 张宇, 赵焕蓓, 康勇 (4603)
- 低电压电流应力的有源钳位 ZVS 软开关技术 ..... 凡绍桂, 巩冰, 游江, 孙力, 段建东 (4616)
- 具有低电压应力的新型开关电容七电平逆变器 ..... 叶远茂, 陈仕铠, 华特科 (4628)
- 电动汽车混合储能装置小功率分流方法 ..... 申永鹏, 孙建彬, 王延峰, 李会仙, 唐耀华, 赵俊 (4636)

### · 电机与电器 ·

- 混合励磁轴向磁通切换永磁电机全速域无位置传感器控制 ..... 张蔚, 王家乐, 梁惺彦, 杨泽贤 (4646)
- 软磁复合材料-Si 钢组合铁心轴向磁通永磁电机的结构设计研究 ..... 张文晶, 徐衍亮, 魏顺航, 于爱国 (4656)
- 单绕组无轴承磁通切换电机转子空间位置估计及其无传感器复合控制 ..... 陈垚, 周扬忠, 张竞, 黄政凯 (4666)
- 超导电动悬浮系统阻尼特性研究 ..... 胡道宇, 冯馨月, 张志华 (4679)

### · 高电压技术 ·

- 变压器升高座区域电弧故障与压力特性研究 ..... 刘泽洪, 卢理成, 周远翔, 种芝艺, 胡德霖, 李宇航 (4688)
- 台风“米克拉”近登陆点强风特性实测与输电线路设计风荷载研究 ..... 邵帅, 张宏杰, 潘峰, 杨风利, 王飞 (4698)
- 基于绝缘油拉曼光谱的聚合度定量评估方法 ..... 杨定坤, 陈伟根, 万福, 史海洋, 周永阔 (4710)
- 基于微逾渗理论的电树枝引发和生长特性 ..... 李长云, 王伟, 王翰林 (4720)

### · 英文概述见论文电子版 ·

期刊基本参数: CN11-2107/TM \* 1964 \* S \* A4 \* 368 \* zh \* P \* ¥84.00 \* 4000 \* 32 \* 2021-07 版权所有 未经许可不得转载及上网

PROCEEDINGS OF THE CHINESE SOCIETY FOR  
ELECTRICAL ENGINEERING  
(PROCEEDINGS OF THE CSEE)

Vol.41 No.13 (Ser. 672)

Jul. 5, 2021

CONTENTS

(Electronic Journals <http://www.pcsee.org/EN/volumn/current.shtml>)

• National Key Research and Development Program •

- A LR-ACOPF Based Market Clearing Model and LMP Decomposition  
.....XIAO Yao, BIE Zhaohong, LIU Fan, GAO Xiaosong, LI Gengfeng, LI Yuqian (4363)
- Combined Data-driven and Knowledge-driven Methodology Research Advances and Its Applied Prospect in Power Systems  
..... LI Feng, WANG Qi, HU Jianxiong, TANG Yi (4377)
- Joint Planning of Distribution Network Expansion and Distributed Energy Storage Systems Under  $N-1$  Criterion  
..... LIN Zhe, HU Zechun, SONG Yonghua (4390)
- Dual Level Optimal Dispatch of Power System Considering Demand Response and Pricing Strategy on Deep Peak Regulation  
..... CUI Yang, XIU Zhijian, LIU Chuang, ZHAO Yuting, TANG Yaohua, CHAI Xuzheng (4403)
- Phase Reshaping Control Strategy of LCL Grid Connected Converter Based on Local Complex Impedance Model  
..... WANG Qi, QIN Wenping, ZHANG Yu, REN Chunguang, WANG Lei, HAN Xiaoqing, WANG Peng (4415)
- Decentralized Dynamic Disturbance Compensation Control Strategy for Multiple Parallel Inverters in Microgrid  
.....HU Changbin, SHI Xiangyi, LUO Shanna, ZHOU Jinghua, MA Rui, FAN Hui (4425)

• Smart Grid •

- Quick Calculation Scheme of Backup Protection Online Setting Based on Generative Adversarial Networks .....LING Xiejun, LI Yinhong (4439)
- A Data-Driven Robust Optimization Scheduling of Coupled Electricity-Gas-Transportation Systems Considering Multiple Uncertainties  
.....ZHANG Yachao, ZHENG Feng, SHU Shengwen, LE Jian, ZHU Shu (4450)
- Research on Generation Methods of Partition Scheme of Electromagnetic Loop Network Considering Regional Source-load Equilibrium  
..... YANG Nan, LIU Junhao, CHEN Daojun, LIU Songkai, QIN Tao, ZHAO Tianyi, HAN Jinglin (4462)
- Optimal Design of Inertia and Damping Parameters of Virtual Synchronous Microgrid for Improving Frequency Stability  
..... WANG Lin, JU Yuntao, WU Wenchuan, CHEN Xi (4479)
- Collaborative Optimal Strategy of Real-time Market Bidding and Energy Management for Integrated Energy Station on the Demand Side  
..... YIN Shuangrui, AI Qian, JIANG Ziqing, SUN Donglei, LI Xueliang (4490)
- A Review of Research on Multi-port DC Circuit Breaker ..... ZHANG Shuo, ZOU Guibin, WEI Xiuyan, ZHANG Chengquan (4502)
- Test Study of Vibration Isolation Device for Substation Cabinets Based on Nonlinear Quasi-zero Stiffness Theory Design  
.....CHENG Yongfeng, ZHU Guangnan, LIU Zhenlin, LU Zhicheng, GAO Po, ZHU Zhubing, CAO Qingjie (4516)
- Phase Characteristics Based Travelling Wave Protection for Transmission Line of Three-terminal Hybrid HVDC System  
.....LIANG Yuansheng, HUANG Zejie, LI Haifeng, WANG Gang, JIANG Liantao (4525)

• Power Generation •

- Research and Application of Digital Intelligent Mixedly Burning Inferior Coal Deeply System in Coal-fired Boiler ..... LI Haoyu (4543)
- Discussion on Low-load Stable Combustion Technology of Swirl Pulverized-coal Burner  
..... SONG Minhang, HUANG Yun, HUANG Qian, LI Shuiqing (4552)
- Multi-parameter Optimization and Operation Strategy of Fluegas Waste Heat and Water Co-recovery System for Coal-fired Power Plants  
..... YANG Kaixuan, FENG Youlin, LIU Ming, YAN Junjie (4566)
- Effect of Series Dry Gas Seal on the Aerodynamic Performance of a Supercritical Carbon Dioxide Axial-inflow Turbine  
..... DU Qiuwan, ZHANG Di, XIE Yonghui (4576)
- Study on the Thermal Storage Performance for Carbon Nanotubes-boron Nitride/Myristic Acid Composite Phase Change Material  
.....ZHANG Zhongbin, ZHU Changlin (4585)
- Numerical Simulation Study on the Influence Factors of Graded Dust Collection Efficiency of Condensed Mist Eliminator  
..... LI Xiongfeng, GE Chunliang, LIU Wenju, JIANG Nan, LIU Jiaheng, TANG Feixiang (4594)

• Power Electronics and Drives •

- Zero-voltage Soft-switching Conditions and Loss Balance Method of Three Level ANPC-DAB  
..... GUAN Qingxin, ZHANG Yu, ZHAO Huanbei, KANG Yong (4603)
- Active Clamped ZVS Soft Switching Technology With Low Voltage and Current Stress  
..... FAN Shaogui, GONG Bing, YOU Jiang, SUN Li, DUAN Jiandong (4616)
- A Novel Switched-capacitor Seven-level Inverter With Low Voltage Stress ..... YE Yuanmao, CHEN Shikai, HUA Teke (4628)
- Power Distribution Method of Wavelet for Hybrid Energy Storage Systems in an Electric Vehicle  
.....SHEN Yongpeng, SUN Jianbin, WANG Yanfeng, LI Huixian, TANG Yaohua, ZHAO Jun (4636)

• Electric Machines and Apparatus •

- Position Sensorless Control of a Hybrid Excitation Axial Flux-switching Permanent Magnet Machine in Full Speed Range  
..... ZHANG Wei, WANG Jiale, LIANG Xingyan, YANG Zexian (4646)
- Design and Research of Axial Flux Permanent Magnet Motor Based on Soft Magnetic Composite Material-Si Steel Combined Core  
.....ZHANG Wenjing, XU Yanliang, WEI Shunhang, YU Aiguo (4656)
- Rotor Spatial Position Estimation and Sensorless Composite Control of Bearingless Flux-switching Permanent Magnet Motors  
.....CHEN Yao, ZHOU Yangzhong, ZHANG Jing, HUANG Zhengkai (4666)
- Study on the Damping Characteristics of Superconducting Electrodynamical Suspension System  
.....HU Daoyu, FENG Xinyue, ZHANG Zhihua (4679)

• High Voltage Engineering •

- Research on Pressure Characteristics of AC Turret on Arc Fault  
.....LIU Zehong, LU Licheng, ZHOU Yuanxiang, CHONG Zhiyi, HU Delin, LI Yuhang (4688)
- Study on Field Measurements of Strong Wind Characteristics Near the Typhoon “Mekkhala” Landing Place and Design Wind Loads of  
Transmission Lines .....SHAO Shuai, ZHANG Hongjie, PAN Feng, YANG Fengli, WANG Fei (4698)
- Quantitative Evaluation Method of Degree of Polymerization Based on Raman Spectra of Insulating Oil  
.....YANG Dingkun, CHEN Weigen, WAN Fu, SHI Haiyang, ZHOU Yongkuo (4710)
- Initiation and Growth Characteristics of Electric Tree Based on Micro-percolation Theory ..... LI Changyun, WANG Wei, WANG Hanlin (4720)

• For Extended Summaries, Please See the Electronic Journals •