

2023 3rd International Conference on Intelligent Power and Systems (ICIPS 2023)

**Shenzhen, China
20 – 22 October 2023**



**IEEE Catalog Number: CFP23UE0-POD
ISBN: 979-8-3503-2870-7**

**Copyright © 2023 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP23UE0-POD
ISBN (Print-On-Demand):	979-8-3503-2870-7
ISBN (Online):	979-8-3503-2869-1

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

Table of Contents

Research on Static Reverse Analysis Technology for Security Detection of Power Industrial Control Software	1
Jinshan Chen, Sihang Yu, Xuanxuan Xie, Yu Cheng, Zhijun Tang, Chaoping Deng, June Li	
Multi-node Trusted Remote Attestation and Recovery Scheme for Power Industrial Control Terminal	10
Wei Liu, Jianye Yu, Longyun Qi, Kangle Yang, Ke Li, Zhichao Xu, Ketong Shang, Qiuxin Wu	
Quantify Randomness of Quantum Random Number with Transformer Network	17
Zhenwei Li, Bao Feng, Liangjie Cui, Hui Wang, Yuxiang Bian, Genle Piao, Xingyu Zhou	
Predictive-Based Delay Compensation for Classical VOC Control with Enhanced Transient Performance in Grid-Connected Inverters	23
Wenhui Zhi, Yu Li, Qiwu Wang, Jianbo Gao, Qingzhuo Li, Guofeng Dong, Daojie Liu, Yuanxiang Sun, Yongdu Wang	
Model Predictive Control of Self-Contained Electro-Hydraulic Actuator Driven by Permanent Magnet Synchronous Motor	28
Qiwu Wang, Jianbo Gao, Yu Li, Guofeng Dong, Daojie Liu, Wenhui Zhi, Yuanxiang Sun, Yongdu Wang	
Research on poor contact fault of switch cabinet based on Fluent	33
Zhen Xie, Yang Gao, Cailian Gu, Aoran Xu	
Design of safety test system for high voltage arrester in complex electromagnetic environment	37
Chenchen Zhang, Yong Xia, Bing Lv, Pengcheng Zhu	
A Review of Small-signal Model Simulation Modeling Methods for DC-DC Converters	42
Ziyi Cao	
Modeling method of metallized film capacitor based on electrothermal coupling analysis	47
Yixin Zhu, Hao Wu, Qiaoshu Lei, Shunkai Lou, Dezhi Xu	
Application of multi-version and multi-temporal data display technology of control system graphics based on CIM/G	54
Li Zhang, Qing Zou, Xiao Han, Kun Huang, Xueyong Zhang, Yueyan Chen	
Double Switches Quadratic High Step-up Converter Based on Coupled Inductance	60
Boyuan Zhang	

Design of General Intelligent Control Platform for Thermal Power Plants	
Zhaojin Chen, Wenjing Zhang, Changgeng Wang, Chunyu Gao, Dongsheng Wei, Weiting Zhen, Hongyi Guo, Yanhong Cui, Chunyu Zhang, Meng Liang, Junfeng Long, Yuan Fang	65
Simulation analysis and modeling of local discharge sensor	72
Yulong Xing, Xueyu Han, Qian'ao Yu, Yonggui Wang, Yuanyuan Hu, Xinsu Mei	
Optimal Configuration of Thermal Storage Capacity for Cogeneration Units Based on Multi-objective Algorithm	78
Yanru Zhang, Jianjun Zhu, Changrui Wang, Xiaole Qi, Jing Dai, Zhenjiang Wang, Aiyun Yan, Shuowei Jin, Muyao Zhang, Wanyuan Xu	
Study on a novel 1D Halbach permanent magnet array based on the analysis of the side shape of permanent magnets	86
Chengzhen Fu, Guangdou Liu, Xulu Zhan	
Development of an integrated energy system simulation computing platform based on a typical cross-border area	90
Shumin Chen, Biao Qiao, Hao Zhang, Shukui Liang, Guangzeng You, Yipeng Qin	
A Single-phase Integrated Battery Charger for EV Based on Dual Three-phase Motor	100
Henri Josephson Raherimihaja, Guodong Sun, Shan Lu, Xiaoye Xu	
Switching Frequency Hysteresis Junction Temperature Control Strategy for Si IGBT/SiC MOSFET Inverter Parallel Module (SSIPM)	106
Yiyang Zhong, Zishun Peng, Yuxing Dai, Huasen Xie	
Research on Life of Parallel Module of SiC MOSFET/Si IGBT Inverter	111
Cheng Peng, Zishun Peng, Yuxing Dai, Senhua Xie	
Passive Sliding Mode Control Strategy for Modular Multilevel Matrix Converters	116
Qifan Zhang, Mingdong Wang, Zhiru Xie	
Power System Monitoring and Management Based on Smart Sensors	122
Li Zhou	
A Torque Efficiency Optimization Method for Dual Five-phase PMSMs Coaxial Drive System under Shaft Phase Deviation	128
Guodong Sun, Henri Josephson Raherimihaja, Shan Lu, Bingxue Wang	
Simulation Analysis of Electromagnetic Vibration of Shunt Reactor Based on AC and DC	133
Dabiao Wang, Jun Zhou, Kai Mao, Liang Huang, Guojun Xiong, Pengju Zhang	
Direct speed predictive control of permanent magnet synchronous motor	139
Mingzheng Gao, Huibo Liu	

Research on reliability improvement of wind turbine gearbox	143
Xiuqi Zhang, Yong Li	
Structure of a model for developmental changes of dissolved gas in normal transformer oil	147
Helong Wang, Hong Mu, Xiaolei Yu, Jinfeng Zhang, Can Zhu, Wenli Huang, Xiaoyi Ji, Mengjun Liu	
A compact dual-band rectenna for WIFI bands	152
Lei Li, Ruifeng Xu, Jingxu Cao, Xue Li	
Study of Multi-converter Aggregation with Improved Equivalent Parameters	157
Guanchu Chen, Zian Li, Baoyu Zhai, Arimas Bexkek	
An Integrated Boost-Inverter with No leakage Current	162
Qiwei Yuan	
A voltage control method for isolated grid based on long short-term memory neural network optimized by improved particle swarm optimization algorithm	167
Xiangqiang He, Mingshun Liu, Qingxin Pu, Chengxiang Li, Dongxu Chang	
Design of High PSRR and Low Noise for LDO	175
Qingtian Zhao, Qianqian Lei, Yonggang Chen, Xudong Zhang	
A Low Power And High Linearity Ultra Wideband Mixer	179
Jianhui Xiong, Qianqian Lei, Zhenqi Chen, Song Feng	
A Two-stage Dynamic Comparator with Low Delay and Low Offset	184
Xingyu Liu, Qianqian Lei, Run Chen, Yanfei Yang	
Comprehensive Simulation Study of Electromagnetic Characteristics of Power Transformers in Nuclear Power Plants	188
Zhongqing Yang, Lijun Huang, Chao Gao, Erya Gao, Yuhui Feng, Kai Wang	
The Practical Engineering Application of Improved Grey Prediction Model in Power Load Forecasting	193
Jiru Jiang, Wenmeng Zhao, Mingyu Ou, Tao Wang, Guanglei Huang	
Research of Substation and Dispatch Communication Protocol Base on IEC61850 Model	200
Deshun Jia, Baifeng Chen, Zhihua Zhu, Jinfeng Zhao, Changming Ge, Haichao Ji, Wang Lei, Wang Xuan	
Design of a Voltage-Controlled Isolated Weinberg Converter Based on Digital Control	205
Ying Shen, Zirui Zhu, Congrang Jiang, Ziwen Fang, Tao Liu	

Image-Based Length and Width Measurement of Crimped Tension Clamp	213
Huitu Shao, Jiliang Lv, Shengguan Qu, Zhengfeng Ceng	
Based on NSGA-II and MOPSO optimization of a chemical industrial park	218
Qi Han, Xiaojiao Liang, Yuanyuan Feng, Jiping Jiang, Jianhua Wang, Haowen Geng	
Selection of Attribute Indicators in Transformer Fault Diagnosis Based on Fuzzy Clustering	224
Mengjun Liu, Xiaoyi Ji, Jing Shan, Yangchun Cheng, Feng Wang, Hongxia Qin, Li Li	
Research on digital portrait of power information communication system based on business drive	229
Shanqi Zheng, Feng Li, Lei Jin, Bolong Wang	
Fire risk assessment of cable joint based on Time Series Method improved network Analytic Hierarchy Process	237
Min Wei, Yushun Liu, Jiaqing Zhang, Tao Sun, Feng Liu, Liangpeng Ye	
Simulation Analysis of Crimping Process of Strain Clamp-ACSR System	245
Zhengfeng Zeng, Jiliang Lv, Shengguan Qu, Huitu Shao	
The principle and influence analysis of suppressing ultra-low frequency oscillation by using additional GPSS control	250
Tao Xu, Shiyun Sun, Zichao Zhou, Haiyang Feng, Han Deng, Youwei Chen, Boyu Li	
Fixed frequency three-phase CLLC resonant converter for a wide range of voltage outputs	255
Zhenhai Song, Yuzuo Pan, Tao Dai, Xiaodong Li	
The pilot protection scheme based on Tellegen's theorem for the outgoing line of photovoltaic station	260
Youwei Chen, Haiyang Feng, Hongchun Shu, Shiyun Sun, Pihao Zhang, Han Deng, Zichao Zhou	
Cable Conductor Temperature Prediction Method Based on Nonlinear Auto-Regressive Model with Exogenous Inputs Neural Network	266
Meng Hong, Ying Lu, Yanli Xin	
Research on the Application of Deception Defense Technology in Smart Grid	272
Yuzhen Wang, Guoxiao Zong, Qiang Wei	
Bi-Orthogonal Projection Learning for Dimensionality Reduction	278
Yingyi Liang, Junjun Fan, Chunsheng Li, Jiajun Wen	
Energy-efficient WSNs Model Based on Fuzzy Logic Clustering Protocol and MOML	283
Bo Bian	

Multi-energy microgrid operation optimization strategy on Stackelberg game considering energy service price	287
Liang Ma, Shigong Jiang, Ruixin Qian, Qingxi Li, Hai Huang, Yi Lin	
Research on power flow calculation method of three-phase unbalanced microgrid based on time-domain iterative method	297
Jinhua Dong, Haoyu Wu, Yixin Zhu, Yujie Chen, Dezhi Xu, Wenzhou Lu	
Distribution network reconfiguration based on improved artificial bee colony algorithm	304
Zhengjiang Wang, Aihong Tang	
VAE-based Multi-domain Feature Alignment and Generative Network for Few-Shot Radar Models Identification	309
Yifang Zhang, Xiyu Fan, Xiangrong Zhang, Caijin Xu, Guanchun Wang	
Research on Algorithm for State Recognition of Electric Power Goods Based on Image Recognition	316
Hua Fang, Li Wang, Xiaojiang Sun, Wencan Yan, Shaowei Zhou, Liguang Wang	
An identification method for disturbance signal basing on support vector machine with optimized multi-universe algorithm	321
Ke Zhou, Qingrun Jin, Zhiyue Mo, Wei Tao, Jiekang Wu, Zhen Lei	
An Improved Model Predictive Control method with Luenberger Observer for Measurement Noise Suppression and Reduction of Current Ripples	326
Daojie Liu, Qiwu Wang, Yu Li, Jianbo Gao, Guofeng Dong, Wenhui Zhi, Yuanxiang Sun, Yongdu Wang	
Intelligent Analysis Model of Distribution Network Line Loss Based on DAE-LSTM Neural Network	331
Fan Yang, Xinye Liu, Bingbing Lu	
Capacity optimization of microgrid considering slope climbing effect of thermal power units	335
Jianjun Zhu, Yanru Zhang, Muyao Zhang, Jing Dai, Xiaole Qi, Zhenjiang Wang, Aiyun Yan, Shuowei Jin, Wanyuan Xu, Changrui Wang	
A high-performance table based HTML5 for power grid dispatching and control system	342
Le Liu, Xiao Han, Yan Bian, Qing Zou, Yunfeng Sun, Weirui Yue	
Short-term Prediction Method of Distributed Photovoltaic Power Generation Based on LSTM Network	348
Huiyu Song, Xiaoguang Huang, Dayang Li, Junhua Zhang, Chao Deng, Zhichu Wei	

Multi-objective two-level planning optimization method for distribution network based on network loss model and adaptive fruit fly algorithm	354
Juqin Xuan, Jieyun Zheng, Zhuolin Chen, Zhanghuang Zhang, Ying Shi	
A Parameter Identification Method for Robust Model Predictive Control of Virtual Synchronous Generator Based on Two Sliding Mode Observers	358
Chengshuai Li, Zhenkun Liu, Hui Liu	
Low-carbon Demand Response Study of Parks Based on Electric Carbon Factor Guidance	365
Hao Jia, Zhijun Bai, Chao Zhang, Xinyu Xu, Rongqiang Wang, Yuan Cheng	
Trend Analysis of Power Quality Basing on Deep Belief Network	371
Wan Yang, Heping Peng, Yilong Chen, Hongbin Wang	
A Rough Set Based Similarity Analysis Method for Power Quality	376
Yilong Chen, Hongbin Wang, Heping Peng, Wan Yang	
Cloud Energy Storage Online Optimal Scheduling Strategy Based on Approximate Dynamic Programming	381
Yuanming Huang, Kai Li, Zhijian Zeng, Xingan Yao, Jinghui Wu, Jiaxun Liu	
Modular Modeling Method for Transfer Function of VSC Grid-Connected System	388
Yutong Li, Haishun Sun	
Active Support Performance Test of Grid-connected Photovoltaic System Based on Grid-forming Control	393
Xinze Xi, Yun Hu, Chao Xing, Qi Guo, Shoudong Xu, Liang Tu, Peng He, Yihua Zhu, Mingzhang Su, Chao Luo	
Two-Stage Optimization Scheduling of Multi-Microgrids with Hydrogen-Infused Gas in an Uncertain Environment using Nash Bargaining	398
Hui Zhang, Jiye Wang, Xiongwen Zhao, Qinghai Ou	
A Search Method for Controlled Islanding Surface Considering the Critical Nodes in Isolated Network	404
Qingxin Pu, Xiangqiang He, Guosong Wang, Dongxu Chang, Yihua Zhu, Chengxiang Li	
Cooperative consensus control of energy storage units in microgrid via a dynamic triggering approach	410
Xinwei Wang, Jinchang Chen, Yican Gu, Haoyi Liu, Xingzi Zhang	
Active Distribution Network Day-Ahead Day-In Collaborative Dispatching Method Based on Optimal Economic Operation Area	417
Hui Zhang, Jiye Wang, Xiongwen Zhao, Xiaohui Yuan	

Real time status evaluation of submarine cables based on health index and cloud model	424
Yang Yang, Chengqian Zhang, Hongtao Ni, Dong Liu	
Construction and Application of Power Grid Fault Handling Knowledge Graph	431
Fan Li, Yingjie Tian, Yun Su, Naiwang Guo, Jun Gao, Haiyan Pan	
Study on the Uniformity of Ion Current Density in the Calibration device of DC Total Electric Fields	437
Xuping Qi, Yanmei Cao, Lin Wang	
Research on IPv6 Address Scan Detection Algorithm Based on Patterns	442
Wei Liu, Wei Deng, Xiong Xiao	
Voltage Control Strategy for Cooperative Regulation of Fast and Slow Devices in Active Distribution Network	447
Guangde Dong, Yongtao Chen, Xiaojun Zhu, Tao Chen, Yiyao Zhou, Qianggang Wang	
A new single-phase grounding fault location method of distribution networks with the influence of distributed generators and loads	457
Lang Yang, Xinqiao Fan, Li Zhang, Hui Li	
Signal Integrity Analysis in High-Speed Clock Circuit	463
Yu Liu, Congyi Zhu, Zhengyan Chen	
Research on Hierarchical Coordinated Control Based on AC-DC Hybrid Microgrid	469
Chao Xi, Mengtian Yu, Jian Nie, Qi Feng, Jie Liu, Hui Ma	
Compensation Control for Line Impedance Detection in Interconnected DC Microgrids Based on Periodic Single-Pulse Detection Method	475
Zhiwei Wang, Yujie Zou, Cheng Yang, Haoyang Cui	
Research on The Whole Process Management of Monitoring Information Based on The Integration of Four Tables	479
Baifeng Chen, Deshun Jia, Jingfeng Zhao, Zhihua Zhu, Shuxin Huang, Changming Ge, Jian Yang, Haichao Ji	
Transient Synchronization Stability Analysis of the Grid-integrated DFIG	484
Jiajun Wang, Wenjuan Du, Zhen Gao, Haifeng Wang	
Energy Optimization of Smart Grid Based on CFO Algorithm	495
Shifen Han	
Electricity Load Forecasting Based on DBO Optimized VMD Decomposition and Feature Screening	499
Shaolin Chen, Ming Kang, Chenglin Liang, Tao Xu, Jingjing Yu	

Analysis of the impact of electric vehicle charging on distribution network protection	506
Jiahao Su, Ke Chen, Yinghui Liu, Kaixin Zhang	
Design of a Photovoltaic Power Prediction System Based on Improved Ensemble Learning Algorithms	510
Zhisheng Lv, Yuchao Wang, Weiping Zhang, Weiying Chen	
Power supply recovery model of active distribution network after disaster based on user outage loss evaluation	515
Bo Tang, Chuang Yu, Liu Feng, Rui Liu, Guan Wang	
A Risk Balanced Routing Optimization Method for Power Communication Private Networks	523
Ting Sun, Jiangning Wu, Xinning Wang, Wei Zhou, Zhenwei Li	
Research on Regulating the Integration of Seasonal Load Scale into Rural Distribution Network	529
Yanze Wang, Deping Yang, Wei Song	
Based on the synchronous grid connection of pumped storage units	535
Jiayao Li, Bo Zhao, Fei Zhang, Shiyue Du	
Islanding partition method based on chaotic OPL-GWO algorithm under local grid fault	540
Mingliang Yang, Min Cheng, Pijiang Zeng	
Research on secure interaction of Distribution Network data assets under Privacy Protection Framework	546
Shuai Kang, Caiguang Ma, Yunpeng Huang, Zhimin Chen, Meiqi Song	
Short-circuit Characteristics Analysis of Doubly Fed Induction Generator Considering Multi-stage crowbar Switching Strategy	552
Pihao Zhang, Hongchun Shu, Haiyang Feng, Shiyun Sun, Tao Xu, Chaoshun Jiang, Weisheng Liu	
Study on the analysis and suppression strategy of the oscillation risk on the AC side of the hybrid cascaded DC system	558
Qichen Chen, Kuan Zheng, Shangfu Teng, Linzhen Fan, Yiming Zhang, Siqi Chen	
A resilience enhancement method for high proportional renewable energy systems under source-load risk scenarios	563
Yanchun Li, Tianmeng Yang, Zelong Chen, Peng Li, Xuan Song, Yumin Zhao, Jicheng Liu, Wei Feng	

Risk Assessment of High-percentage Renewable Energy in Source-load Imbalance Scenarios under Severe Weather	569
Yanchun Li, Zelong Chen, Tianmeng Yang, Peng Li, Xuan Song, Yumin Zhao, Jicheng Liu, Wei Feng	
Application of personnel flow simulation in the analysis of infection risk in ships with medical functions	581
Li Yan, Meng Cui, Hongbin Meng	
A C-DCGAN-based method for generating extreme risk scenarios of high percentage new energy systems	588
Yanchun Li, Peng Li, Tianmeng Yang, Zelong Chen, Xuan Song, Yumin Zhao, Jicheng Liu, Wei Feng	
Optimal Scheduling of Integrated Energy Systems with Carbon Capture and P2G Conversion in Response to Multi-Type Demands	594
Ruihuan Chai, Kun Yang	
H_{∞} filtering of a constant time delay neural networks with quantized output	598
Jing Han, Yu Xia, Liting Zhang, Tao Zhang, Hong Gao	
Monitoring and Display Technology for Human-machine Service in Power System based on Lightweight Human-machine Cloud Terminal	603
Xia Yin, Zhen Yan, Zhimeng Lv, Lulu Li, Guang Chen, Hua Xu	
Research on Integrated Lightning Protection Technology for Power Transmission Lines	609
Xiangbo Gong	
Day-ahead scheduling considering the flexible supply and demand balance of distribution network after large-scale PV grid-connection	615
Dong Wu, Zhili Li, Yanju Ma, Wei Zhang, Jing Yang, Yangyang Song, Jingjing Zhao	
Power System Topology Optimization Method Based on Maximum Connectivity Subgraph	621
Jiangang Lu, Wenxin Guo, Huijuan Tan, Yue Dai, Chen Wang	
Design of Transmission Line Identification and Localization System Based on Machine Vision	626
Hongwei Li, Yiji Qin, Shengqiang Yang, Peng Zhou	
Research on reliability of flexible DC transmission system based on fuzzy comprehensive evaluation	630
Zhaozhao Peng, Menghu Li, Li Fan	
Dynamic State Estimation of Power Systems Based on Extended Kalman Particle Filter	638
Chun Li, Junbo Zhang	

Application of instant graph generation technology in real-time power systems	645
Xiongwei Bao, Sha Sha, Haiyang Wang, Weirui Yue, Hua Xu, Kun Huang	
Research on Key Management Method for New Energy Power System Interconnection Terminals	650
Yun Feng, Feng Zhai, Xiaobing Liang, Liang Zhang, Yuan Fang, Xiang Cai	
Research on Multi-Objective Demand Response in Industrial Parks Considering Electricity Costs and Consumer Comfort	655
Manshu Li, Xiaobo Cui, Lei Ma, Liang Tang, Gang Wang, Yao Rao	
Speech recognition model of abnormal information in power dispatching system based on time domain analysis	662
Jun Zhang, Huicong Li, Rui Guo, Fangfang Li, Chengcheng Lu	
Study on Protection Scheme of VSC-HVDC Outgoing Line from Wind Farms	666
Guoxin Li, Chi Zhang, Kangle Deng, Lingxiao Chen	
Comprehensive Evaluation and Optimization Method of Energy Storage Economic Benefits Based on Typical Application Scenarios	671
Jing Shi, Bingjie Li, Zesen Li, Xiaoyan Hu, Guojing Liu	
Vulnerability Assessment Research of Power Systems Based on Improved Fuzzy Hierarchy Process Algorithm	679
Jun Hu, Shaotang Cai, Zhenghua Shen, Xiangpeng Zeng, Haiou Peng, Haitao Dang	
Comprehensive Optimization of Integrated Smart Energy Systems with Multi-Load Demand Response	683
Christian Ndayishimiye, Ling Lu, Niyobuhungiro Jean Bertrand	
A Method for Thermal Ageing Condition Assessment of Mineral Transformer Oil Based on Three-Dimensional Fluorescence Spectroscopy	692
Enbo Zhao, Zelin Shi, Yunpeng Liu, Mingqi Pang, Lei Fang	
Graphics and Model Maintenance Technology for new generation dispatching support system	697
Qing Zou, Xiao Han, Li Zhang	
Optimal configuration method of energy storage in provincial power system based on multi-type flexible resource scheduling priority	703
Jing Hu, Zihan Meng, Bibin Huang, Nana Li, Zhiyong Shi, Bing Sun	
Electric field distribution characteristics of live working entering equipotential process of $\pm 110\text{kV}$ transmission line	707
Chenglei Zhang, Yitao Zhang, Quanlei Qu, Ling Jiang, Guangxiuyuan Zhu, Shengcheng Dong, Jinchao Zhao	

A novel enterprise electricity carbon emission accounting method based on power trading flow	712
Jingliang Wang, Lijian Luo, Weifang Huang, Ke Hu, Qing Yang, Qingrui Wang, Zishuo Xu, Luyao Wang, Yelong Wu, Chen Ling	
Multi-step Compensation Control Strategy under DoS Attack in Cyber Physical System	723
Meng Wu, Xinchun Jie, Jong Shao, Zhishuai Zhai	
Master-slave game optimization scheduling of virtual power plant considering electric vehicles	728
Yang Lv, Yangyang Ding, Ruihan Diao, Shijie Wang	
A power line fault cause identification method based on CNN-BiLSTM and attention mechanism	732
Xinqiao Fan, Lang Yang, Li Zhang, Liyu Zhu	
Photovoltaic power prediction based on WOA-GRNN	737
Minghui Song, Yulu Wang	
Real-time Control Strategy for Wind-solar-storage Industrial Park Based on Variational Modal Decomposition	742
Qin Wang, Yefu Chen, Xinlei Cai, Zijie Meng, Dongkuo Song	
Fault characteristics analysis of DC transmission system embedded in 220kV AC power grid	749
Bing Chen, Zhiwei Liu, Zhan Cao, Huilong Zhao, Wei Wu, Yuren Fu	
Identification of industrial user interaction capabilities based on Pearson-mutual information	754
Mingfeng He, Shuo Jiang, Yicheng Zhang, Huifang Guo, Biyao Huang	
Reactive Power Flexibility Quantification for Battery Energy Storage Systems	759
Mengyao Zhang, Ling Xu, Xiaohu Zhang, Jianzhe Liu, Feilong Fan, Canbing Li	
Study on the Spatiotemporal Distribution Characteristics of Offshore Wind Power Output in East China	766
Ling Xu, Mengyao Zhang, Ruanming Huang, Wenjie Jiang	
Research on Energy Management Strategy of Marine Diesel-electric Hybrid System	775
Ningfang Chen, Xiangguo Yang, Ruzhao Deng, Xing Wang	
Research on Optimization Scheduling of Active Distribution Grid for planed Power Tracking of Interconnection Line	780
Fei Chen, Jiansheng Hou, Lin Zheng, Keqin Ji, Peng Wang	

Electricity Data Valuation Considering Attribute Weights	788
Yong Deng, Xiaoming Li, Xiang Yu, Zhening Fu, Hancheng Chen, Jingyu Xie, Danhong Xie	
Research on Coordinated and Optimized Operation of Distribution Networks Containing High Permeability Distributed Renewable Energy	795
Yanze Wang, Fengshan Lin, Han Liu	
Research on Power System External Fault Monitoring Techniques Based on Deep Learning	799
Ning Chen, Fashe Li, Shuang Wang	
Optimal planning and operation of hybrid renewable energy system with flexible hydrogen-battery storage	803
Jiale Wang, Su Guo	
Measurement and Analysis of Active Frequency Support Capability of Large Capacity Wind Storage Joint System	808
Chunhui Liu, Pengwei Yang, Xiaolu Chen, Xinyue Chen, Haoran Chen	
Scale and Scheduling Collaborative Optimization Based on Power Redistribution of Wind-solar-battery Hybrid Systems	816
Tianze Song, Su Guo, Ling Ji, Yong Wang, Jiale Wang, Wenjia Ji	
Reproduction of Experimental Tests for Tree-Line Conflicts in 10kV Distribution Lines	821
Bosen Guo, Tianyou Li, Chaoyi Huang, Lianhui Wang, Shichuan Chen	
Equivalence study of 110kV transmission line simulation tower head gap and atypical gap Equivalence study	827
Ling Jiang, Shengfu Wang, Guangxiuyuan Zhu, Zhenghong Bao, Chenglei Zhang, Shengcheng Dong, Ji Ma	
Modeling, Optimization and Evaluation of Production-storage-utilization Hydrogen System Based on Renewable Energy	832
Chengjia Bao, Deqi Liu, Youjun Wang, Jinxia Mao, Yuhua Tan, Qian Zhang	
Research on customer communication strategy for emergency repair and power restoration in residential areas based on data analysis	839
Jinghan He, Xu Chen, Yanan Li, Gaomeng Jia	
Power System Knowledge Graph Construction and Fault Disposal Contingency Plan Generation Based on Human-in-the-loop	843
Zhanfei Cui, Zhaoyang Yan, Zhenhua Zhang	
Author Index	849