2023 5th International Conference on Electrical Engineering and Control Technologies (CEECT 2023)

Chengdu, China 15-17 December 2023



IEEE Catalog Number: CFP23X90-POD ISBN: 979-8-3503-4226-0

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:
 CFP23X90-POD

 ISBN (Print-On-Demand):
 979-8-3503-4226-0

 ISBN (Online):
 979-8-3503-4225-3

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



Table of Contents

Chapter 1: Control and Application of New Energy and Energy Storage Technologies in Power Systems
Distributed PV Cluster Partition Based on KNN-DPC Clustering Algorithm
Multi-Region Distributed State Estimation of Distribution Networks Considering Integration of Wind Power
Dynamic State Estimation with Multi-Level Data Recognition Considering New Energy Sources
Research on Grid-Connected Performance Analysis Algorithm of Battery Energy Storage System
Distributed Photovoltaic Hosting Capacity Calculation of Distribution Network Based on Deterministic Constraints
A Data-Driven Short-Term Prediction Method for Photovoltaic Power Generation
Configuration Evolution Model for Distribution Network with High-Proportion New Energy Based on System Dynamics
Coordinated Optimization of Hydrogen Integrated Energy System Considering Demand Response
Optimal Capacity Configuration of Electric-Heat-Cold-Gas-Hydrogen Multi-Energy System Considering Fast Load Tracking
Research on the Scheme of Flexible DC Connection of Regional New Energy to the Power Grid
Output Characteristics of PV Panel Output Considering Different Weather Conditions from Practical Measurement Data
Sigmoid Kernel Canonical Correlation Analysis (SCKCCA) for PV Output Power and

An Empirical Method for Stability of Integrated Energy Systems in Parks Based on Time-Domain Simulation
Hongyin Chen, Xiaoqiang Jia, Jianbin Li, Binbin Wu, Yonglu Han, Runzhe Lian, and Guixiong He
Design of Sliding Mode Observer for Internal Oxygen State of PEM Fuel Cell
A Voltage Control Method for Electric Vehicle Charging in the New Power System
Robust Optimization in Energy Management under RESs Uncertainties through BESS Integration
TianYou Yu, Muhammad Muzammal Islam, Jie Wang, and Massimo La Scala
Photovoltaic Power Generation Power Prediction Method Based on Digital Twins and Deep Learning92
Zheng Cheng, Yu Zhou, Jinheng Zhang, Yuhuan Li, Yongqing Deng, Shiqi Tan, and Maoqing Jiang
PCS Grid Connection Control Algorithm for Energy Storage System Considering Stability 97 Wang Ruogu, Gao Xin, Deng Zejun, Wang Junyue, Yang Kun, and Song Zhengxiang
Emergency Control for Sending-End Power System with Renewable Energy under HVDC Blocking Based on Deep Reinforcement Learning
Multi-Dimensional Quantitative Evaluation of Fault Transient Characteristic Accuracy of DFIG Farm Equivalent Model
Application of Hydrogen Energy Storage Technology and its Impact on Short-Circuit Current
Chapter 2: Modeling, Analysis, and Control of Power Systems
Research on the Droop Control Strategy of Microgrid Based on ADRC
Density Peak Clustering Load Curve Based on Mutual Local Density and Multi Cluster Merging
Formula for Calculating Sending-End and Receiving-End Voltages of AC Two-Bus System with Constant Power Load P+jQ135 GeneQue Lee, SangJoong Lee, and Juchul Kim
Parameter Identification Method for Composite Load Based on Enhanced Quantum Particle Swarm Optimization Algorithm

Robust Planning of DC Distribution Lines and Energy Storage Equipment in Distribution Networks Considering Photovoltaic Consumption	147
Chaoyi Zhang, Liuzhu Zhu, Hui Zhang, Renwei Shi, Junshan Liu, and Keer Ning	
Nonlinear Modeling and Control of a Hydropower Plant: A Comparative Study of Classical and LQR-Based Governors	155
Victor Viscarra-Gallardo, Rodrigo Corrales-Arcienega, and Francisco J. Triveno-Vargas	
A Composite Detection Method Based on FFT for Wideband Harmonics in Power System Yifei Wang, Weiqiang Fan, Xiaojing Han, Chenguang Han, Kai Dang, and Lihui Yang	163
Optimal Operation Study of Distribution Network Based on Flexible Multi-State Switch and Shared Energy Storage	172
Li Zheng, Yang Ning, Cui Chenggang, Chen Hui, Wang Xin, and Lu Wenbo	
Static Voltage Stability Analysis of Power Grid with UPFC Considering Wind Power Uncertainty	178
Zhao Lu, Li Menghu, and Peng Zhaozhao	
Integrated Model Forecasting of Electric Power Loads for Large Consumers Based on Fuzzy RBF Neural Network	184
Hang Zhou, Xue Li, Xiaohui Pan, Lifeng Wang, and Bin Yang	
Load Decomposition Method Based on Improved EEMD-Person-PCA Lin Lin, Hu Xinyu, Wang Jiannan, Yuan Song, and Yuan Song	190
ESO-Based Internal Mode Control-Sliding Mode Control for Servo System	195
Comparative Stability Study of Grid-Following and Grid-Forming Converters in Current Control Timescale	200
Yunpeng Zhou, Wei He, and Jiabing Hu	
Active Distribution Network Planning and Operation Optimisation Based on Digital Twin Technology	206
Shuiqiang Gu, Liwei Liu, Kang Yao, He Yang, Hongliang Chang, Jia Li, and Faqiang Zhao	
Optimization of Speed Control System for Distribution Network Power Supply Vehicle Operation	212
Chen Xin, Dongdong Huang, Xiaocheng Meng, and Kun Jiang	210
Research on Reliability Improvement of Power Grid Based on 10kV Distribution Line Cross City Interconnection	210
Hong Qiu, Chen Yuting, Ye Meng, Wang Fei, Yang Yong, Zhang Hongwei, and Li Ni	213
An Improved Gaussian Power Flow Analysis Method for Active Distribution Network Dongsheng Shu, Jie Yang, Yaxing Li, Maosong Zhang, and Luyao Zhang	224
Improved Opening Window Trajectory Simplification Algorithm Yingjie Liu and Zhiying Yang	230
A Coordinated Optimization Method for New Power System Source Network Load	00-
Storage Based on Deep Learning	

An Integral-Event-Triggered Scheme for AVR-LFC Optimization Strategy with Guaranteed L∞-Gain	240
Zhuoyin Li, Jindong Liu, Hongmei Li, Pengyu Zhang, and Yihao Zhang	0
A Research on Tree-Based Modeling Method for Distribution Network	245
Jian Ding, Qijing Yang, Penghao Fan, Tianpin Xu, Qi Liu, and Jinliang Zou	
Research on Under Frequency Load Shedding Method Considering Inertia Information Haijun Chang, Qiming Wang, Fusuo Liu, and Hui Huang	250
Modeling and Risk Assessment of Cyber Attacks in Distribution Grid Cyber-Physical Systems	257
Cheng Zeng, Shaosheng Fan, and Dongqi Liu	201
Optimal Load Restoration Scheduling for Active Distribution Networks Leveraging SOPs and E-Transportation-Based VPP	263
Yangjunran Zhou, Wei Lou, Lu Chen, Zhengli Hu, Jinhu Fang, Chengjia Zhang, and Xiaodong Yang	
Dynamic Allocation Method of Network-Side Capacity Margin Based on Source-Load-Storage Interaction	268
Xiao Liu, Hao Wang, Pu Zhao, Nan Chen, Yi Sun, and Xiyang Guan	200
Experiment Verification of Distribution Characteristics of Stray Current in Urban Rail Transit	274
Wencai Zhang and Ya-Ning Li	
Research on Security Risk Assessment of North China Power Grid Based on Risk Matrix Fan Ruiming, Xiong Yuwei, Zhang Peng, Liu Kunqi, Zhang Jun, and Li Fuqiang	279
Chapter 3: Design, Testing, and Fault Diagnosis of Power Equipment	
Research on Magnetic Integration Technology of Half-Bridge Converter for	
Aerospace Application	284
Shubo Zhi, Qi Tang, Jianping Wang, Xingzheng Pei, Xiaofeng Zhang, and Mingming Ji	
Research on Heating Simulation Model of GIS Internal Joint	289
Sun Yandi, Li Jie, Zhang Pipei, Shi Wei, and Wang Peng	
An Electromagnetic Torque Calibration Algorithm Based on Multiple Linear Regression Principle	294
Study on Temperature Rise of Hot Spot of Oil-Immersed Power Transformer Winding Pengfei Yi, Yang Hu, Songlin Wu, Yuyu Zhou, Li Luo, Li Zhang, and Lepeng Xiao	301
Evaluation Model of Equipment Utilization in Power Grid Operation and Inspection System Based on Fuzzy Comprehensive Evaluation	306
Chan Shan, Xinqian Xia, Mengwei Wang, Zixuan Zhu, and Shijun Wang	
Simulation of Tip Defect Discharge Process under the Influence of Multiple Physical Fields	313
Yingting Luo, Lei Wang, Junfei Jiang, Hailin Xu, Shenglong E, and Shiyu Lai	

A DFT Study on Modified MoS ₂ for CO ₂ Gas Sensor	320
Research on Active Disturbance Rejection Control Technology of Two-Wheel Self-Balancing Robot	325
Research on the Attenuation Characteristics of UHF Electromagnetic Waves inside UHV GIS Switchgear	333
High-Frequency Full-Bridge 48V DC-5V DC LLC Resonant Converter with AlGaN/GaN HEMTs Jingyu Shen, Liang Jing, and Jinpeng Qiu	338
The Autonomous Crawling Drive System of Tower Operation Robot Design and Research Huang Min, Wang Rui, Li Chongji, He Zhi'an, He Jibiao, Liu Zhe, and Wu Xujing	343
Research on Insulation Reliability of Submarine Cable Accessories for HVDC Transmission Applications Shang Nanqiang, Sun Jing, Shen Hui, and Liang Wenke	348
Study on Power Flow Improvement using Static Compensators and Thyristor Controlled Series Capacitor in Transmission Network	354
Voltage Sharing Control with Gate Resistance Modulation for Series IGBTs during Turn-On and Turn-Off	360
Research on Combined Detection Method of Partial Discharge Based on UHF and X-ray Imaging Xizhou Du, Qiang Xu, Xing Lei, Ting Ye, Ruitian Fan, and Jie Zhou	365
An Approach to Model Human Kinetic Energy Harvesting with Wearable Lifejackets to Assist Search and Rescue Jeffrey To and Loulin Huang	370
Integrated Detection Sensor of Metal and Magnet in Wireless Power Transfer System	375
PCB Defect Detection Based on Improved YOLOX Algorithm	380
HIDG-Based PSO Algorithm: Suspicious Sensor Selection for Power Grid Monitoring System under Data Integrity Attack Pandeng Li, Zhihong Liang, Yiwei Yang, Liangyu Dong, Yuhan Suo, and Yi Hao	385
Research on a Three-Level Three-Bridge Switching Power Amplifier	391

An Analytical Study of a Tripping by Three-Phase Inconsistent Fault in 220kV GIS Circuit Breaker	396
Jia Xiaoyuan, Hong Qiu, Wang Shaoping, Huang Xi, Li Jin, Hu Minshan, and Wang Fei	
Study on Transfer Characteristic Hysteresis of Carbon Nanotube Thin Film Transistor Xun Yi, Yuexin Yao, Zhili Zhao, Peining Yu, Haixin Zou, and Dean Luo	401
Grounding Fault Line Selection in the Distribution Network using a Novel Underdetermined Blind Source Separation Algorithm Yuanyang Xia, Xiaocong Li, Yuan Liu, and Lei Zhang	406
Electric Field Distribution and Protection of Live Working on EHV Transmission Lines with Arresters	411
Jiu Shao, Hongquan Fu, Kun Jiang, and Xiaocheng Meng	411
A State Diagnosis Method for Distribution Transformer Device Based on Cloud Edge Collaboration	416
Bo Xiang, Huaimi Zhang, Tangbao Song, Xilin Tan, Bo Wang, and Yi Xu	
Design of Safe Trackside Equipment Driving and Control System	421
Application of an On-Board Low-Potential Power Plant using Cold Energy	426
Research on State Detection of Power Equipment Based on Acoustic Imaging Technology	431
Jianyong Zhao, Jiale Qi, Yuan Gui, Chen Liang, and Jiamei Cao	
An Indirect Verification Approach for Dynamic Control of Wheeled Mobile Robots	438
Research on Insulator Detection Method Based on Machine Vision	447
Harmonic Interference Observer Sliding Mode Control for DC-AC Inverters with Periodic Mismatch Disturbances	453
Jindong Liu, Zhuoyin Li, Pengyu Zhang, Hongmei Li, and Yihao Zhang	
Analysis on the Influence of Grounding Trench on the Slope Stability of Transmission Line	458
Zhang Yun, Chen Shuping, Zhang Zilong, Ding Qi, and Zhang Pengtong	
Design and Implementation of a Portable Digital Energy Measurement Field Diagnosis Instrument Based on DBN Huizhu Guo, Yuqing Duan, Jianshun Ding, Wen Zhou, Xinran Li, Wengi Zhang, and Jun Liu	464
Application of Finite Set Model Predictive Control to Five-Phase Induction Motors Yan Li, Zhongcui Miao, Lei Zhang, and Hui Zhang	469
Research on the Trip Characteristics of High-Voltage Circuit Breakers Based on Chaos System Theory	474
Sun Wenxing, Zhang Chi, Yao Congwei, Sun Shuai, and Yan Yingjie	

Research on Operation Strategy of Electric Power Communication Power Supply System Ting Wei and Wenqiang Yin	479
Improved DSFD Algorithm with Enhanced Feature Fusion and Information Utilization	484
Phase Synchronization Control Strategy Based on Voltage Detection for Dual-LCC Bidirectional Wireless Charging System	. 489
Chapter 4: Intelligence, Automation, and Market Operation of Power Systems	
A Method for the Protection of Substation Operation Safety in Smart Grids Based on Operational Information Transmission Encryption and Drawing Integrity Verification	. 499
A New Approach for Electricity Demand Forecasting Based on Improved Informer Haoyun Deng and Qiang Feng	507
Hybrid Teaching Experiment Design of Automatic Control Principles Based on Simulink Qianqian Chen, Shuo Tian, Hao Jia, and Liying Zhang	515
A Bi-Layer Capacity Planning Method for Park Integrated Energy System Considering Exhaust Gas Emission Penalties Zhaoqing Zhang, Yonghui Sun, Chenxu Yin, and Yunfan Meng	. 521
A Novel Community-Based Photovoltaic Energy Sharing Business Model Incorporated in Decentralized Energy Markets Jieyu Lei, Shibin Gao, Nikos D. Hatziargyriou, Xiaoguang Wei, Tao Huang, and Jianzhong Wei	. 527
Arbitrage Assessment of Pumped Hydro Storage in Power Spot Market	535
Failure Propagation Analysis through Dynamic Evolution of the Vulnerability Community Network Junjie Zhou, Tao Huang, Shouji Zhang, Chen Li, and Xia Lei	. 542
Development of Traverse Target Positioning System Based on Pole and Tower Operation Robot	. 549
Design of Energy Carbon Measurement and Carbon Emission Control Platform for High-Energy-Consuming Enterprises	. 554
Tao Tang, Yuzhen Sun, Quan Zhou, Daogang Peng, and Huirong Zhao	
Digitalization of the Production Line for the Oil Pressing Process	559
Research on the Whole Process Control Method for Active Defense Fixed Construction Points to Prevent External Forces from Damaging Power Facilities Hong Qiu, Li Ying, Chen Yuting, Lin Guocheng, Li Ni, Wang Yongyi, and Wang Fei	. 566

Spot Market	571
Hao Yan, Chao Qi, Bei Zhao, Jiafei Huan, and Jun Shu	-
Research on Precise Information Push Technology Based on Power Market Behavioral Data	577
Xia Nannan, Kuai Jipeng, Zhang Kai, Dong Bo, Gu Shuqian, and Ding Peng	
Research on the Deviation Transmission Mechanism of Electricity Selling Companies	582
Integrated Protection Testing Method for Intelligent Substation Based on Security Risk Isolation Technology	587
Hongtao Zhang, Zijian Zhang, Shun Yan, and Ruohan Wang	
Optimal Dispatch of Virtual Power Plants with Wind-Solar Uncertainty and Electricity-Carbon Trading	592
Yubo Fan, Zhe Yang, Cheng Chang, Jiong Fang, Tangyun Xu, Yue Tian, Jijun Shui, and Daogang Peng	
Coal-Containing Captive Power Plant Enterprises Considering the Synergy of the Carbon Electricity Market Participate in the Research of New Energy Consumption ModeLiqing Xu, Daogang Peng, and Huirong Zhao	598
Implementation of Intelligent Q&A System for Electric Power Knowledge Based on Knowledge Graph	605
Research on Determining the Point for Paradigm Shift in the Electricity Market	610
Assessment of Carbon Transfer Related to Inter Provincial Electricity in China and Analysis of Influencing Factor	616
Jindou Tao, Yongzhi Min, Guo Wang, Haiyang Tao, Pengfei Su, and Shengting Qiang Fault Location Method of High Fault Tolerance Segment in Distribution Network Based	
on Multi-Source Information Fusion and Verification Dan Liu, Ping Xiong, Xiaotong Ji, Shuai Chen, Xinying Jiang, and Ke Jia	621
Mechanism of Lightning Arrester Overheating during Operation Based on Multiple Data	600
Source Analysis	629
Method for Mechanized Construction Erosion Area Identification in Transmission Line Based on Deep Learning	634
Jia Feng, Bin Chen, Enyang Li, Lijun Zhang, Fei Liu, and Chenxin Guo	
Economic Evaluation Method of Flexibility Upgrade of Thermal Generator in Power Spot Market	639
Hongyi Zhang, Qian Zhang, Liu Shi, Jing Wang, Jianguang Wang, and Mingyang Qiao	
Research on Power Market Data Asset Management Framework	645

Analysis for the Influence of Power Grid Peak Shaving Costs on Power Grid Investment and Development	. 650
Ruiguang Ma, Ke Xu, Fan Shao, Chao Cheng, and Haoxiang Zhang	
Investment Requirements Analysis for Advanced Power Systems in Sichuan: A System Dynamics Study	. 659
Weiting Xu, Tiannan Ma, Yufan Chen, Xinting Yang, and Xuexin Wang	
Analysis and Suggestions on the Current Situation of Carbon Emission Verification and Monitoring in Electric Power Enterprises	. 666
Xinli Li, Chao Liu, Shuzhen Li, Chunming Fu, Rui Wang, and Xushen Zhang	
Research on the Carbon Footprint Evaluation Method of Electric Power Equipment Production Based on the Life Cycle Analysis	674
Xingang Wang, Shuzhen Li, Kaisaier Aisikaer, Xinli Li, Guozhen Zhang, and Hengzhi Liu	
Author Index	. 681