

2025 5th International Conference on Electrical Engineering and Mechatronics Technology (ICEEMT 2025)

**Shenzhen, China
17-19 October 2025**

IEEE Catalog Number:
ISBN:

CFP25AF3-POD
979-8-3503-9241-8



Copyright © 2025, IEEE

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:	CFP25AF3-POD
ISBN (Print-On-Demand):	979-8-3503-9241-8
ISBN (Online):	979-8-3503-9240-1

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

TABLE OF CONTENTS

Complex Cmor wavelet detection method for voltage sag	1
<i>Jing Gong, Yirui Zhao</i>	
Fault Characterization of 39-Phase Angular Brushless Excitation and Rotating Rectifier Systems in Nuclear Power Plants	5
<i>Jiaxing Yan, Feng Niu, Jien Ma, Youtong Fang</i>	
Study on the Influence of Harmonics on Mechanical Vibration of Converter Transformers	10
<i>Qidi Zhong, Xiaolin Shen, Shaowei Wang, Yang Chao, Xiaoge Meng, Zhiliang Yin</i>	
Dual-Layer Dynamic Pricing Demand Response Method for Maximizing Utilization of Wind-Solar Dominated Systems with Energy Storage Integration	15
<i>Xi Yang, Yingdong Lai, Jingzhong Zhou, Wei Zou</i>	
Research on optimization of potential distribution of 220kV surge arrester based on finite element method	19
<i>Huize Liu, Hongfeng Zhao</i>	
Simplified SLCC Model Based on Dynamic Phasor Model of Converters	23
<i>Zhenhua Zhu, Yaowen Sun, Chunjin Li, Chuyang Wang</i>	
Modeling and AC Noise Analysis of Power Distribution Network for System-on-Wafer	29
<i>Xinyu Chen, Lin Gu, Chenhao Liu, Jiayi Wang</i>	
Calculation and Analysis of Can Losses of Canned Active Magnetic Bearing	33
<i>Rui Zhang, Ning Wang, Cong Xu, Liwei Song</i>	
Structural Design of Novel Multi-Arm Carbon Nanotubes and Study on Thermal Conductivity of Their Epoxy Composites	39
<i>Zhijian Liu, Tao Xu, Gengbin Zhang, Chenxing Ding, Yaoxuan Ruan, Tinghan Song</i>	
A robust planning method for zero-carbon building microgrids incorporating plant carbon sequestration mechanisms	43
<i>Wenfeng Chen, Dong Liu, Fei Yan, Quan Sui, Adil Lari</i>	
Planning of low-carbon building optical-storage-direct-flexible microgrids considering phase change materials	49
<i>Wenfeng Chen, Mu Yang, Fei Yan, Quan Sui, Adil Lari, Chang Liu</i>	
Numerical Modeling and Validation of Magnetic Fields for Three Permanent Magnet Tracks Based on Equivalent Current Method	55
<i>Xianfeng Zhao, Xiaodong Wang, Haojie Qin</i>	
A Transaction-Based Settlement Framework for Electricity Markets	61
<i>Yifan Wang, Yuxuan Zhao, Zhao Xia Jing</i>	
Research on Lightning Current Diversion Characteristics of 220 kV Transmission Line Towers Considering Multi-Factor Coupling	68
<i>Jianwei Zhong, Fengjing Jiang, Siqin Xu, Bin Yu, Zhongyue Chen, Biao Peng, Jing Liu, Zhenyu Li</i>	

Investigation of Wind-Induced Deviation Behavior of Jumper Cables in 500 kV Tension Towers under Gust Effects	73
<i>Linming Jin, Bin Lan, Ziwei Zhao, Shunji Zhang, Hao Wu</i>	
An On-Line Partial Discharge Monitor for HV Switchgear Based on Pulse-Current Double-Time-Integral Charge Estimation Method	79
<i>Cong Qian, Yuanhao Zhu, Jun Xu, Pengcheng Zhou</i>	
Dry-Processed High-Loading Composite Cathodes for High-Energy-Density Solid-State Batteries	84
<i>Wenwei Zhan, Xiaoguang Yang, Ji Qi, Yong Yi</i>	
Research on primary frequency regulation control strategy for photovoltaic power generation based on virtual synchronous generator	90
<i>Wenzhao Liu, Guozheng Han, Guofang Zhu</i>	
Power Allocation of Multi-Stack Fuel Cells in an Electric-Hydrogen Hybrid Storage System for a Wind Farm Under a Dispatch Strategy	94
<i>Xinyi He, Shanke Liu, Zheng Zhou, Yinkai Bao, Hao Chen, Lijun Yu</i>	
Research on Analysis Techniques for the Synergistic Regulation Potential of Electric Vehicle Charging/Discharging Loads and Air Conditioning Loads	104
<i>Yiming Chang, Xiaosong Ma, Ming Bai, Linghan Hu, Kunze Zou</i>	
Research on radiation resistant resin for generator insulation	108
<i>Jiang Zhou, Chunqin Ni, Huixin Huang, Guoyong Liu, Yue Zhang, Yuan Yuan</i>	
Hardware-in-the-Loop Simulation Testing of the Grid-Connected Performance of VSG based Grid-Forming Energy Storage	112
<i>Shakenbieke Alimasibieke, Baoyu Zhai, Haiyang Wu, Xu Zhi</i>	
Research on grid based cluster voltage management strategy incorporating distributed micro energy storage	117
<i>Zhanlei Gu, Tengju Guo, Guangdong Zhao, Zezhong Zhao</i>	
Research on Massive DER Dynamic Dispatch Information Model for Distribution Areas Based on IEC 61850 DER dynamic dispatch information model	121
<i>Hechong Chen, Fan Yang, Zhichun Yang, Chao Wang, Yu Chen, Lingyan Sun</i>	
Calculation Method for Differences in Aging Rates of Resistors in Surge Arresters Under Different Impulse Current Waveforms	126
<i>Xin Luo, Jianfeng Shi, Yang Dong, Wei Liu, Haojun Lin, Yongxia Han</i>	
Research on control method of ultra high voltage transmission line electroscope for unmanned aerial vehicles	131
<i>Baoqing Liang, Chuncheng Han, Xuanbo Fei</i>	
Research on Single-Phase Grounding Fault Characteristics in 20kV Distribution Networks with Low-Resistance Neutral Grounding Systems	135
<i>Weihao Liu, Yuantao Wang, Weifeng Yang, Wei Ma, Quanhua Jiang, Dongran Liu, Ruiqing Zhang</i>	
Study on Optimization Simulation of Silicone Rubber Coating for Hybrid Porcelain Insulators	139
<i>Tangbing Li, Bichuan Xu, Longwu Zhou, Riwen Zhou, Qiang Wu, Yu Wang</i>	
Analysis of Optimal Capacity Configuration for Wind-Solar-Storage Systems in Clean Energy System	143
<i>Tianhao Xu</i>	

Analysis of the Impact of Distributed Phase Modulators on the Static Stability Margin of High Proportion Wind Power Systems	148
<i>Ri Qu, Yang Liu, Xu Zhang</i>	
Numerical Simulation and Experimental Investigation of Plasma Dynamics in Grid-type Compressed Arc extinguishing Device	153
<i>Yuang Long, Ping Huang</i>	
Transient Power Angle Characteristics Analysis of Phase-shifting Capacitor Based on Large-scale New Energy Base	157
<i>Lei Wang, Daquan Shen, Bin Lu</i>	
Auxiliary Damping Control Method for Subsynchronous Oscillations in High-Voltage STATCOM	162
<i>Xiangyang Duan, Haibo Zhou, Zhiqiang Wang, Chunguang Wang, Shengjie Liu, Anjie Wang</i>	
Research on the Sub-synchronous Oscillation Problem of New Energy Inverters Connected to the Power Grid	168
<i>Xiangyang Duan, Zhiqiang Wang, Haibo Zhou, Chunguang Wang, Anjie Wang, Shengjie Liu</i>	
Thermal Aging Evaluation of Generator Silicone Insulation Based on Frequency Domain Dielectric Technology	173
<i>Guoyong Liu, Xisong Zeng, Jiang Zhou, Yue Zhang, Mingpeng He, Guanglin You</i>	
Selective Identification and Differentiated Action Scheme for Distributed Energy Resources (DER) During Grid-Side Faults	178
<i>Hechong Chen, Fan Yang, Shuxian Fan, Bei Meng, Yang Lei</i>	
LDMOS Power Device Design Based on Partial N-type and P-type Buried Oxide Layers	184
<i>Xiaolong Wang, Hongxiang Yu, Zhiming Wei</i>	
Research on Action Setting Value of SF ₆ Fast Switch Fault Current Limiter	189
<i>Jinpeng Hao, Yaojia Huo, Bo Ma, Hao Liu</i>	
Optimal Configuration of Grid-Forming Energy Storage Considering Short Circuit Ratio of Multiple Renewable Energy Stations	194
<i>Yingjun Zhuo, Zhanghao Huang, Yehong Shu, Siyu Lu, Yuxiang Huang</i>	
Design and analysis of an aeroengine inlet total pressure distortion simulator for distortion pattern	199
<i>Ye Yang, Xingya Da, Yuan Yi, Junqiang Wu</i>	
Design and Analysis of a Fully Automatic Elastic Hook Joint Device for Power Transmission Systems : Fully Automatic Elastic Hook Joint Device	203
<i>Mian Pei, Zhiping Zhang, Bo Mei, Jie Sheng, Yunfei Yang</i>	
A Miniaturized Surgical Robotic Arm Treating Ophthalmic Diseases	208
<i>Yunfei Wang, Chunbo Wang, Mengyao Liu, Hao Ren, He Zhang</i>	
Research on Harmonic Suppression Strategy of Dual-Three-Phase Steer-by-Wire System	214
<i>Gang Wu, Jiabin Gao, Huijian Liu, Helong Wu, Xiangjin Wu</i>	
Design and Implementation of a Smart Height-Adjustable Desk Based on STM32 and IoT Communication	222
<i>Jing Jin, Zheyuan Deng, Gaoqin Zhong, Dongxu Xiao, Lantian Deng, Libin Feng</i>	

A modular robot system for the connection of cement poles	226
<i>Fengwei Shi, Lijuan Guo, Xiangtao Liao, Yuan Li, Le Wang</i>	
Design of High Rectangular Coefficient Bandpass Filter Using $\lambda/4$ Open-Circuit Lines	231
<i>Jianning Zhou, Li Dan Li, Yurong Wang, Chen Li</i>	
Design and Analysis of Star Node Clock Tree	235
<i>Ning Wang, Ruixue Wang</i>	
Modeling and Control of an Electro-hydraulic Active Suspension System	240
<i>Hongyu Ye, Lijun Zhang, Dejian Meng</i>	
Research on Efficient and Controllable Rectification Technology for Wireless Power Transfer in HeavyLoad AGV	247
<i>Le Jiang, Rengui Lu</i>	
Research on Permanent Magnet Synchronous Motor (PMSM) for Train Adhesion Control Based on Active Disturbance Rejection Control (ADRC)	251
<i>Kangyu Wang</i>	
Power Information Feedback Routing Optimization Method for Multi-Node IoT System	257
<i>Yong Qu, Li Shao, Xuwen Xiao, Chunsheng Guo</i>	
AI and IoT-Based Anti-Sway and Self-Rotating Lifting System for Pipeline Handling: Electromechanical Design, Sensing, and Safety Perception Control	262
<i>HongLin Mi, Shunli Wang, Liang Zhao</i>	
Design and Performance Analysis of a Multi-Source Complementary and Intelligently Regulated System for Air Compressor Waste Heat	269
<i>Linlin Li, Junhao Li</i>	
Study on the Loss Mechanism and Temperature Rise of Torque Motors Based on Electromagnetic-Thermal Coupling	274
<i>Huamao Zhan, Chenshuo Wu, Yahui Chang, Zhanliang Xu, Nan Yu, Yinyi Wang, Genyuan Cao, Leilei Hao Yuqi Wang, Qiang Yang</i>	
Analysis of Internal Temperature in DC-Link Capacitors Based on Electro-Thermal Coupling	279
<i>Yong Yang, Wenxiong Huang, Yongjun Wang</i>	
The Design of Power Optical Fiber Online Monitoring and Fault Early Warning System	283
<i>Zhichao Wen, Shipeng Xu, Yong Wang, Xinxin Yao, Hejun Jing, Long Ma, Xiaoxue Li</i>	
A Tubular IPMC Sensor for Omnidirectional Flow Sensing under DC Stimulus	287
<i>Ning Tian, Libin Xue, Kejie Zhao, Hong Lei</i>	
Kinematic Modeling and Workspace Analysis of a 6-Degrees-of-Freedom Parallel Robot with Large Workspace and No Singularity	292
<i>Guangzhuang Jiang, Wei Ding</i>	
Dynamic Deadtime Adjustment Strategy for Series Half-Bridge Three-Level LLC Resonant Converter	299
<i>Qiang Wu, Jingyu Pan, Xiaofei Luan, Jinxiao Lu</i>	
Research on Noise Reduction of CFRP Drilling Tool Wear Signals Based on the Combination of CEEMDAN and Wavelet	304
<i>Linsheng Liu, Yushu Lai</i>	

Review of live-line working robot technology	308
<i>Shouwei Wang, Zugang Xi, Wei Zhang, Yetao Tan, Yuhang Luo</i>	
Research on Fault Analysis and Diagnosis of Fiber Channels	318
<i>Yaojun Zhang, Yuxin Yang, Dong Liu, Fenyong He, Zhiyong Liu, Jie Li, Bin Shao</i>	
Current Prediction of Three-phase Four-switch Brushless DC Motor Commutation Torque Ripple Suppression Strategy	322
<i>Rixi Deng, Wang Liao, Chengkai Ye, Mingxuan Che</i>	
A Comparative Study of IK and ID Controllers for Motion Capture Using a Hybrid Vision System	332
<i>Duanjiao Li, Wenxing Sun, Jianming Liu, Yongchao Liang, Min Zhang, Ziran Jia, Xuefeng Ning Yuxuan Zhao, Yuanchen Tang, Jindi Zhang</i>	
Optimized Deployment of Edge Nodes in Offshore Fishing Grounds Based on a New Metaheuristic Algorithm Cooperated with Distance Vector Hop Algorithm	336
<i>Jingyi Lin, Jing Zhang, Yi Lin, Quan Liu, Juan Su, Meng Li</i>	
Enhancing Fault Detection in Mechatronic Systems Utilizing the Transition Analysis Algorithm	344
<i>Florian Hoffmann, Julius Heine, Bernard Bäker</i>	
Deep Reinforcement Learning to Enhance the Robustness of Electric Vehicle Fast Charging	349
<i>Kevin Renatus, Wilhelm Biehl, Bernard Baeker</i>	
Intelligent Identification Method for Overhead Line Conductor Entanglement Fault Based on Improved Mask R-CNN Algorithm	356
<i>Yugang Liu, Xuetao Zhou, Nan Li, Xiaoyu Zhang, Liyun Zhang, Mingce Li</i>	
Bearing fault diagnosis based on signal time-frequency analysis and SE-ResNeXt model	360
<i>Fan Yang</i>	
Research on the Temperature and Humidity Prediction Model for Switchgear Based on RFID Technology and L-M Optimized BP Neural Network Algorithm	365
<i>Shudong Wang, Yucheng Qian, Jian Kang, Qian Qian Deng</i>	
Deep Reinforcement Learning-based Research on Electric Vehicle Charging and Discharging Scheduling	371
<i>Xiaoli Liu, Hongwu Qin, Wang Lei</i>	
STraTA-Factory: A Dual-Domain Fusion Method for Industrial Time-Series Fault Detection	375
<i>Yuwei Guo</i>	
Deep Learning-based Adaptive Robot Control and Path Planning	380
<i>Linlin Tian</i>	
Multi-Agent and Hierarchical Economically Optimal Operation Strategy for Micro Grid by Fixed-Time Consensus	384
<i>Ekramul Huda, Wenjun Wei, Dil Afroz Rawnak</i>	
Prediction of Grinding Removal Amount for Pneumatic Eccentric Grinding Head Based on MultiSensor Data Fusion	392
<i>Guolei Wang, Weiwei Men, Yuqi Yang, Pin Zhang, Qingbiao Zhang, Yuxiao Pu</i>	

A mechanical fault diagnosis method for on-load tap changer based on WPD time-frequency domain feature fusion and GWO-SVM	399
<i>Feiming Jiang, Ruifeng Wei, Zhenjiang Chen, Hui Wang, Yongsheng Duan, Wenqiang Yang, Xiaoqing Xu Yuefeng Zhang</i>	
Power Load and Price Forecasting Based on Spatiotemporal Decoupling and Explainable Artificial Intelligence Interaction Perception	405
<i>Chen Yan, Hebin Ruan</i>	
Intelligent Recognition Method for Small-Scale and Similarity Defects in Power Transmission Lines	409
<i>Lejia Sun, Shengyu Wang, Wenhao Yang, Yimeng Zhang</i>	
Battery State of Charge Estimation Based on Tabu Search Optimized CNN-Transformer	413
<i>Minxing Zhang, Yun Wang</i>	
Breaking the Limitations of Traditional PID: Research on Precise Control of Second-Order Inertial Lag Temperature Systems Driven by PSO Algorithm	420
<i>Jiaqi Zhang</i>	
Intelligent diagnosis model for abnormal noise of power transformer based on multi-channel wavelet convolution	424
<i>Meng Gao, Ran Zhuo, Zengxin Pu, Fan Zhang, Deyuan Yu</i>	
Research on Temperature Compensation Model of Optical Fiber Single Hydrogen Sensor Based on Kalman Filter and PSO-BP	429
<i>Li Niu, Dawei Jiang, Fucun Huang, Yang Liu, Juyong Cui, He Yang</i>	
Cable Fault Maintenance and Troubleshooting Method Based on OTDR Combined with Wavelet Transform and CNN	433
<i>Shipeng Xu, Zhichao Wen, Yong Wang, Shuang Tong, Mingze Li, Heshu Yang, Dongyang Han</i>	
Research on Two-Stage Day-Ahead Scheduling Optimization of Pumped Storage Based on Adaboost.R2-LSTM-GA-PSO	437
<i>Jianshan Zhao, Haifeng Wang, Tang Fei, Yaojin Chen</i>	
Path Planning for Mobile Robots Based on an Improved Artificial Lemming Algorithm	442
<i>Kaixuan Xing, Xu Wu, Jiacheng Hu, Ping Wu</i>	
Research on Coordinated Optimal Dispatch for Regional Source-Grid-Load-Storage Based on DC Power Flow Sensitivity Matrix	448
<i>Shirui Feng, Yulong Gu, Yu Chen, Dawei Feng, Wei Feng, Pengyu Wang</i>	
A Rapid and Accurate Monitoring Method for Birds in Substations Based on the Improved YOLOv11	454
<i>Sishi Fu, Zhiang Zhang, Junan Guo, Bo An, Jiarui Zhang, Qiang Dong, Sizhe Chen, Anqi Wang Ruihuan Wang</i>	
Anomaly Detection Virtual Simulation System for Meter Installation and Connection: A GAN-Based Approach	459
<i>Wenming Wang, Genkuan Lian, Wei Tan, Jing You, Wanying Kang</i>	
Big Data-Based Anomaly Alert Method for User Low-Voltage Side Power Usage Security Status	463
<i>Xiaoshu Huang, Rong Zhu, Haibo He, Gangfeng He, Wenwen Liu</i>	
Inertia Estimation for Power System Based on Feature Identification and Model Tuning	467
<i>Siran Yang, Xinyan Liao, Yibo Li, Ling Yang</i>	

A Comparative Study of Single-Ended and Double-Ended Traveling Wave Methods for Offline Fault Location in 10-kV Distribution Cables	471
<i>Ji Huang, Guozheng Han, Yanchen Zhang</i>	
A detection method for line break faults based on response characteristics in distribution network	475
<i>Jianyue Man, Yuanwu Zhu, Guangjun Hao, Xinxin Wei, Wende Chen</i>	
A Method for Assessing Distribution Network Reliability Integrating Uncertainty Modeling of Wind and Solar Power with V2G Coordination	480
<i>Jiajun Zhang, Xiangyu Lv, Deixin Li, Jiarui Wang, Haiyang Guo, Yutong Liu</i>	