

# **2025 4th Asia Power and Electrical Technology Conference (APET 2025)**

**Xiamen, China  
26-28 December 2025  
Pages 1–471**

IEEE Catalog Number: CFP25CS8-POD  
ISBN: 979-8-3315-6850-4



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:    | CFP25CS8-POD      |
| ISBN (Print-On-Demand): | 979-8-3315-6850-4 |
| ISBN (Online):          | 979-8-3315-6849-8 |

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

|                                                                                                                                                                                      |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Novel Four-Level Nested Neutral Point Clamped Dual-Active-Bridge for Medium-Voltage Application .....                                                                                | 1  |
| <i>Minxin Lin, Jiaqi Lin, Yin Chen, Haibin Li, Xianyang Cui, Tao Jin</i>                                                                                                             |    |
| Prediction of Circuit Breaker Closing Time for Small-Sample Conditions with a Multi-Output XGBoost Model .....                                                                       | 7  |
| <i>Jia Zhou, Qiang Zeng, Weiping Zhang, Dongqi Liu</i>                                                                                                                               |    |
| Key Technologies and Applications for Planning and Control of Phase Shifter Engineering in Transmission Grids .....                                                                  | 13 |
| <i>Quanquan Wang, Jinjiao Lin, Xu Wang, Xingning Han, Xiaodong Liu, Wanchun Qi, Zhiwei Wang</i>                                                                                      |    |
| Dual-Loop Feedforward Control for a Hybrid DC Bus AC Line Conditioner Under Wide Input Voltage Fluctuations .....                                                                    | 22 |
| <i>Chenlong Zhang, Weimin Wu, Houqing Wang, Xiaodong Lv, Huiyang Zhang, Junling Gao</i>                                                                                              |    |
| A Two-Step Model-Free Predictive Current Control Strategy for a Four-Level NNPC Inverter Based on Sliding Mode Observer .....                                                        | 28 |
| <i>Yusheng Fang, Xianyang Cui, Baichuan Ye, Yilu Wang, Minxin Lin, Tao Jin</i>                                                                                                       |    |
| Oscillation Damping Control Based on Q-Axis Voltage Feedforward for Grid-Connected Converters .....                                                                                  | 34 |
| <i>Xue Zeng, Jingjing Huang, Bo Pang, Kai Liao, Jianwei Yang, Zhengyou He</i>                                                                                                        |    |
| Design and Simulation Analysis of a High-Voltage Power Supply System Based on Phase-Shifted Full-Bridge Topology .....                                                               | 42 |
| <i>Yuanjie Zhu, Yiyun Huang, Shengmin Pan, Congguo Gong, Kai Yu, Xiaolong Li, Hulin Feng, Denghui Wang</i>                                                                           |    |
| An Improved Hybrid Quasi-Resonant Soft-Switching ANPC Three-Level Converter and Its Dynamic Zerosequence Voltage Injection Control Strategy .....                                    | 47 |
| <i>Fan Zhang, Xuan Wang, Ling Qin, Yunlong Han, Huajie Xiao</i>                                                                                                                      |    |
| An Optimized Strategy for Soft-Switching and Current Stress in a Three-Level Full-Bridge DAB .....                                                                                   | 53 |
| <i>Zhicheng Li, Liansheng Huang, Xiaojiao Chen, Shiyong He, Xiuqing Zhang, Sheng Dou</i>                                                                                             |    |
| A Design Method for the Open-Loop Cutoff Frequency of Grid-Connected inverter Phase-Locked Loop Based on Operation Margin .....                                                      | 61 |
| <i>Jin Li, Chaoyi Peng, Yongquan Nie, Ziyu Wang, Zihao Peng, Yuhang Luo</i>                                                                                                          |    |
| A Systematic Design for Conflicting Constraints in Multi-Mode AC-AC Converters .....                                                                                                 | 67 |
| <i>Tingyi Lin, Weimin Wu, Houqing Wang, Xinyu Zhang, Xiaodong Lv, Junling Gao</i>                                                                                                    |    |
| Power System Operating Mode Extraction Method Based on Chronological Production Simulation and Expert Experience Indices .....                                                       | 73 |
| <i>Songtao Zhang, Dian Chen, Runzhao Lu, Zhenjun Gao, Xiaoqi Zhang, Xuetao Dong, Xin Ma, Guoqiang Lu</i>                                                                             |    |
| Design of a PSM High-Voltage Power Module with Boost Circuit .....                                                                                                                   | 78 |
| <i>Zhibin Sun, Jian Zhang, Yiyun Huang, Wendi Fan, Rui Guan, Chenglong Huang, Linkai He, Yu Zhou</i>                                                                                 |    |
| Construction of Digital Twin Model for Ultra-High Voltage Converter Transformer Bushing and Simulation Analysis of Transient Operation Conditions of Electric-Thermal Coupling ..... | 85 |
| <i>Zhang Shiling, Xiao Qiang, Wu Jungang, Yang Feng</i>                                                                                                                              |    |

|                                                                                                                                                     |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Online Analysis Method for AGC Capability Evaluation Indicators of Supercritical Units Considering Physical Characteristics and Control Logic ..... | 90  |
| <i>Dejun Shao, Deyu Li, Mengxuan Shi, Jun Liu, Fei Xu, Lei Chen, Qun Chen, Ling Hao, Mujie Zhang Feng Li</i>                                        |     |
| An Unsupervised Clustering-Based Method for Safety Analysis of Hydropower Unit Start-Up Procedures .....                                            | 96  |
| <i>Peng Zhang, Yong Luo, Haoyu Liu, Yifan Wang, Tingxiang Cao, Jie Yao</i>                                                                          |     |
| Flexible Operation Technology of Thermal Power Units for Multi-Time Scale Power Balance Requirement of New Power System .....                       | 104 |
| <i>Dejun Shao, Jun Liu, Mengxuan Shi, Lei Chen, Fei Xu, Qun Chen, Ling Hao, Yajun Wu, Xiaojie Pan</i>                                               |     |
| A Data-Driven Unit Commitment for Day-Ahead Transmission Reserve Allocation .....                                                                   | 112 |
| <i>Weile Kong, Hongxing Ye, Yinyin Ge, Qian Zhou, Chaohong Sun</i>                                                                                  |     |
| Research on the Characteristics of Medium and High Frequency Harmonics in Direct-Drive Wind Turbine .....                                           | 118 |
| <i>Pu Chen, Shupeng Li, Xianxu Huo, Shun Tao</i>                                                                                                    |     |
| Cascaded Deadbeat Predictive Control with Harmonic Suppression for PMSM .....                                                                       | 125 |
| <i>Xinyu Bai, Yulong Liu</i>                                                                                                                        |     |
| Compensation of EEMF Observer in High-Speed IPMSM Sensorless Drive .....                                                                            | 131 |
| <i>Xingyang Guo, Wei Sun, Dawei Li, Ronghai Qu</i>                                                                                                  |     |
| Influence of the Welding Process on Iron Loss Characteristics in Interior Permanent Magnet Synchronous Motor .....                                  | 137 |
| <i>Hiroto Yamaguchi, Yanhui Gao, Hamzbahmani Hamed</i>                                                                                              |     |
| Data-Driven Technologies to Accelerate Unit Commitment Problem .....                                                                                | 143 |
| <i>Michen Wang, Hongxing Ye</i>                                                                                                                     |     |
| Closed-Loop Control of Wide-Voltage Electromagnetic Relays Resistant to Short-Term Voltage Dips .....                                               | 147 |
| <i>Zhipeng You, Jierong Zhuang, Zhihong Xu</i>                                                                                                      |     |
| Non-Contact Micro-Vibration Monitoring of Power Equipment Based on FMCW Millimeter-Wave Radar .....                                                 | 153 |
| <i>Yanqing Lu, Pei Cao, Kai Gao, Leiting Guo, Huan Yuan</i>                                                                                         |     |
| High-Frequency Electromagnetic Radiation Detection by MSSKST-Prony Algorithm .....                                                                  | 158 |
| <i>Feng Yang, Ye Li, Shiling Zhang, Yun Jia, Xiaoyang Ma, Zhenyu Chu, Zesen Gui</i>                                                                 |     |
| Design and Key Technology Research of Intelligent Inspection System for Ultra-High Voltage Converter Stations .....                                 | 164 |
| <i>Zongzhang Yang, Liyun Zha, Lei Long, Jianglong Yu, Zhiying Luo, Jujian Pan</i>                                                                   |     |
| Structural Sensitivity Enhancement and Noise Reduction Methods for Flexible Piezoelectric Sensors .....                                             | 169 |
| <i>Lisheng Chen, Qiang Zhang, Xin Wang, Guoming Ma, Dengfeng Jv</i>                                                                                 |     |
| Modeling and Stability Domain Estimation of the Polynomial Structure Preservation Model for Power Systems .....                                     | 174 |
| <i>Gao Xingyi, Jiang Xiufeng</i>                                                                                                                    |     |

|                                                                                                                                            |     |
|--------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Intelligent Monitoring of Subsynchronous Oscillations in Power Systems Based on Cross-Modal Feature Fusion .....                           | 180 |
| <i>Shengtao Xu, Mou-Fa Guo, Wei Gao, Zeyin Zheng</i>                                                                                       |     |
| A PSO-Based STATCOM Parameter Optimization Strategy for Mitigating Commutation Failures in a SLCC-HVDC System .....                        | 186 |
| <i>Lingjie Kong, Ao Zhao, Ruisheng Diao, Haifeng Li, Zhiwei Wang</i>                                                                       |     |
| Improved Hybrid Synchronization Control Strategy for Transient Stability Enhancement of Flexible Interconnection Equipment .....           | 191 |
| <i>Qingwei Wang, Longyue Wang, Pengfei Hu, Xieli Fu</i>                                                                                    |     |
| Game-Theoretic Multi-Agent Coordination in Hybrid AC–DC Systems with Grid-Forming and Flexibility Devices .....                            | 197 |
| <i>Le Zhao, Ling Xu, Mengyao Zhang, Jiawei Xiang, Qinxin Huang</i>                                                                         |     |
| Online Evaluation for Primary Frequency Regulation Capability of Supercritical Units Based Dynamic Modeling .....                          | 203 |
| <i>Dejun Shao, Jun Liu, Mengxuan Shi, Deyu Li, Lei Chen, Fei Xu, Qun Chen, Ling Hao, Yajun Wu, Xiaojie Pan</i>                             |     |
| Design of Centralized Monitoring System of Embedded DC Converter Stations .....                                                            | 209 |
| <i>Deng Kai, Guo Tao, Xu Weigang, Xu Bing, Gu Mingqing, Zhao Huilong, Liu Xiaofan</i>                                                      |     |
| Control Strategy for Two-Phase Operation of Two-Terminal Fractional Frequency Transmission System .....                                    | 214 |
| <i>Min Zhou, Yonghuan Liu, Zhida Kong, Yi Chen, Yongwen Chen, Yang Huang, Qingxin Wang, Tiantian He</i>                                    |     |
| Analysis of the Impact of MMC Valve Group Charging at the Inverter Side on LCC Station in Hybrid MMC-LCC Multi-Terminal HVDC Systems ..... | 220 |
| <i>Lei Long, Zongzhang Yang, Liyun Zha, Weijie Zhao, Jujian Pan, Juyue Mo</i>                                                              |     |
| Analysis of Electromagnetic Environmental Impact of $\pm 200\text{kV}$ Overhead DC Lines .....                                             | 226 |
| <i>Xianmeng Zhang, Wei Liu, Gang Wu, Xiaodong Liu, Bing Chen, Ruiyong Zhang, Xu Yuan, Fei Yuan</i>                                         |     |
| Molecular Structural Properties of Biaxially Oriented Grafted Polypropylene Under AC/DC Voltage Conditions .....                           | 231 |
| <i>Xiaosi Lin, Liuhui Cai, Yuhang Liu, Jianjun Lin, Zhaoyu Ran, Zhijie Cheng, Qiyuan Huang, Jieshan Sun</i>                                |     |
| The Engineering Practice of Embedded HVDC Technology: A Case Study of the Yangzhou-Zhenjiang HVDC Project .....                            | 235 |
| <i>Xingning Han, Xiaodong Liu, Xu Wang, Zhenjian Xie, Wenjia Zhang, Zhiwei Wang</i>                                                        |     |
| Reliability Analysis of Transmission Tower-Line System Under Combined Wind and Ice Loads Based on Monte Carlo Simulation .....             | 242 |
| <i>Xin Hu, Peng Li, Xiyu Wang, Shuaijie Wang</i>                                                                                           |     |
| Application of SLCC Technology in the Yangzhen Phase II HVDC Project .....                                                                 | 247 |
| <i>Yan Tao, Xianmeng Zhang, Xintong Mao, Xiangping Kong, Chenqing Wang, Xingning Han, Zhiwei Wang</i>                                      |     |
| CVaR-Based Coordinated Dispatch of Flexibility Resources in HVDC Systems and Reliability Assessment .....                                  | 252 |
| <i>Yu Xiao, Hongxing Ye, Yinyin Ge, Yi Huang, Haoxiang Wang, Nan Wei</i>                                                                   |     |

|                                                                                                                                        |     |
|----------------------------------------------------------------------------------------------------------------------------------------|-----|
| Key Technologies and Applications of Long-Span Ultra-High Towers in the Fengcheng-Meili 500 kV Transmission Project .....              | 258 |
| <i>Jiao Zhu, Xiaodong Liu, Bing Chen, Buhui Li, Xingning Han, Zhiwei Wang</i>                                                          |     |
| Research and Application of Virtual Joints for Effectively Increasing the Length of High-Voltage Cable Segments .....                  | 266 |
| <i>Xingmin Hou, Haisheng Song, Shengxiexian Xuan, Hanghui Ji</i>                                                                       |     |
| Simulation of Rime Ice Accretion on Railway Messenger Wires .....                                                                      | 272 |
| <i>Liu Wang, Yuheng Zhang, Wenxuan Zhou, Li Qi, Jiaqi Liu, Fanghui Yin</i>                                                             |     |
| Research on the Influence of Embedded HVDC and HVAC Common-Tower Configuration on DC Lines .....                                       | 277 |
| <i>Wei Liu, Fei Yuan, Ruiyong Zhang, Mingqing Gu, Huilong Zhao, Zhiwei Wang</i>                                                        |     |
| Analysis of Dynamic Response Characteristics of EHV Transmission Tower Under Cumulative Effect of Mine Earthquake in Mining Area ..... | 282 |
| <i>Hongbin Zai, Zhihua Jin, Limin Zhang, Dandan Wang</i>                                                                               |     |
| Application of the Power Mutual Support Function of the Jian-Su UHVDC in Jiangsu Power Grid .....                                      | 287 |
| <i>Wang Qiang, Li Pengbo, Bo Bin, Li Haifeng, Shen Mingkan, Xu Jin, Sha Haoyuan, Wang Zhiwei</i>                                       |     |
| Mechanism of Electrical Failure in Power Transformer Bushings Initiated by Mechanical Damage .....                                     | 291 |
| <i>Nuo Chen, Ting Wang, Zhiguo Hao</i>                                                                                                 |     |
| Protection and Faulted Line Identification Scheme for Same-Tower Multi-Circuit AC-to-DC Systems Based on Polarity Recognition .....    | 296 |
| <i>Zhenxing Li, Zhe An, Yi Zhu, Hanli Weng, Qiuji Wang, Hong Tan</i>                                                                   |     |
| Bird-Damage Fault Identification of Capacitor Bank Towers Based on Frequency-Domain Analysis .....                                     | 302 |
| <i>Runqi Fan, Hongsen Zou, Zhuo Chen, Zhiguo Hao, Bin Chai, Chunxiang Mao, Ting Wang</i>                                               |     |
| Fault-Type Identification and Switching Strategy for MMC-Based DC De-Icing Lines Using Active Signal Injection .....                   | 307 |
| <i>Yao Zhong, Chuang Fu, Xiaodong Ren, Zhuxin Shi, Qi Yang, Lusong Zhang, Huarong Zeng</i>                                             |     |
| Research on Optimization Strategy of Transformer Inrush Current Criteria for the Rapid Identification of Evolving Faults .....         | 313 |
| <i>Xiwen Shan, Yarong Guo, Tiezhu Wang, Shicong Ma</i>                                                                                 |     |
| Identification of Serious Discharge State of Transformer Surface Discharge Defects Based on Chaos Theory .....                         | 320 |
| <i>Yi Liu, Xu Yang, Li Xiao, Hui Wang</i>                                                                                              |     |
| High-Impedance Fault Recognition in Distribution Networks via Improved MFCC-Based Image Features and Deep Learning .....               | 326 |
| <i>Lin Chen, Mou-Fa Guo, Jian-Hong Gao, Wei Gao</i>                                                                                    |     |
| Research on a Method for Identifying Mechanical Fault Characteristics of Circuit Breakers Based on Optical Flow Machine Vision .....   | 331 |
| <i>Xiaomeng Li, Hualiang Zhou, Zhantao Su, Han Sun, Lu Lu, Kun Wang, Haiyang Lv, Yuxin Chen</i>                                        |     |
| Design and Fault Diagnosis Strategy for Series-Type Hybrid DC Circuit Breakers .....                                                   | 337 |
| <i>Caifa Fan, Longfei Tang</i>                                                                                                         |     |

|                                                                                                                                                 |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Detection Method of Different Fault Phase Secondary Ground Fault After Active Arc Suppression in Distribution Network .....                     | 342 |
| <i>Yuan Ma, Wei Zhang, Shaoming Pan, Liangyuan Chen, Wei Huang</i>                                                                              |     |
| A Single-Phase Grounding Fault Section Location Method for Distribution Networks Based on Modified Graph Autoencoder and Cluster Analysis ..... | 348 |
| <i>Zijie Zheng, Zuli Jiang, Wei Gao, Xiaofang Li, Yitao Jiang</i>                                                                               |     |
| Comparative Analysis and Failure Diagnosis of 220 KV Cable Termination Stress Cones .....                                                       | 354 |
| <i>Chenhui Zhang, Jianan Yan, Panqing Chen, Danyang Zhang, Han Wu, Yuqiang Hou, Liming Yang Fanyi Cai</i>                                       |     |
| A High-Impedance Fault Location Method for Distribution Networks Using VPD Oscillator Response and Multidimensional Feature Fusion .....        | 360 |
| <i>Xilin Zhong, Zuli Jiang, Wei Gao, Xiaofang Li</i>                                                                                            |     |
| Research on Coordinated Control Strategy for Valve Group and Pole Fault Power Transfer in UHVDC Three-Terminal Transmission System .....        | 366 |
| <i>Zongzhang Yang, Lei Long, Liyun Zha, Jianglong Yu, Hongsheng Guan, Anyun Shi</i>                                                             |     |
| A Convolutional Neural Network-Based Open-Circuit Fault Diagnosis Method for Three-Level Back-to-Back Converters .....                          | 371 |
| <i>Xiaoyue Sun, Zhenbin Zhang, Zhen Li, Haoyu Chen, Huimin Huang</i>                                                                            |     |
| Predictive Control of Commutation Failure for UHVDC System with LCC-VSC Hybrid Cascaded-Connection Topology .....                               | 377 |
| <i>Sha Haoyuan, Guo Tao, Zhu Xiaofeng, Wang Shugang, Wang Qiang, Zhang Xianmeng, Zhao Huilong Li Haifeng</i>                                    |     |
| Application of Graphene Smart Sensors in Detecting High-Frequency Partial Discharge in Polyimide Insulating Films .....                         | 383 |
| <i>Yuxing Lei, Bo Li, Mengyao Zhu, Jiao Sun, Zhongli Zhang</i>                                                                                  |     |
| UHF Partial Discharge Feature Extraction for GIS Based on Variational Mode Decomposition and Multi-Feature Fusion .....                         | 388 |
| <i>Weichao Xu, Ruiming Fang</i>                                                                                                                 |     |
| Study on Flashover and Creepage Characteristics of Pressboard Impregnated with Mixture of Natural Ester and Mineral Oil .....                   | 394 |
| <i>Huarui Wang, Qiang Zeng, Weiping Zhang, Xinzhong Zhang, Zhihua Yang, Weiguang Huang</i>                                                      |     |
| Distributed Capacitance Calculation of MOA Based on Field-Circuit Coupling Simulation .....                                                     | 398 |
| <i>Sisheng Wu, Shengwen Shu, Peng Xie, Sixiang Lin, Yuchen Huang, Haohe Yang</i>                                                                |     |
| Highly Thermal Stable Self-Healing Epoxy Resin for Power Electronic Packaging .....                                                             | 403 |
| <i>Yuyang Zeng, Yifan Gao, Jinliang He, Qi Li</i>                                                                                               |     |
| A Multi-Factor Fusion Network With Transfer Learning for Magnetic Core-Loss Prediction .....                                                    | 408 |
| <i>Longsheng Xu, Liping Zhang, Kaiming Chen, Xie Jingyi, Lebin Wang, Yu Chen, Tingfeng Shao, Junmin Hu</i>                                      |     |
| Method for Improving Adhesion Strength of Insulator Surface Coatings Based on Plasma Modification .....                                         | 414 |
| <i>Ziwen Deng, Yue Pang, Youshuo Liu, Jiaming Cheng, Cheng Pan</i>                                                                              |     |
| Study on Magnetic Core Loss Modeling Based on Temperature-Corrected Steinmetz Equation .....                                                    | 418 |
| <i>Yao Xiao, Shengwen Shu, Guobin Wang, Xiaolin Xu, Kang Wang, Bing Liu</i>                                                                     |     |

|                                                                                                                                                                                               |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Multi Source Sensing and End Insulation Structure Optimization of Ultra-High Voltage Converter Valve Side Bushing Based on Particle Swarm Optimization Algorithm and Digital Twin Model ..... | 424 |
| <i>Luo Dan, Zhang Shiling, Lei Taoling, Wang Shibin</i>                                                                                                                                       |     |
| Rolling Optimization of Coupled Power-Traffic Networks with Semi-Dynamic Assignment and Dynamic Wireless Charging .....                                                                       | 431 |
| <i>Haoran Liu, Xiaohan Fang</i>                                                                                                                                                               |     |
| Design of Resonance Tracking Control Method for Wireless Power Transfer Systems Using Asymmetric Square Waves .....                                                                           | 437 |
| <i>Chengyi Mao, Jiwei Huang</i>                                                                                                                                                               |     |
| Coordinated Restoration of Power-Transportation-Information Networks Considering UAV Relay Communication .....                                                                                | 441 |
| <i>Shichuang Li, Le Liu, Xiaoning Kang, Xuming Chen, Jinliang Fu, Chenjun Fan, Xi Huang, Qi Tong</i>                                                                                          |     |
| Research and Development of Distributed Photovoltaic Energy Module Devices Based on WIoTa Wireless Communication Technology and Experimental Verification of Dispatching Algorithms .....     | 447 |
| <i>Zhang Shiling, Xiao Qiang, Li Yanchen, Chen Meng</i>                                                                                                                                       |     |
| Mutual Inductance Parameter Monitoring Method for Magnetic Network Energy Routers in AC/DC Hybrid Microgrids .....                                                                            | 453 |
| <i>Sayed Abulanwar, Zheng Yin, Fujin Deng, Yeyuan Xie, Yaqian Zhang, Yunqing Hu, Sahar S. Kaddah A. S. Ayub, Abdalbasit Mnider</i>                                                            |     |
| A Review of Electric Vehicle Hosting Capacity Assessment in Distribution Networks: Methods, Mathematical Models, and Enhancement Strategies .....                                             | 459 |
| <i>Yanfang Mao, Xiaoxiang Lv, Zhujiang Ou, Yu Zong, Ting Qin, Zhonghao Qian</i>                                                                                                               |     |
| User Profile-Based Electric Vehicle Adjustability Identification Method .....                                                                                                                 | 465 |
| <i>Xiaochuan Wei, Shanshan Shi, Yike Guo, Zhenghao Zhou, Zizhuo Gao, Runlong Liu</i>                                                                                                          |     |
| Charging Scheduling Strategy for Electric Vehicle Microgrids Considering Peak-Valley Balancing and User Costs .....                                                                           | 472 |
| <i>Huican Zhou, Jingzheng Li, Shiyuan Zhang, Bolin Zhao, Yusheng Fang, Tao Jin</i>                                                                                                            |     |
| A Hybrid Heuristic-MILP Warm-Start Framework for Electric Vehicle Charging Station Planning .....                                                                                             | 478 |
| <i>Yunfan Meng, Yonghui Sun, Chenxu Yin, Liang Zhao, Haoran Dai, Peibiao Chen</i>                                                                                                             |     |
| Research on the Design and Operation Strategy of the “Light Storage Charging” Smart Demonstration Project .....                                                                               | 484 |
| <i>Wu Jungang, Dou Junhao, Bai Yong, Zhang Shiling</i>                                                                                                                                        |     |
| Combining Feature Dimensionality Reduction and Entropy-Based Weighting for Enhanced Load Clustering in Agricultural Parks .....                                                               | 490 |
| <i>Hailong Zhang, Zhen Niu, Linxiang Zhao, Shijun Wang, Xin He, Ying Qi</i>                                                                                                                   |     |
| Research on Short-Term Electricity Load Forecasting Based on Multiscale TCN-BiGRU-Attention .....                                                                                             | 497 |
| <i>Jiayu Zou, Xixiu Wu, Qingyong Zhang</i>                                                                                                                                                    |     |
| Three Dimensional Surface Fitting and Prediction of Wind Power Photovoltaic Hydropower Energy Storage and Load Curve, and Joint Optimization Strategy for Energy Storage .....                | 503 |
| <i>Zhang Shiling, Wu Jiaxing, Wu Jungang, Jia Yun</i>                                                                                                                                         |     |

|                                                                                                                                        |     |
|----------------------------------------------------------------------------------------------------------------------------------------|-----|
| Study on Coupling Simulation of Transformer Temperature and Electric Field Distribution in High-Altitude Environments .....            | 509 |
| <i>Yueping Yang, Wenlong Liao, Xin Yang, Yu Zhang, Jing Xu, Jian Hao, Zhen Zhao</i>                                                    |     |
| Experimental Study on Temperature Field of Steel Components Under Electric Fire .....                                                  | 513 |
| <i>Xilong Chen, Xian Gao, Tao Zhu, Weihua Wang</i>                                                                                     |     |
| Reliability Assessment of Power Supply in Substations Based on System Partitioning .....                                               | 521 |
| <i>Ning Zhan, Ting Wang, Zhiguo Hao</i>                                                                                                |     |
| SLCC-Based Zonal Power Reciprocal Technology and Engineering Application .....                                                         | 527 |
| <i>Xintong Mao, Jian Ling, Bin Bai, Xianmeng Zhang, Dongbin Lu, Zhenhua Zhu, Zhiwei Wang</i>                                           |     |
| A Bayesian Framework for Harmonic State Estimation with Correlation Modeling Across Different Harmonic Orders .....                    | 533 |
| <i>Yingle Fan, Jianming Deng, Tao Tang, Xiao Zhang, Lingdong Su, Dunbin Xu, Caihai Zou, Zongshuai Jin</i>                              |     |
| A Dynamic Line Rating Method Under Extreme Weather with Trade-Off Between Capacity Enhancement and System Security .....               | 538 |
| <i>Chao Zhu, Yunpeng Guo, Xiaodi Zhang, Xilin Chen, Deng Ma</i>                                                                        |     |
| Research and Applications of Warning Technologies for Electrical Safety .....                                                          | 544 |
| <i>Ruihan Pei, Sirui Fan, Qiang Zhang, Wei Wang, Ximing Zhang, Guoming Ma, Dengfeng Ju</i>                                             |     |
| A Two-Stage Robust Optimization-Based Coordinated Dispatch Method for Mobile Emergency Resources Under Ice Disasters .....             | 549 |
| <i>Shuai Shao, Yujie Li, Nan Xiao, Haohe Yang, Zhongyi Yang, Shengwen Shu</i>                                                          |     |
| Thermal Failure Mechanism Analysis of Space Solar Cells Under Partial Shading Conditions .....                                         | 555 |
| <i>Feng Li, Zhi Huang, Xuan Zhang, Baoyi Cheng, Ziliang Zhang</i>                                                                      |     |
| Distributed Energy Resources Operation with Stationary Battery Storage Cooling in Southeast Asian Islanded Distribution Networks ..... | 561 |
| <i>Ruoxuan Leng, Nan Zhou</i>                                                                                                          |     |
| Comprehensive Evaluation of Battery Modules in Energy Storage Station Based on Entropy Weighting Method .....                          | 567 |
| <i>Xiao Qiang, Zhang Shiling, Wu Jungang, Ye Fan</i>                                                                                   |     |
| A Method for Extracting New Health Feature of Lithium-Ion Batteries in Constant Voltage Charging Curve for SOH Estimation .....        | 572 |
| <i>Junqi Bai, Ke Xu, Laiqiang Kong, Sidun Fang</i>                                                                                     |     |
| Analysis of Economic Viability and Development Recommendations for Independent Energy Storage in Different Regions of China .....      | 578 |
| <i>Anbang Xie, Naixun Li, Yihan Zhang, Jingyi Shang</i>                                                                                |     |
| Fast Day-Ahead Co-Allocation of Pumped-Storage Under Reserve Activation Risk .....                                                     | 586 |
| <i>Hanqi Tao</i>                                                                                                                       |     |
| Research on Technologies of Offshore Wind Power Off-Grid Black Start Supported by Grid-Forming Energy Storage .....                    | 592 |
| <i>Rui Xie, ZiYang Li, ZhaoPei Liang, Bin Lin, Wei Chen, ZhenYu Yang</i>                                                               |     |

|                                                                                                                                                          |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Optimal Energy Storage Configuration Method for Typical Distribution Areas Considering Economic Efficiency and Transformer Utilization .....             | 600 |
| <i>Sihao Zhu, Fang Chen, Jinze Li, Qiyi Li, Guang Luo, Ziang Zhu, Xiangfei Wang, Yun Zhou</i>                                                            |     |
| Research on a Time-Series Simulation Method for Carbon Emissions in Power Systems Considering the Carbon Storage Characteristics of Energy Storage ..... | 607 |
| <i>Baodi Ding, Rong Pan, Yanping Xu, Mingxin Zhao, Jie Bai, Xiaohui Qin</i>                                                                              |     |
| Modeling and Collaborative Optimization of Wind-Storage-Charging Systems Based on VAE-WGANGP Model .....                                                 | 613 |
| <i>Xiao Qiang, Zhang Shiling, Wu Jungang, Ye Fan</i>                                                                                                     |     |
| Engineering Study on Topology-Switching Device Performance Matching in Active Balancing for Energy Storage Systems .....                                 | 619 |
| <i>Jie Tang, Jie Ma, Xin Zhou, Gaosheng Zhang, Xinlei Zheng, Tongjia Liang</i>                                                                           |     |
| Primary Frequency Regulation Control Strategy for Energy Storage Considering Soc Self-Recovery .....                                                     | 625 |
| <i>Haitao Ouyang, Kailiang Weng, Qile Chen, Zhenshan Zhu</i>                                                                                             |     |
| Integrated Planning and Optimal Dispatch of Source-Grid-Load-Storage Systems with Renewable Energy Considering Policy Constraints .....                  | 631 |
| <i>Yong Sun, Haotian Zhao, Zhenyuan Li, Baoju Li, Dexin Li, Guanqun Zhuang</i>                                                                           |     |
| Research on Equivalent Models for Photovoltaic Power Plants Based on an Improved C-FCM Method .....                                                      | 637 |
| <i>Siming Gao, Dewen Zhang, Yanming Feng, Hang Lu, Long Tan, Zhongzhi Qu, Jizheng Yang, Chao Xu</i>                                                      |     |
| Variable Time-Resolution Optimal Scheduling Method for Power System with Concentrating Solar Power Generation .....                                      | 643 |
| <i>Peijie Guo, Yalu Sun, Kun Ding, Guoshan Yang, Deqi Liu, Zan Ni</i>                                                                                    |     |
| Distributed Optimization Scheduling Strategy for Wind-Solar-Building Multi-Agent Energy System Considering Electricity Price Uncertainty .....           | 649 |
| <i>Zhiwen Zhao, Jingzheng Li, Yilu Wang, Bolin Zhao, Yusheng Fang, Tao Jin</i>                                                                           |     |
| A Statistical Analysis-Based Evaluation Index System for Multi-Scale Fluctuation Characteristics of New Energy and its Application .....                 | 655 |
| <i>Xin Zhao, Aobin Zhang, Naixin Duan, Jiliang Jin, Yu Qiao, Yuxing Tong</i>                                                                             |     |
| Explainable Graph Reasoning for Substation Construction Safety .....                                                                                     | 660 |
| <i>Liang Chen, Yiting Yin, Bo Huang, Shilun Zeng, Shen Ma</i>                                                                                            |     |
| Optimized Operation of Integrated Energy Systems Based on TCN-LSTM Prediction and Multi-Agent Cooperative Games .....                                    | 667 |
| <i>Yilu Wang, Xianyang Cui, Zhiwen Zhao, Bolin Zhao, Yushen Fang, Tao Jin</i>                                                                            |     |
| Soft Actor-Critic-Based Optimization for Security-Constrained Economic Scheduling in High-Renewable Power Systems .....                                  | 672 |
| <i>Yingbei Yao, Da Sang, Kai Xia, Yiqing Xu, Xiangwen Wu</i>                                                                                             |     |
| Implementation of a Robust Penalty-Interior-Point Method for Optimal Power Flow Analysis .....                                                           | 678 |
| <i>Wei Cui, Junheng Li, Xiaowei Ma, Meng Wang, Cong Wang, Penghan Li, Chao Duan</i>                                                                      |     |
| Real-Time Rolling Optimization Scheduling Technology for Cascade Hydropower Stations .....                                                               | 684 |
| <i>Changping Li, Feixiong Chen, Junjie Lin</i>                                                                                                           |     |

|                                                                                                                                                        |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Research on the Circuit Design Method of an 8 KA Fast Control Power Supply for Fusion Devices .....                                                    | 689 |
| <i>Haiji Yu, Hong Lei, Li Jiang</i>                                                                                                                    |     |
| An Optimization Strategy Considering the Multi-Energy Complementarity for Agricultural and Pastoral Parks .....                                        | 695 |
| <i>Hailong Zhang, Zhen Niu, Linxiang Zhao, Shijun Wang, Xin He, Ying Qi</i>                                                                            |     |
| Research on the Optimal Flood Control Operation Model for Cascade Hydropower Stations Based on Piecewise Linearization .....                           | 701 |
| <i>Chunlan Cao, Jinlin Chen, Feixiong Chen, Junjie Lin</i>                                                                                             |     |
| Quantile Mapping Based Condition-Informed Risk Assessment for the Optimal Maintenance Scheduling of Power Substation Equipment .....                   | 707 |
| <i>Jingxiao Liu, Nan Zhou, Ling Luo, Gehao Sheng, Xiuchen Jiang</i>                                                                                    |     |
| Risk Assessment of Cascading Failures in Power Systems and Vulnerability Analysis of Key Lines .....                                                   | 713 |
| <i>Xin Hu, Xiyu Wang, Peng Li, Yunzheng Chen</i>                                                                                                       |     |
| Modeling and Risk Assessment of Cyber-Physical Power Systems Against Extreme Events .....                                                              | 718 |
| <i>Zhengqi Xu, Wenzhong Li, Haitao Xu, Yujie Sheng, Bijing Liu, Zhaoguang Pan</i>                                                                      |     |
| Research on Zonal Modeling of DC Bias Risk in Large AC Power Grids .....                                                                               | 724 |
| <i>Zhuohong Pan, Xiaotong Gou, Yingying Zhang, Lin Geng, Bichuan Xu, Xin Liu</i>                                                                       |     |
| Integrated Fuzzy Bayesian Network-Monte Carlo Framework for Multi-Fault Risk Assessment in Highspeed Railway Power Supply Systems .....                | 729 |
| <i>Yixin Cao, Dezhong Ma, Wenfei Ding</i>                                                                                                              |     |
| A Risk Assessment Method for Ice Disaster Based on Interpretable Ensemble Learning .....                                                               | 735 |
| <i>Shuai Shao, Yujie Li, Haohe Yang, Nan Xiao, Zhongyi Yang, Shengwen Shu</i>                                                                          |     |
| Identification Technology of Excitation Inrush Current in Power Transformers Based on Calculated Electromotive Force .....                             | 740 |
| <i>Sun Jiahao, Zhang Shiling, Wang Pengbo, He He</i>                                                                                                   |     |
| Design and Experiment of 1700 V Planar IGBT with Double-Gate for Reducing Turn-off Loss .....                                                          | 747 |
| <i>Chenyuxin Jiang, Qingyu Liu, Yingxuan Chen, Pengcheng Xing, Li Wan, Chao Liu, Lezhong Li Wanjun Chen</i>                                            |     |
| A Novel Aging Monitoring Method for SiC MOSFETs in Power Cycling Tests .....                                                                           | 753 |
| <i>Duan Dai, Runze Wang, Zhaoyang Wei, Jianing Wang, Jiujian Gui, Shaolin Yu</i>                                                                       |     |
| A High-Density 16-Channel Modular Power Amplifier System Using Indigenous SiC IPMs: Design, Modeling, and Experimental Validation .....                | 757 |
| <i>Xuyu Wang, Yunxian Shen, Milan Wei, Gen Long</i>                                                                                                    |     |
| Research on Operating Characteristics of a Novel High-Power Rectifier with Source Filtering and Dynamic Reactive Power Compensation Capabilities ..... | 763 |
| <i>Yao Zhong, Chuang Fu, Changhao Yu, Kui Xu, Xianyin Mao, Kang Li, Minghao Wu, Huarong Zeng</i>                                                       |     |
| Research on a Novel Overvoltage Suppression Circuit and its Application in Enhancing the Overvoltage Withstand Capability of SVG Devices .....         | 769 |
| <i>Chao You, Xueting Lei, Xin Chen</i>                                                                                                                 |     |

|                                                                                                                                                            |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Study on Electrical Field Distribution Characteristics of UHVDC Valve-Side Bushings Under Different Load Rates .....                                       | 774 |
| <i>Longfei Li, Dingqian Yang, Fei Zhang, Chunlei Ren, Zhijie Ge, Zhao Guang Du</i>                                                                         |     |
| Design of a High-Precision EKF-Based Phase-Locked Loop for High-Power Power Supplies .....                                                                 | 779 |
| <i>Jiahao Peng, Can Wang, Qingwu Chen, Quancheng Pu</i>                                                                                                    |     |
| Study on Aging Performance of DC Support Capacitors Based on MMC Converter Valve Full-Scale Test Platform .....                                            | 785 |
| <i>Xiang Huang, Jiang Guo, Mengyi Xu, Jiao Zhou, Wenjing Zhang, Yankun Fan, Kai Chen</i>                                                                   |     |
| Electro-Thermal-Lifetime Co-Design of DC-Link Capacitor in 3L-NPC Inverters .....                                                                          | 790 |
| <i>Liutao Xu, Weimin Wu, Houqing Wang, Xiaodong Lv, Huiyang Zhang, Xinyu Zhang</i>                                                                         |     |
| Quantitative Analysis Method for Resonant Stability of Fractional-Frequency Offshore Wind Power System Based on Frequency-Domain Impedance Criterion ..... | 796 |
| <i>Haitao Zhang, Ruxi Zhang, Chenting Zhao, Jizhi Han, Taiyu Wang, Qianwen Zhang, Yamin Sun, Xiao Wang</i>                                                 |     |
| Research on Critical Issues in the Development of Large-Scale Wind–PV Bases in Desert, Gobi, and Sandy Regions .....                                       | 803 |
| <i>Yanfei Pan, Qiong Li</i>                                                                                                                                |     |
| Wind-Solar-Storage Capacity Planning Considering Complementarity and Time-of-Use Price .....                                                               | 807 |
| <i>Zijun Mao, Qianchang Chen, Xianbo Ke, Jing Liu, Zun Guo, Hongxing Ye</i>                                                                                |     |
| Research on Optimal Configuration of Energy Storage Capacity in Wind-Solar-Storage Multi-Energy Complementary Power Generation System .....                | 813 |
| <i>Zhang Zhenzhen, Zhang Zhijie, LV Qingquan, Gao Pengfei, Zhang Jialin, Zhang Haozhe</i>                                                                  |     |
| Parameter Optimization of SVG for Enhanced Transient Voltage Recovery of Offshore Wind Farm Integration Using Reinforcement Learning .....                 | 820 |
| <i>Xun Lu, Ao Zhao, Ruisheng Diao, Jinye Cao, Jiahua Wang</i>                                                                                              |     |
| Wind Power Clustering and Operation Mode Generation Method Based on Pearson Correlation Analysis .....                                                     | 826 |
| <i>Jiecong Wang, Guangming Lu, Kaiyuan Hou, Chen Shi, Pei Guo, Shunyou Cai</i>                                                                             |     |
| Status-Aware and Market-Responsive Pricing for Peer-to-Peer Energy Trading: A Comparative Analysis of Efficiency and Equity .....                          | 832 |
| <i>Pengpeng Wu</i>                                                                                                                                         |     |
| Dynamic Aggregation Model of Flexible Resources Based on Bi Level Optimization .....                                                                       | 838 |
| <i>Zilun Shen, Ye Tian, Taiyu Gu, Rui Guo, Ying Chai</i>                                                                                                   |     |
| A Community Electricity Consumption and Trading Method Based on Dynamic Electricity Pricing .....                                                          | 845 |
| <i>Chen Liang, Junhong Duan, Yaxin Li, Kai Wei, Li Luo, Rui Xu</i>                                                                                         |     |
| Optimized Energy Interconnection Dispatch of Multi-Feeder Systems for Low-Carbon Economic Operation .....                                                  | 851 |
| <i>Sihao Zhu, Yongjun Zhou, Yirui Zeng, Mingyi Guo, Lijia Zheng, Yandan Xiao, Ziang Zhu, Yun Zhou</i>                                                      |     |
| Autonomous Transmission Line Inspection Using Transfer Learning Enhanced Deep Learning Models .....                                                        | 859 |
| <i>Oscar Tsai, Mei Yang, Shengjie Zhai</i>                                                                                                                 |     |

|                                                                                                                                                 |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| An Intelligent Identification Algorithm for Wildfire Echoes Based on Dual-Polarization Radar Monitoring .....                                   | 865 |
| <i>Yunchu Cheng, Xiaojie Wang, Shaokang Chen, Jun Xu, Chaoying Fang, Qiong Wang</i>                                                             |     |
| Research on Ice Detection Method of Wind Turbine Blades Based on Fusion Convolutional Neural Network .....                                      | 872 |
| <i>Wang Tingting, Xing Zuoxia</i>                                                                                                               |     |
| Signal Analysis and Diagnosis of External Breakage Behaviors in Distribution Cable Trenches Using Piezoelectric Acoustic-Vibration Sensor ..... | 880 |
| <i>Lisheng Chen, Qiang Zhang, Xin Wang, Guoming Ma, Dengfeng Jv</i>                                                                             |     |
| Harmonic Source Localization in Distribution Networks Based on Data-Mechanism Fusion and Spatiotemporal Graph Modeling .....                    | 886 |
| <i>Fang Chen, Minghao Zou, Ming Yang, Zhengyu Wang, Zhuhua Chen, Yanyi Fu, Meng Liu</i>                                                         |     |
| Topology-Aware PPO with Physical Residual for Distribution Network Voltage Control .....                                                        | 891 |
| <i>Rui Liu, Xiaobo Dou, Jingxuan Ding, Saining Yin, Shuxian Yi, Jin Zong</i>                                                                    |     |
| A Two-Stage Multi-Resource Coordinated Load Restoration Strategy for Distribution Systems .....                                                 | 897 |
| <i>Sheng Wang, Yi Huang, Ke Wang, HaiTao Hu</i>                                                                                                 |     |
| GAT-MADDPG Algorithm-Based Volt-VAR Control for Active Distribution Networks .....                                                              | 903 |
| <i>Jingxuan Ding, Xiaobo Dou, Congyue Zhang, Rui Liu, Xinghua Huang</i>                                                                         |     |
| Analysis of Dominant Instability Modes in Power Systems with High Penetration of Power Electronic Devices .....                                 | 909 |
| <i>Jiahua Wang, Fangyuan Sun, Ruiyuan Zeng, Ruisheng Diao, Lingjie Kong, Junjie Li, Baorong Zhou</i>                                            |     |
| A Bi-Level Stochastic Framework with Hybrid PSO-GWO for VPP Co-Optimization of Economic and Grid Support Objectives .....                       | 915 |
| <i>Anees Ahmad, Usama Aslam, Vikram Kumar, Touseef Ahmed, Muhammad Ahsan Niazi<br/>Muhammad Shahzad Aziz</i>                                    |     |
| Optimal Configuration of SOP in Flexible Distribution Network Based on Sensitivity Analysis .....                                               | 921 |
| <i>Peng Wu, Kaiyuan Ji, Zhaohe Yu, Yaoqi Li, Wenhao Yang, Hao Liu, Guan hong Qiao</i>                                                           |     |
| A Parallel Hybrid AC-DC Architecture for Power Distribution Systems .....                                                                       | 927 |
| <i>Chengtao Ye, Xiang Lin, Qingqing Zheng, Hualong Yu, Jing Ye, Chengqian Tu</i>                                                                |     |
| Identification and Optimization of Key Power Grid Operation Indicators Based on Indicator Correlation Matrix .....                              | 933 |
| <i>Chen Shi, Zhen Huang, Hongyang Dai, Zhonghui Li, Guangming Lu, Jiecong Wang</i>                                                              |     |