

2024 IEEE International Conference on DC Technologies and Systems (DCTS 2024)

**Zhuhai, China
19-20 October 2024**



**IEEE Catalog Number: CFP24VX7-POD
ISBN: 979-8-3503-7947-1**

**Copyright © 2024 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:	CFP24VX7-POD
ISBN (Print-On-Demand):	979-8-3503-7947-1
ISBN (Online):	979-8-3503-7946-4

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

Contents

A01-01	Research and application of heat loss calculation and analysis method in the design process of conductivity sensors for high-voltage direct current converter valves	1
A01-02	Study on Coherent Radiation Directivity Algorithm for Power Capacitor Tower in HVDC Converter Station	6
A01-03	Design of Intelligent Monitoring Terminal Based on Electric Power Maintenance Safety Operation	14
A01-04	Analysis and Treatment of Frequent Pressure Failures in the AC Filter Field Circuit Breakers of UHV Converter Stations	19
A01-05	Analysis of the influence of voltage measurement anomalies on the DC side of UHVDC flexible converter stations	24
A01-06	Converter Transformer fault diagnosis method based on double-weighted loss function and DT-Lightgbm-Gcforest	31
A01-07	Numerical Simulation and Experimental Research on Water Distribution for Compact Converter Valve Module	37
A01-08	Research on GIS basin insulator performance and two-stage curing method	42
A01-09	Power Balance Optimization Modulation Strategy for Hybrid Cascaded H-Bridge Inverter	47
A01-10	The Research on High Voltage Test Technology of $\pm 800\text{kV}$ High-end valve side bushing in Kunlunlong Flexible HVDC Project	53
A01-11	The Research on Key Technologies of Partial Discharge Measurement in Suspended Wall Bushing for EHV and UHV DC Projects	58
A01-12	A Magnetic Coupling Mechanical DC Circuit Breaker	64
A01-13	Analysis of the Reasons for the Failed 10kV MOA Based on Impulse Aging and Power Frequency Aging Tests	70
A01-14	Study on Surge Arrester Impulse Stress in a 500kV AC Switch Yard Under Multiple Lightning Strikes	76
A01-15	Research on key technology of N-phase interleaved parallel DC/DC converter	81
A01-16	Analysis of the Dispersion of Insulator $U_{50\%}$ Considering the Influence of Waveform and Altitude	87
A01-17	10kV SiC MOSFET Module for Traction Converter Application	93
A01-18	A Magnetron Method for Enhancing the Erosion Resistance of Vacuum Interrupter Contacts Using Halbach Arrays	99
A02-01	Design of flexible HVDC control system based on MMC	104
A02-02	A digital converter station monitoring data fusion method for full-stop fault discrimination	110
A02-03	Fault identification method for flexible HVDC line based on Euclidean similarity calculation	115
A02-04	A new protection scheme for HVDC transmission lines based on discrete-domain Digital Filter modeling	121
A02-05	Study of defects based on simulation of action currents of EM multi-column parallel arresters	127
A02-06	A Coordinated Strategy to Mitigate DC Voltage Rise in MMC-HVDC Systems with Offshore Wind Integration	133
A02-07	Active Power Limitation of Windfarm Generation Transmitted Through MMC-HVDC Systems	139
A02-08	LCC-MMC HVDC Line Pilot Protection Based on U-Q Characteristic Curve	145
A02-09	Analysis on Current Control Strategy of Yunnan-Guizhou Interconnection Project	151
A02-10	Analysis of the action of converter bridge differential protection caused by magnetizing inrush current of converter transformer	156
A02-11	Switching Strategy And Fault Analysis Of Earth Metal Loop For Hybrid Three-terminal HVDC Transmission	161

A02-12	Study of key operation and maintenance parameters of optical measurement system based on purely optical current transformer	166
A02-13	Risk Analysis and Upgradation of Protections for HVDC Project with Common Grounding Electrode	170
A02-14	Pitfalls and Improvements Analysis of closing permission and loss of voltage criterion Logic in Backup Automatic Switch	175
A02-15	Research on the solution of the abnormality of DC protection LAN network communication between converter station based on TDC platform	178
A02-16	Unsupervised learning and expanded strategy for Multi-parameter coupling oil-immersed transformer intelligent fault diagnosis system	182
A02-17	Transformer Anomaly Detection Using Deep Belief Network with Dynamic Adaptive Knowledge Transfer and Interval Type-2 Fuzzy Set for Uncertain Parameters	189
A02-18	An MMC optimal balancing control strategy based on SMs' Capacitor Voltage Characteristics	195
A02-19	A Novel Dual-Switch Capacitor Series DC Transformer Topology with Faults and Inrush Current Suppression	201
A02-20	Linear Quadratic Optimal Control of MMC-STATCOM with Stationary Frame under Asymmetric Fault in AC Power Grid	207
A02-21	Principle Analysis and Optimization Strategy for Tripping Self-holding Circuit in the Last Breaker Protection of AC Filters	212
A02-22	Advanced Wideband-frequency Grid Impedance Measurement Utilizing MMC-HVDC Integration	217
A02-23	Reliability Analysis of Multi-terminal Blocking-type MMC Flexible DC System	223
A03-01	A zero crossing protection method for DC distribution network	228
A03-02	Key Parameters Affecting the Transient Characteristics of Active Distribution Networks Under Large Disturbances	234
A03-03	Multi-Objective Optimal Design of High Power, High Frequency, High Voltage Transformer Considering Insulation for DC distribution Grid	240
A03-04	Condition Assessment and Maintenance Strategy of Flexible DC Distribution Equipment Based on Improved FMEA	247
A03-05	Flexible Retrofit Planning for Distribution Networks in Urban High-density Load Areas	253
A03-06	Research on Engineering Design of AC-DC Hybrid Distribution Network for the Integration of New Generation and Load	259
A03-07	A Fast Single-Ended Protection Scheme for DC Distribution Networks	266
A03-08	Single-Line-to-Ground Fault Section Location for Multi-Terminal DC Distribution Networks	271
A03-09	Hydrogen Energy Storage-based DC Energy Hub for Regenerative Braking Energy Utilization in Electrified Railways	277
A03-10	Economic Analysis of a Fractional Frequency Offshore Wind Power System Utilizing PMSG for Direct-Drive Turbines Without Terminal Converters	283
A04-01	An Adaptive Inertia and Damping Control of VSG with Four-leg inverter for Photovoltaics-Storage Grid Connected System	289
A04-02	Voltage Disturbance Observation Method Based on Dual Active Bridge Converter Loss Model	295
A04-03	DC microgrid flexible interconnection switch and its control strategy	301
A04-04	Placement and Sizing Method Analysis for Distributed Renewable Energy in Distributed AC/DC Power System	306
A04-05	Analysis of Resource Configuration for Power Quality Control in Distribution Network with High Proportion Distributed PV	312
A04-06	Research on the carbon reduction scheme of green buildings based on DC power supply technology	317
A04-07	DC Terminal Impedance Modeling and Stability Analysis for VSG-Controlled Grid-Connected Inverter	327
A04-08	Credibility Assessment of Low-voltage Topology Changes Detection Based on Data Quality Analysis	333
A05-01	Seismic performance analysis of DC transmission tower-line system of unequal	338

	height	
A05-02	An AC/DC loss allocation method considering three-terminal flexible direct current under power market environment	346
A05-03	Research on the abnormal discharge law of HVDC transmission converter valve and its improvement measures	350
A05-04	Research on the Inversion of Measured Shielding Lightning Waveforms on 500kV Transmission Line	356
A05-05	Small-Signal Stability Analysis of Grid-Tied GFL/GFM VSCs System	361
A06-01	Research on Insulation Coordination Design for ± 600 kV Bipolar HVDC Transmission Line with Dedicated Metallic Return in Chile	367
A06-02	Research On The Calculation Of Air Clearance In The Valve Hall Of A Converter Station Under Ultra-High Altitude Conditions	373
A06-03	Research on the Configuration of New Energy Storage Capacity and Cost Evaluation for Large New Energy Bases	379
A06-04	Optimization of Operating Frequency for Flexible Low-Frequency Transmission Systems Considering Multiple Variables	385
A06-05	Flashover Characteristics of 500kV Insulators under Positive Short-tail Wave Impulse	391
A07-01	A Study on Fault Diagnosis of Valve Cooling Equipment Based on Parallel Voiceprint Recognition Algorithm of AMFCC and DNN	397
A07-02	Analysis of anonymous phase grounding fault and tripping strategy optimization for double-circuit transmission lines on the same tower	402
A07-03	Exploration and Practice of Industry-Education Integration and Collaborative Education for Postgraduate Training in the Field of New Electrical Engineering	410
A07-04	LoRa Terminal Network Access Authentication Technology Based on Radio Frequency Fingerprint	415
A07-05	Digital management tool of DC maintenance equipment based on RPA robot and Wiegand table	421
A07-06	Research on MEC and LoRa-based scheme for processing state information of equipment in converter station	424
A07-07	Short Circuit Currents Constrained Switching Optimization Enhancing Flexibility of Urban Power Grid with Energy Storage System	428
A07-08	Research method of insulator burst fault identification based on self-attention YOLOv4	434
A07-09	Research on Prediction of Inlet Valve Water Temperature in Flexible DC Valve Cooling System Based on VMD-DF	440
A07-10	Selective Detuning Energy Information Integration Method for DC Microgrid DC-DC Converter	448
A07-11	Multi-level Encapsulated U-type Unit Inverter Energy-Information Integration Approach	454
A07-12	High-frequency modelling and optimal design of common-mode inductors for EMI suppression of valve cooling system sensors	460
A07-13	Diagnostic study of insulation defects in zero-carbon DC system based on GRU-ATT	467
Author index		474-480