

International Conference on Power Electronics and Power Transmission (ICPEPT 2021)

Journal of Physics: Conference Series Volume 2108

Xi'an, China
15 - 17 October 2021

ISBN: 978-1-7138-5079-3
ISSN: 1742-6588

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

This work is licensed under a Creative Commons Attribution 3.0 International Licence.
Licence details: <http://creativecommons.org/licenses/by/3.0/>.

No changes have been made to the content of these proceedings. There may be changes to pagination and minor adjustments for aesthetics.

Printed with permission by Curran Associates, Inc. (2023)

For permission requests, please contact the Institute of Physics
at the address below.

Institute of Physics
Dirac House, Temple Back
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481
Fax: 44 1 17 920 0979

techtracking@iop.org

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
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Preface	
Peer Review Declaration	
Study on Key Technologies of Power Dispatching Control System Under the Background of Cloud Computing.....	1
<i>Siming Zhou, Guanqiang Liu, Hai Qin, Tian Xia</i>	
Electromechanical Transient Modeling and LVRT Parameter Identification of Large Capacity Full Power Converter Wind Turbines Based on PSASP Program.....	9
<i>Guoqiang Lu, Xiangyu Tao, Chunmeng Chen, Jiatian Gan, Xufeng Zhao</i>	
Application of Space Vector Pulse Width Modulation Algorithm Based on Programmable Logic Array in Power System.....	17
<i>Zhihai Cheng, Hui Liu</i>	
Research on Operation Reliability Evaluation of Power-Generating Unit	23
<i>Shuai Di</i>	
Starting System and Safety Protection of Explosion-Proof Diesel Engine for Coal Mine Based on Compressed Air	30
<i>Kun Zhu, Jiquan Liu, Zhiwei Yan, Lei Zhang</i>	
Simulation Analysis of Underwater Working Condition of Ship Rudder Blade Based on Fluent.....	37
<i>Haowei Zhao, Guifeng Liu, Jianggui Han</i>	
Comparing and Analysis of Test and Evaluation Methods for Connected Vehicle Communication Antenna System.....	43
<i>Tong Zhu, Guotian Ji, Guokai Jiang, Yifu Ding, Jiaxu Feng, Changyuan Wang</i>	
Multistage Noise Reduction Processing for Vibration Signal of Hydropower Units.....	51
<i>YouSong Shi, Jianzhong Zhou</i>	
Current Status and Prospects of Gas Turbine Technology Application	59
<i>Jiangpeng Li, Ziti Liu, Ruoxuan Ye</i>	
Experimental PIV Investigation of the PZT Fans Array Coupling Effect at High Reynolds Numbers	69
<i>Yiyang Chen, Hao Ding, Ziwen Wang, Jianxin Li, Jiahuan Cui</i>	
Research on Small Lightweight Electromagnetic Interference Measurement System Based on Patrol Unmanned Aerial Vehicle	85
<i>Pingyuan Liu, Nian Wu, Junwen Yao, Xianbin Ke, Shiguang Bie, Feng Liu</i>	
Research on Residual Current Warning Technology Based on Big Data Analysis.....	90
<i>You Li, Chuanfu Xia, Yuan Zhuang, Baoquan Liao, Shuai Huang</i>	
Research on the Operation Model and Strategy of Lithium Battery to Provide Frequency Regulation in the Power System.....	96
<i>Yu Shi, Zhong Zhang, Jing Wang, Hao Li, Xiang Zhao, Xintong Yang</i>	
Research on Security Access of Power Internet of Things Terminals Based on Edge Computing Technology	107
<i>Yong Tang, Linghao Zhang, Juling Zhang, Siyu Xiang, He Cai</i>	

Simulation Analysis of Current in Metal Sheath of Power Cable Considering Temperature Characteristics	113
<i>Jian Fang, Min Zhang, Wenxiong Mo, Bo Huang, Jiaxing He, Xiang Lin</i>	
Design and Electromagnetic Analysis of Switched Reluctance Linear Generator in Electric Vehicle	120
<i>Jieyu Liu, Ye Tang, Wenyu Cheng, Changpeng Li</i>	
Development of the Line Protection Measurement and Control Device Based on Domestic MCU	127
<i>Chengxuan Zhao, Yuantao Wang, Chuankun Ni, Hu Chen, Yunlong Xu, Wei Ma, Yixin Su</i>	
Transmission Line Condition Assessment Technology Based on Multi-Source Parameter Fusion.....	136
<i>Wentao Dai, Minzhen Wang, Jiankai Guo, Zheng Li, Dongliang Qiao, Ziwen Shang</i>	
Approach for Provincial Distribution Automation System in Outage Analysis	142
<i>Zhihao Zhang, Yulin Qian, Diandian Zhou, Kexin Zhang</i>	
Design and Implementation of Active Frequency Control Algorithm for Virtual Power Plant Based on Flexible Resource Rapid Response	151
<i>Bin Li, Junjie Yu</i>	
Complete Characteristic Curve Processing Method Based on Improved Backpropagation Neural Network and Logarithmic Curve Projection.....	158
<i>Baonan Liu, Jianzhong Zhou</i>	
The Heat Transfer Coefficient Predictions in Engineering Applications.....	164
<i>Junchi Wan</i>	
Frequency Tracking and Tuning Control of Wireless Power Transfer System	170
<i>Ziyi Liu, Hao Zhan</i>	
Simulation Research on Electric Field Distribution of Insulator String in ULTRA High Voltage Transmission Line	177
<i>Weihao Shen</i>	
Application of Automatic Code Generation Based on PSIM in Digital Control BUCK Circuit	186
<i>Yang Lu, Puqiong Yang</i>	
Design of Vision System for High Voltage Transmission Line Obstacle Removal Robot.....	194
<i>Yijiang Wu, Zhicong Dong, Huibin Zhou</i>	
Demonstration and Optimization of Floor Height of 220kV GIS Room in the Indoor Substation.....	201
<i>Yan Li, Peng Wu, Lin Xing, Ning Wang, Rong Cheng, Yuan Hu</i>	
Pulse Interference Identification and Suppression for OFDM Signal	205
<i>Wei Wei, Tao Peng, Li Ye</i>	
Design of Synaptic Neuronal Circuit Based on Memristors.....	215
<i>Lin Ma, Yi Tong, Lin He</i>	
Research on Real Time Simulation Modeling Method of Large Scale MMC Electromagnetic Transient.....	221
<i>Lei Wang, Hongjun Zhang, Hui Hu, Liping Hao, Wei Xu</i>	
Remote Monitoring System Design of Power Substation Based on GPRS	234
<i>Yicheng Xiong, Qian Liu, Maojun Deng, Zhilei Niu</i>	

Research on Secondary Cable Identification Based on the Principle of Electromagnetic Induction.....	242
<i>Li Zhu Bao, Jia Yan Yu, Yu Wu, Hao Wu, Zhi Jun Tang, Jun Cheng Wang</i>	
NB-IoT Based Method for Monitoring the Tilt Status of Transmission Towers.....	249
<i>Yan Zheng, Yanfeng Wu, Jianchuan Gao, Shu Cui</i>	
Design and Characteristics of CMOS Inverter Based on Multisim and Cadence.....	255
<i>Haoran Xu, Jianghua Ding, Jian Dang</i>	
Wireless Power Transfer System Based on Frequency and Impedance Matching Hybrid Adjustment Against System Detuning	263
<i>Zhengnan Yuan, Pengcheng Fu, Guangshuai Lu, Pengfei Cao</i>	
Research and Classification of Wireless Power Transfer with Relative Application.....	269
<i>Muchen Qiu</i>	
Compressed Air Energy Storage and Future Development	276
<i>Jingyue Guo, Ruiman Ma, Huiyan Zou</i>	
Characteristics and Applications of Superconducting Magnetic Energy Storage.....	283
<i>Yuyao Huang, Yi Ru, Yilan Shen, Zhirui Zeng</i>	
Simulation Experiment on Energy Tower Coupled with Buried Pipe System of Ground-Source Heat Pump for Cross-Season Heat Storage.....	293
<i>Jianhui Wang, Ziqiang Liu, Yingkai Liang, Guohui Peng, Weiyu Wang, Wei Liu</i>	
Application of Digital Twin Technology in Energy and Power Industry.....	301
<i>Xueqing Liang, Shuming Du, Xiaofan Zhao, Chao Liu</i>	
Hierarchical Control Strategy for Microgrid Based on Finite-Time Consensus Algorithm	307
<i>Binfeng Tang, Ying Huang</i>	
A Novel Control Method of Low-Voltage-Ride-Through Technique for Asymmetrical Hybrid Energy Storage System.....	314
<i>Xiaomeng LI, Ze Gao, Zhen'an Zhang, Yufei Rao</i>	
Study on Control Strategy of Output Stability of Wind-Solar Reservoir Thermal System	321
<i>Shengshan Li</i>	
A Smart Grid Planning Method with Coal-To-Electricity Based on Multifactor Adaptability.....	330
<i>Jiakun An, Shuqiang Yang, Tao Wang, Chungaung He, Hongjie Jia, Yunfei Mu, Xiaohong Dong, Yang Zhao, Xiaolin Tan, Wei Guo</i>	
Smart Grid Oriented Internet of Things Technology and Application Analysis	341
<i>Wenting Zhou, Jingfeng Xiao</i>	
Transient Overvoltage Characteristics in Submarine Cables of Multi-Terminal Flexible HVDC Transmission System	346
<i>Man Feng, Tao Li, Jinjuan Liu</i>	
Research on Data Acquisition Technology of Distribution Automation Based on Internet of Things Communication Protocol.....	352
<i>HuiChao Wu, MingYi He, HaiZeng Wei</i>	
Research on Multi-Point Hopping Communication System in Power Network Based on Information Fusion Model.....	361
<i>Lifeng Yu, Kaibo Hu, Jiachen Lv, Zhiling Xia</i>	

Design of Distributed Timing Task Scheduling System for Smart Grid.....	371
<i>WenSheng Tang, JinZhi Wang, Tao Fan</i>	
Research on Residual Current Detection System of Substation Alternating Current Power Supply	377
<i>You Li, Chuanfu Xia, Yuan Zhuang, Baoquan Liao, Shuai Huang</i>	
Intelligent Detection Method of Abnormal State of Power Equipment Based on Infrared and Visible Image Information.....	384
<i>Tao Liu, Bo Qu, Guolong Li</i>	
Research on the Optimal Strategy of Pumped Storage Power Station to Provide Multiple Time- Scale Reserves.....	390
<i>Xiaomeng Li, Xiaopeng Yu, Ze Gao</i>	
Online Monitoring of Transmission Line Operation Based on Power Internet of Things	401
<i>Xiaohua Zhang, Wenxiang Xue, Shuyuan Wang, Yi Lu, Hui Wang</i>	
Research on the Application of Renewable Energy in DC Data Center	407
<i>Xingyu Bai</i>	
Research on the Formation and Solution of the Bullwhip Effect of Electricity Material Reserve	413
<i>Wenlong Zeng, Fei Peng, Qiaozhang Hong, Jinsheng Liu</i>	
Insulator Filth Monitoring and Situation Awareness Based on Ultraviolet Pulse and Least Square Method	418
<i>Tao Liu, Bo Qu, Guolong Li</i>	
Dynamic Data Processing Method Based on Generalized Least Square Method	424
<i>Zhaoxin Yang, Zhenghua Gu, Wenqing Zhang</i>	
Research on Intelligent Metrological Verification Technology Based on Internet of Things	430
<i>Meng Yu, Jianmin Liu, Xiaowen Li, Nana Wang, Fan Wang</i>	
Energy Storage Planning of Park Energy System Based on Multi-Dimensional Digital Twin Technology	437
<i>Tianlong Xiong, Chao Yang, Qing Cheng, Xianlong Yang, Shu Lin</i>	
Lithium Battery Loss Model and Economic Optimal Control Strategy for Secondary Frequency Regulation in Power System.....	443
<i>XiaoChi Zhang, Xu Sha, ZhiTong Zheng, Jie Gong, Yuan Li, Kai Sun</i>	
Smart Substation Network Quality Monitoring and Fault Prediction.....	450
<i>Chao Li, Qi Peng, Dehui Wang, Linglu Luo, Huanhuan Zuo</i>	
Topology Identification Method of Distribution Network Based on Branch Active Power	462
<i>Biqi Liu, Danni Wang, Yunpeng Li, Lin Qiao, Shuo Chen</i>	
An Optimization Method of Clock Synchronization for Large-Scale Regional Power Network Based on IEEE 1588.....	468
<i>Yue Zuo, Xingcai Wang, Bo Zhang</i>	
Capacity Configuration Optimization and Analysis for Multi-Energy Complementary Microgrid in Hydropower Station Considering the Renewable Energy Accommodation	473
<i>Yang Gao, Bin Liu, Jinyu He, Kai Zhang, Li Liu, Li Jin, Juguang Ren</i>	
Application of Trusted Computing Technology in Active Defense of Smart Substation	479
<i>Liandong Chen, Tao Yang, Gang Li, Xin Liu, Ning Lu, Kai Cheng, Xiaopeng Xin</i>	

Research on Key Technology of 3D Digitization for Secondary System of Power Grid Based on Model Application Analysis	486
<i>Qingquan Liu, Tiecheng Li, Qian Zang, Jiagnbo Ren, Yuhao Zhao, Xiaoguang Hao</i>	
Online Cleaning Method of Power Grid Energy Anomaly Data Based on Improved Random Forest	499
<i>Ke Chen, Hongkai Wang, Zhangchi Ying, Chengxin Zhang, Jiaqi Wang</i>	
A FPGA-Based Parallel Method of Bridge Data Compression	505
<i>Jianlong Zhang</i>	
Application of Millimeter Wave Radar in Safety Obstacle Avoidance of Crane in Electric Power Construction	513
<i>Wei He, Shenglei Hu, Wang Pan, Lijuan Zhang</i>	
Ethernet Transmission Method Based on Modified Format for Distribution Domain Protection System	520
<i>Haijiang Wu, Jinrong Chen, Feng Liao, Yonghao Li, Shaoheng Zhong, Shuaibing Wang</i>	
Short Term Wind Power Interval Prediction Based on VMD and Improved BLS	525
<i>Yang Zhao, Chuanbo Wen</i>	
Intelligent Driving Detection System Based on Unmanned Driving Background	532
<i>Hongqi Wang, Shouman Chen, Yahong Wen, Chaofan Zhou</i>	
Analysis and Design Based on the Operation Mode of Power Electronic Transformer in Smart Grid	537
<i>Runzhuo Ma</i>	
Intelligent Alarm Data Noise Reduction for Power Systems Based on Singular Value Decomposition.....	545
<i>Chen Chen, Hongren Man, Xiu Liu</i>	
Remote Acquisition of Insulator Icing Flashover Signal Based on Frequency Optimization of Ring-Shaped Intelligent Current Sensor	555
<i>Qiancheng Lv, Bing Tian, Zhong Liu, Zhiming Wang, Xu Yin, Hongdi Sun, Bofeng Luo</i>	
Research on Synchronization Mechanism of Artificial Intelli-Gence Model Based on Belief Measure and Its Application in Pumped Storage Power Station	563
<i>Jinliang Dong, Xu Zhang, Haijiang Li, Wenzhi Song, Jinglin Guo</i>	
Research on Output Power Quality Control Technology of Three-Phase Inverter	568
<i>Yinfeng Zhang, Ying Shao, Kang Lei, Kongxian Wang</i>	
Influence of Antenna Half-Power Beam Width on Equipment Under Test Volume in Radiation Disturbance Measurement	575
<i>Yi Zhou, Dong Zhang, Xiaoguang Xu, Jun Li</i>	
Thermal Analysis of Main Components in the Design of High-Power Tetrode	582
<i>Haoran Zhong, Wenbo Chen, Xueyu Gong, Honghu Wu, Puqiong Yang, Yongjie Luo</i>	
A New Hybrid Magnetic Coupler for Large Misalignment Tolerance in Inductive Power Transfer System	589
<i>Zhongxiu Hao, Pengcheng Fu, Pengfei Cao</i>	
Muti-Level Voltage Synthetic Voltage Direct Power Flow Controller	595
<i>Xinwei Cao, Youjun Zhang, Zhengzheng Sun</i>	

Effect of F Functional Modification on the Stability and Electronic Structure of Borene	602
<i>Cuicui Sun, Mengmeng Liu</i>	
Design and Analysis of CFETR CS Coil and Pretension Structure.....	606
<i>Zitong Liang, Langzhou Jin</i>	
Study on Environmental Adaptability of Metal Plate Fuel Cell	615
<i>Hailiang Wang, Junxiao Feng, Lanyun Li, Zhengkai Tu, Bo Zhou, Guanqiong Wang, Qinshu Xu, Jianping Xu, Jinghui Gao</i>	
Application of Molecular Dynamics Simulation in Self-Assembly	626
<i>Mingjia Fang</i>	
Research on the Control Mode of Homogeneous Charge Compression Ignition Combustion Working Process and Its Technical Prospect	631
<i>Sirui Chen, Yichen Deng, Zhuojun Ma, Yujing Zhang</i>	
Influence of Floating Ring Seal Working Condition Parameters on the Dynamic Characteristics of Transient Gas Film	638
<i>Lishan Xu, Weizheng Zhang, Junjie Lu, Zhu Liu</i>	
Stress Analysis of HCPB BB Under Ex-Vessel LOCA Condition	645
<i>Mengdi Dai, Xiaomo Wang</i>	
Performance and Optimization Study of R290 as Alternative Refrigerant for R22 in Low Temperature Heat Pump System	649
<i>Yun Zhang, Cichong Liu, Wanyong Li, Junye Shi, Jiangping Chen</i>	
Stability Analysis of Microgrid Inverter Off-Grid Mode Considering Nonlinear Load	660
<i>Xiaoyan Shi, Bin Wang, Shuijuan Yu</i>	
A Control Strategy for Battery/supercapacitor Hybrid Energy Storage System	670
<i>Congzhen Xie, Jigang Wang, Bing Luo, Xiaolin Li, Lei Ja</i>	
A Clock Synchronization Method in Power Dispatching Based on BeiDou Navigation System.....	679
<i>Hongbo Lian, Xingcai Wang, Shuo Zhang</i>	
Research Status of Thermal Management of Hydrogen Energy Proton Exchange Membrane Fuel Cell	685
<i>Jibao Liu, Huanyong Cui, Lei Gao, Jiangtao Wang, Meiyang Wang, Fajia Li</i>	
Experimental Study on Pore Forming Characteristics of Simulated Hydrate Broken by High Pressure Water Jet.....	692
<i>Zijian Dai, Hualin Liao, Ke Yang, Feng Sun</i>	
Recent Progress for Different Inertial Confinement Fusion Schemes: A Systematical Review	697
<i>Yihong Qian, Botao Huang</i>	
Study on Impulse and Ablation of Aluminum Irradiated by Millimeter Spot of Short Pulse Laser	710
<i>Mingyu Li, Jifei Ye, Chentao Mao, Sibo Wang, Chenghao Yu</i>	
Numerical Simulation of the Effect of Different NaCl Concentration on Boiler Flame Combustion Process.....	718
<i>Zhihai Cheng, Jiahao Wang, Xinhai Han</i>	

Application of Step Motor Servo Control Technology in Integrated Thermal Management of Advanced Fighter System.....	724
<i>Mingliang Hu, Erjun Yu, Wen Yan</i>	
Experimental Analysis on Mechanical Properties of Aluminum Conductor Steel-Reinforced for Transmission Line	735
<i>Xing Li, Jian Zhang, Haochen Wang, Chuanbin Liu, Yuhui Liu, Chenrui Guo</i>	
Effect of Rapid Thermal Shock Cycle on the Thermomechanical Reliability of 20Sn-80Pb Solder Bumps.....	745
<i>Shiqi Chen, Guisheng Gan, Qianzhu Xu, Zhaoqi Jiang, Tian Huang, Cong Liu, Peng Ma</i>	
Analysis and Prevention of Boiler Fire-Extinguishing Caused By the Thermal DCS Fault.....	754
<i>Mingliang Zhao, Shuai Guo, Zhiyu Song, Xiu Liu, Ping Guo</i>	
Research and Design of X-Band Low Noise Amplifier Based on CMOS Process.....	758
<i>Chao Ma, Hongjiang Wu, Xudong Lu, Haitao Sun</i>	
Numerical Simulation Research on Inter-Electrode Capacitance of High-Power Electronic Tetrode	764
<i>Yongjie Luo, Puqiong Yang, Honghu Wu, Wenbo Chen, Haoran Zhong</i>	

Author Index