2019 IEEE/IAS 55th Industrial and Commercial Power Systems Technical Conference (I&CPS 2019)

Calgary, Alberta, Canada 5 – 8 May 2019



IEEE Catalog Number: ISBN:

CFP19CPS-POD 978-1-5386-7552-6

Copyright \odot 2019 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:
 CFP19CPS-POD

 ISBN (Print-On-Demand):
 978-1-5386-7552-6

 ISBN (Online):
 978-1-5386-7551-9

ISSN: 2158-4893

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

Integrated Control of Renewable Energy and Fault Restoration for Distribution Systems
Multi-Objective Coordinated Energy Dispatch and Voyage Scheduling for a Multi-Energy Cruising Ship
Li Zhengmao, Xu Yan, Fang Sidun, and Wang Yu
Joint Generation and Demand-Side Management for Shipboard Carbon Capture and Storage System
Sidun Fang, Yan Xu, and Zhengmao Li
Probability-Interval Based Optimal Planning of Integrated Energy System with Uncertain Wind Power
Zhe Li, Chengfu Wang, Ming Yang, Wenli Zhu, and Ying Ding
The Design of a Holistic IoT-Based Monitoring System for a Wind Turbine
A Dynamic Weighted Aggregation Equivalent Modeling Approach for the DFIG Wind Farm Considering the Weibull Distribution
A Multi-Stage Dynamic Equivalent Modeling of a Wind Farm for the Smart Grid Development 49 Yuhao Zhou, Long Zhao, Ting-Yen Hsieh, and Wei-Jen Lee
Rapid Method for Generation Prioritization during System Restoration with Renewable Resources
Flexible Demand Resource Pricing Scheme: A Stochastic Benefit-Sharing Approach
UPS Node Based Workload Management for Data Centers Considering Flexible Service Requirements
Optimal Scheduling of AC/DC Comprehensive Energy Network via Risk Embedded Two-Stage Stochastic Optimization
Yuanzheng Li, Jiaming Yin, Tianyang Zhao, Yun Liu, and Fanrong Wei
Day-Ahead Market Optimal Bidding Strategy and Quantitative Compensation Mechanism Design for Load Aggregator Engaging Demand Response
Stochastic Multi-Objective Economic/Emission Energy Management of a Microgrid in Presence of Combined Heat and Power Systems
Two-Stages Bidding Strategies for Residential Microgrids Based Peer-to-Peer Energy Trading 110 Zhenyuan Zhang, Haoyue Tang, Qi Huang, and Wei-Jen Lee

Estimating Frequency Changes Due to Smart Grid Functions	119
Field Verification of an Autonomous Anti-Islanding Scheme of a Microturbine Inverter-Based Generator	129
Alexandre B. Nassif, Ricardo Torquato, Humud Said, and Daniel Lang	
Harmonics and Interharmonics of Top and Mudpump Variable Frequency Drives in Drilling Rigs Alexandre B. Nassif, Humud Said, and Daniel Lang	134
Electrical Safety of Resonant Grounding	140
Grid-Connected Wind Power Plants: A Survey on the Integration Requirements in Modern Grid Codes	145
Yuan-Kang Wu, Shih-Ming Chang, and Paras Mandal	
Electrical Safety of Academic Laboratories	154
Distributed Event-Triggered Control for Islanded Microgrids: Cyber-Physical Design and	161
Implementation	101
Solar Power Ramp Event Forewarning with Limited Historical Observations	170
Cybersecure Distributed Voltage Control of AC Microgrids	178
Continuous Availability Lighting Systems: The Led Solution by Design	184
Risk Mitigation Strategies for Emergency Power Upgrades in Critical Facilities	190
Feasibility Analysis of Different Energy Storage Systems for Solar Road Lighting Systems	196
Methodology for Quantifying the Economic Impact of Cyberattacks on Bulk Electric Systems	206
Programmable Logic Controller Based Automatic Voltage and Frequency Control of MicroGrid: To Study Load Characteristics of MicroGrid	211
Applying Reactive Power Compensators to Large Wind Farms to Improve the Stability of Isolated Power Systems	216
Analysis of Historical Transformer Failure and Maintenance Data for Facility Reliability	224

DC Microgrid Load Shedding Schemes	232
Hybrid AC/DC Microgrid Configurations for a Net-Zero Energy Community	239
Power Grid Optimal Topology Control Considering Correlations of System Uncertainties	246
Determination of Load Characteristics for Electrical Load Analysis in Shipboard Microgrids	253
Management and Maintenance of Electrical Equipment in Industrial Facilities	262
Design of an Industrial IoT-Based Monitoring System for Power Substations	268
An Optimized Frequency Scanning Tool for Sub-Synchronous Interaction Analysis of Non-Linear Devices	274
Comprehensive Benchmark System for Load Management Applications using Morphological-Based Load Profile Clustering	281
Optimal Demand Response in a Building by Battery and HVAC Scheduling using Model Predictive Control	289
Effect of Electrode Geometry on Arc Flash Protection Boundary	295
State-of-the-Art Methods for Detecting and Identifying Arcing Current Faults	303
Frequency-Selective Grounding for 3¢ Transformers	316
Solid-State Transformers for Distribution Systems: Technology, Performance, and Challenges 3 S. A. Saleh, C. Richard, X. F. St. Onge, K. McDonald, E. Ozkop, L. Chang, and B. Alsayid	326
Series Faults in Electrical Cords and Extension Cords	341
Solar PV Power Plant Underground Cable Sizing Case Study	347
Automatic Load Shedding Protection at a Coal-Chemical Plant	354

Dynamic Study and Analysis of Synchronous Generator under Sudden Short Circuit and Load Rejection Tests	. 363
Duclair Tiomo, Emmanuel Ymele Kenfack, and René Wamkeue	
Analysis of Lightning Transients in a Commercial Building using the PEEC Method	. 368
A Pilot Protection Scheme for MMC-HVDC Transmission Lines Based on Filtered Differential Current	. 374
Discrete Wavelet Transform for Improving the Accuracy of an Unbalance Current Protection Relay Due to Transient Fault and Inrush Current Signals	. 382
Novel Over-Current Protection (OCP) Methodology Applied for Flyback Converters to Improve Accuracy of OCP of Industrial Productions	. 393
Effect of Prime Mover's Characteristics on the Survivability of a Synchronous Generator during Transient Overload Conditions	. 400
Ferroresonance Causing Sustained High Voltage at a De-Energized 138 kV Bus: A Case Study Yunfei Wang, Xiaodong Liang, Iraj Rahimi Pordanjani, Ryan Cui, Ali Jafari, and Colin Clark	. 407
Effect of Historical Trends, Equipment Age, and Maintenance on Circuit Breaker Failure Rates C. C. Thompson and C. I. Barriga	. 416
Evaluation of a Unique Transient Hardened Transformer Designed to Withstand Primary Switching Transients: Simulation, Lab Tests and Analysis	. 426
High Impedance Fault Detection and Isolation in DC Microgrids	. 435
Enhancing Reliability of Power Systems through <i>IIoT</i> – Survey and Proposal	. 443