

2021 IEEE Power and Energy Conference at Illinois (PECI 2021)

**Urbana, Illinois, USA
1 – 2 April 2021**



**IEEE Catalog Number: CFP2112J-POD
ISBN: 978-1-7281-8649-8**

**Copyright © 2021 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:	CFP2112J-POD
ISBN (Print-On-Demand):	978-1-7281-8649-8
ISBN (Online):	978-1-7281-8648-1

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

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

A UNIFIED METHOD FOR FAULT LOCATION IN MULTI-VOLTAGE MICROGRIDS	1
<i>Ahmed M. Hanafy; Karim H. Youssef; Nabil H. Abbasy</i>	
A POWER REROUTING STRATEGY IN ELECTRICAL MICROGRIDS UNDER POWER ELECTRONICS FAULTS	8
<i>Abdallah Nasser Eldeen; Ali M. Bazzi</i>	
AN INTEGRATED MARKET-OPERATION OPTIMIZATION FRAMEWORK FOR EV-RENEWABLE ENERGY COORDINATION IN DISTRIBUTION SYSTEMS	12
<i>M. Ghofrani; C. Hsu; M. Majidi</i>	
A FILTER-MODULATED DROOP CONTROL FOR HYBRID ENERGY STORAGE SYSTEM IN DC MICROGRID	18
<i>Kaige Zhang; Quanming Luo</i>	
GAN BASED HIGH FREQUENCY POWER ELECTRONIC INTERFACES: CHALLENGES, OPPORTUNITIES, AND RESEARCH ROADMAP	23
<i>Matthew Baker; Sarthak Jain; Mohammad B. Shadmand</i>	
A MODULAR MULTI-PHASE ACTIVELY CONTROLLED RESISTIVE LOAD BANK WITH ZERO-CURRENT SWITCHING CAPABILITY AND INTEGRATED SNUBBERS	30
<i>Amanda Jackson; Nathan Pallo; Roderick S. Bayliss; Robert C. N. Pilawa-Podgurski</i>	
MULTIRATE SIMULATION OF WIDE-BANDGAP-BASED ELECTRIC DRIVE SYSTEMS	36
<i>Olatunji Fulani; Thomas Craddock; Oleg Wasynczuk</i>	
GATE DRIVE OPTIMIZATION FRAMEWORK WITH ELECTRO-THERMAL MODEL OF GAN HEMTS FOR HIGH-FREQUENCY DC-DC CONVERTERS	44
<i>Matthew Baker; Amin Y. Fard; Sarthak Jain; Mohammad B. Shadmand</i>	
A REGION-BASED FRAMEWORK FOR CYBERATTACKS LEADING TO UNDERVOLTAGE IN SMART DISTRIBUTION SYSTEMS	50
<i>Ehsan Naderi; Samaneh Pazouki; Arash Asrari</i>	
FALSE DATA DETECTION IN POWER SYSTEM UNDER STATE VARIABLES' CYBER ATTACKS USING INFORMATION THEORY	57
<i>Ali Parizad; Constantine Hatzjadoniu</i>	
RAIL TRANSIT REGENERATIVE BRAKING ENERGY RECOVERY OPTIMIZATION TO PROVIDE GRID SERVICES	65
<i>Samuel Talkington; Santiago Grijalva</i>	
TECHNIQUES FOR MAINTAINING SITUATIONAL AWARENESS DURING LARGE-SCALE ELECTRIC GRID SIMULATIONS	72
<i>Thomas J. Overbye; Komal S. Shetye; Jess Wert; Wei Trinh; Adam Birchfield; Tracy Rolstad; James D. Weber</i>	
SIMULATION OF A SINGLE PHASE GRID-TIED PV SYSTEM UNDER NET-METERING SCHEME	80
<i>Anshu Prakash Murdan; Adarsh Kumar Jeetun</i>	
RESILIENT HYBRID ENERGY SYSTEM (RHES) FOR POWERING CELLULAR BASE TRANSCEIVER STATION DURING NATURAL DISASTERS	86
<i>Md Rakib-Ur Rahman; Payam Niknejad; M. R. Barzegaran</i>	
MOTIVATING THE USE OF DYNAMIC LINE RATINGS TO MITIGATE THE RISK OF WILDFIRE IGNITION	91
<i>Shubham Tandon; Santiago Grijalva; Daniel K. Molzahn</i>	
TOU TARIFF SYSTEM USING DATA FROM SMART METERS	98
<i>Leila Chebbo; Ali M. Bazzi; Ali Yassine; Sami H. Karaki; Nesreene Ghaddar</i>	
WAVELET-EXTREME LEARNING I-MACHINE FOR NEW ZEALAND SMART METER DATA	102
<i>Abhinav Rakesh Chopra; Nirmal Kumar Nair</i>	
APPLYING DIFFERENT WIDE-AREA RESPONSE-BASED CONTROLS TO DIFFERENT CONTINGENCIES IN POWER SYSTEMS	110
<i>Shahrzad Iranmanesh; Steven M. Rovnyak</i>	
LEVERAGING ADDITIONAL SENSORS FOR PHASE IDENTIFICATION IN SYSTEMS WITH VOLTAGE REGULATORS	115
<i>Logan Blakely; Matthew J. Reno; C. Birk Jones; Alvaro Furlani-Bastos; David Nordy</i>	

ASSESSING THE ACCURACY OF BALANCED POWER SYSTEM MODELS IN THE PRESENCE OF VOLTAGE UNBALANCE	123
<i>Abigail Ivemeyer; Matthew Bossart; Rick Wallace Kenyon; Amirhossein Sajadi; Bri-Mathias Hodge; Daniel K. Molzahn</i>	
INTRODUCING A CONCISE FORMULATION OF THE JACOBIAN MATRIX FOR NEWTON-RAPHSON POWER FLOW SOLUTION IN THE ENGINEERING CURRICULUM	130
<i>Elijah Conlin; Niraj Dahal; Steven M. Rovnyak; James L. Rovnyak</i>	
PRELIMINARY ANALYSIS OF NETWORK FRAGILITY AND RESILIENCE IN LARGE ELECTRIC GRIDS	138
<i>Adam B. Birchfield; Jayant Patil; Roger Paredes; Leonardo Dueñas-Osorio</i>	
REACTIVE POWER PLANNING USING SECURITY-CONSTRAINED AC OPTIMAL POWER FLOW AND SENSITIVITY ANALYSES	144
<i>Mohammad Alkhrajah; Maad Alowaijfer; Daniel K. Molzahn; Xiawen Li; Micah Till</i>	
COMPARISON OF REAL AND SYNTHETIC NETWORK MODELS OF THE WESTERN UNITED STATES WITH RESPECT TO NEW REALISM MEASURES	150
<i>Sogol Babaeinejadsarookolae; Jonathan Snodgrass; Sowmya Acharya; Scott Greene; Bernard Lesieutre; Christopher L. Demarco</i>	
EV CHARGING STATION ALLOCATION IN A DISTRIBUTION NETWORK BASED ON POWER QUALITY	158
<i>A. N. Archana; T. Rajeev</i>	
DESIGN AND PROTOTYPE OF A HIGH POWER DENSITY SLOTLESS PMSM FOR DIRECT DRIVE AIRCRAFT PROPULSION	164
<i>Dongsu Lee; Thanatheepan Balachandran; Noah Salk; Jonathon Schuh; Andy Yoon; Peter Xiao; Yangxue Yu; Shannon Lin; Paige Powell; Kiruba K. Haran</i>	
A DOUBLE CURRENT EXCITATION CONTROL METHOD FOR SUPPRESSING TORQUE RIPPLE OF THE NOVEL SRM	170
<i>Da Ren; Dianxue Wang; Hongkui Zhang; Wansong Zhang; Aimin Liu</i>	
IDENTIFICATION AND CORRECTION OF ERRORS IN PAIRING AMI METERS AND TRANSFORMERS	176
<i>Logan Blakely; Matthew J. Reno</i>	
PERFORMANCE ANALYSIS OF SHORT AND MID-TERM WIND POWER PREDICTION USING ARIMA AND HYBRID MODELS	184
<i>Ashoke Kumar Biswas; Sina Ibne Ahmed; Temitope Bankefa; Prakash Ranganathan; Hossein Salehfar</i>	
STATISTICS FOR BUILDING SYNTHETIC POWER SYSTEM CYBER MODELS	191
<i>Morayo Soetan; Zeyo Mao; Katherine Davis</i>	
DISTANCE PROTECTION OF TRANSMISSION LINES CONNECTED TO TYPE-3 WIND FARMS	196
<i>Pallav Kumar Bera; Vajendra Kumar; Can Isik</i>	
CONSIDERATIONS FOR INTERCONNECTION OF LARGE POWER GRID NETWORKS	203
<i>Komal S. Shetye; Thomas J. Overbye; Hanyue Li; Julian Thekkemathiotte; Harvey Scribner</i>	
ALGORITHMS FOR DETECTING NEARBY LOSS OF GENERATION EVENTS FOR DECENTRALIZED CONTROLS	211
<i>Niraj Dahal; Steven M. Rovnyak</i>	
PROACTIVE INTRUSION DETECTION AND MITIGATION SYSTEM: CASE STUDY ON PACKET REPLAY ATTACKS IN DISTRIBUTED ENERGY RESOURCE SYSTEMS	218
<i>Shamina Hossain-McKenzie; Adrian Chavez; Nicholas Jacobs; C. Birk Jones; Adam Summers; Brian Wright</i>	
TOPOLOGY IDENTIFICATION OF POWER DISTRIBUTION SYSTEMS USING TIME SERIES OF VOLTAGE MEASUREMENTS	224
<i>Cody Francis; Vittal Rao; Rodrigo D. Trevizan; Matthew J. Reno</i>	
NEXT-GENERATION RELAY VOTING SCHEME DESIGN LEVERAGING CONSENSUS ALGORITHMS	231
<i>Nicholas Jacobs; Adam Summers; Shamina Hossain-McKenzie; Daniel Calzada; Hanyue Li; Zeyu Mao; Chris Goes; Katherine Davis; Komal Shetye</i>	
UNSUPERVISED ONLINE ANOMALY DETECTION TO IDENTIFY CYBER-ATTACKS ON INTERNET CONNECTED PHOTOVOLTAIC SYSTEM INVERTERS	237
<i>C. Birk Jones; Adrian Chavez; Shamina Hossain-McKenzie; Nicholas Jacobs; Adam Summers; Brian Wright</i>	
Author Index	