2023 IEEE Texas Power and Energy Conference (TPEC 2023)

College Station, Texas, USA 13-14 February 2023



IEEE Catalog Number: CFP23J90-POD ISBN: 978-1-6654-9072-6

Copyright © 2023 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:
 CFP23J90-POD

 ISBN (Print-On-Demand):
 978-1-6654-9072-6

 ISBN (Online):
 978-1-6654-9071-9

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

Cyber-Physical Power System Layers: Classification, Characterization, and Interactions Michael Abdelmalak, Narayan Bhusal, Mukesh Gautam and Mohammed Benidris	1
Energy Efficiency and Economic Analysis For School Buildings in Jordan	7
Optimal Coordination of Directional Overcurrent Relays using Numerical Iterative Method	13
An Analysis of DMS Power Flow Performance	19
SOC-aware Primary Frequency Control of Low-inertia Power Systems with Battery Energy Storage	24
Zakaria Afshar, Hamid Rahmanei, Indra Bhogaraju and Mehdi Farasat	
Robust Switching Control of DC-DC Boost Converter for EV Charging Stations	30
Distributed Energy Resources: A Review, Modeling, and Cyber-Physical Potential of Solar and Wind Generation	36
Co-optimizing Behind-The-Meter Resources under Net Metering	42
Improved NaS Battery State of Charge Estimation by Means of Temporal Fusion Transformer	48
Energy Theft Detection Using the Wasserstein Distance on Residuals Emran Altamimi, Abdulaziz Al-Ali, Qutaibah Malluhi and Abdulla Al-Ali	54
Open-Platform Sensor Node for Agrivoltaics	60
Quantum-Enhanced DC Optimal Power Flow	66
Reinforcement Learning for Intentional Islanding in Resilient Power Transmission Systems Sobhan Badakhshan, Roshni Jacob, Binghui Li and Jie Zhang	72
Designing a Solar/Wind Hybrid Power System for Charging Electric Vehicles	78
Hâ Robust Control of a Grid-Connected Inverter	83
Categorical Databases for Mathematical Formalization of AC Optimal Power Flow	88

Optimal Placement of Electric Vehicle Charging Stations: A Case Study in Jordan 93 Ahmad Bashaireh, Duaa Obeidat, Abdullah Almehizia and Laith Shalalfeh
A Novel Hybrid MPPT Technique for PSC using Weighted Average Approach
Identifying Factors Contributing to Poor Performance of Near-Real-Time Power Flow 105 Gokhan Cakir, Mesut Baran, Valentina Cecchi, Badrul Chowdhury, Ken Crawford, Oluwatimilehin Adeosun, Mariann Thomas and Cara Decoste Chacko
Techno-Economical Assessment of MVAC and MVDC Collector Systems for Offshore Wind Farms
Design of a Three-Phase Inductive Power Transfer Coil with Interphase Mutual Inductance Reduction
A Common Automation Framework for Cyber-Physical Power System Studies
A New Index based on Power Splitting Indices for Predicting Proper Time of Controlled Islanding
Hamzeh Davarikia, Faycal Znidi, Masoud Barati and Heena Rathore A Novel technique for Power sharing and Synchronization of Distributed Generators in an Islanded AC Microgrid
Techno-economic Feasibility of A Trust and Grid-aware Coordination Scheme
Top-Down Control Design Strategy for Electric Power Grid EMP (E3) Protection
A Tutorial on Identification of Subsynchronous Mode Frequencies in Power Transmission Systems using Parametric and Non-parametric Methods
Bi-Level Transactive Coordination of Energy Management Systems in a Community 158 Farshad Etedadi, Sousso Kelouwani, François Laurencelle, Nilson Henao, Kodjo Agbossou and Fatima Amara
Novel Functional Community Detection in Networked Smart Grid Systems-Based Improved Louvain Algorithm
Coordinated Security Measures for Industrial IoT Against Eavesdropping
Cooperative Transmission Strategy for Industrial IoT Against Interference Attacks 175 Abdallah Farraj

A Bayesian Measure For Predicting Outages in Power Distribution Systems	181
Data Trading in Smart Grids: Future Research Directions	187
Inter-area Oscillations caused by Cyber Attacks and their Countermeasures	193
Automatic Generation Control Under Single Time-Delay Attack	199
Soft-Trust Based Architecture for NextG IIoT/IoET Security, Authentication and Authorization	205
Coalitional Game Theory in Power Systems: Applications, Challenges, and Future Directions	211
Capacitor Optimization for EV and Renewable DG Integration	217
Properties of Geomagnetic Disturbances and How they Might Effect Power Systems: An Analysis of Past Geomagnetic Disturbances	223
Polynomial Fitting and Analysis of Geomagnetic Disturbance Impacts	229
P2P Energy Exchanges for Lowering the Hydrogen Production Cost Using Realistic Electrolyzer Model	235
Voltage Balancing Using Continuously Variable Series Reactor	240
Phase Unbalance Impacts on Black-Start Service Restoration of Distribution Networks 2 Adel Heidari-Akhijahani and Karen L. Butler-Purry	245
Multi-Agent Energy Management Strategy for Multi-Microgrids Using Reinforcement Learning	251
Clustering of electricity price: an application to the Italian electricity market	257
Large-signal Stability Analysis of Inverter-based Microgrids via Sum of Squares Technique 2 Hadis Hosseinpour, Mohammad Mansourlakouraj, Mohammed Ben-Idris and Hanif Livani	263
On the Lifetime Emissions of Conventional, Hybrid and Electric Vehicles	269

Undergraduate Research on Adding Relay Models and Generator Capability Curves to Synthetic Electric Grids	75
SST-Based Marine Shipboard System to Achieve Improved Performance & Easy	81
Economic Analysis of Ice Thermal Energy Storage for a Chiller Plant Facility in Mediterranean Climate	87
Evaluating a real-time model decoupling compensation approach for developing scalable, high-fidelity microgrid models	93
Spatiotemporal Impact of Electric Vehicles in Mitigating Damages from Destructive Storms	99
Impact Analysis of DoS attacks on Different MAS Control architectures in Cyber-Physical Testbed	05
Defense-in-Depth Framework for Power Transmission System against Cyber-Induced Substation Outages	11
A study on a new sensorless control method for an induction motor using a non-linear speed observer and hybrid V/f control method	17
Analyze the Effects of COVID-19 on Energy Storage Systems: A Techno-Economic Approach	22
A Genetic Algorithm-Based Power System Volt/Var Optimization Applied to Transmission Studies	28
A Peer-to-Peer Reputation-based Mechanism to Enhance Microgrids' Power Exchange Quality	32
Robust System Reconfiguration in the Presence of Uncertain Loads and Renewable Generation	38
Reconfiguration of Power Distribution Systems in the Presence of Voltage-Dependent Loads	44
An Efficient Model for Optimal Allocation of Renewable Energy Sources in Distribution Networks with Variable Loads	50

Role of Consumption Pattern in Optimal Allocation of Distributed Generators in Electric Power and Energy Systems
Meisam Mahdavi, Francisco Jurado, Konrad Schmitt, Manohar Chamana and Stephen Bayne
Volt/VAR Support and Demand Response Co-Optimization in Distribution Systems with Adaptive Droop Control of Inverters
Short-Term Dynamic Voltage Stability Status Estimation Using Multilayer Neural Networks
Mohamed Massaoudi, Shady S. Refaat, Ali Ghryeb and Haitham Abu-Rub
Bidirectional Gated Recurrent Unit Based-Grey Wolf Optimizer for Interval Prediction of Voltage Margin Stability Index in Power Systems
Measuring and Analyzing Effects of HEMP Simulation on Synthetic Power Grids 38 Carson May, Arthur Barnes, Jose Tabarez, Adam Mate, Eric Nelson and Ross Guttromson
Robust control strategy for a high-power off-board EV charger connected to grid-tied critical loads
Majid Mehrasa, Daisy Flora Selvaraj and Hossein Salehfar
Smart bidirectional charging for frequency support of a low-inertia vehicle-to-grid system in presence of energy storage systems
Necessity of Joint Resource and Transmission Expansion Planning in Presence of System and Policy Uncertainties
Angular Stability Analysis of Parallel Connected Grid-following PV Inverters
Dynamic Transmission and Distribution Analysis for Asymmetrical Networks in the Presence of Distribution-Connected DER Units
Impact of Grounding Conditions on Power Electronic Interfaces in a DC Microgrid 41 Mohadeseh Naghizadeh, Ebrahim Farjah, Teymoor Ghanbari and Eduard Muljadi
Social Network Power System Alarm Application
Preliminary Analysis of the Potential Impact of Electric Vehicle Fleets on Large Power System Inertia Floor
Design and Development of Hybrid Power Conditioning System for Microgrid Application 43 Brijesh P, Arya G Lal, Anoop P, Vishnu Syam and Aby Joseph

OUC Gardenia Grid Integration Laboratory: Overview and implementation
Reliability of Electric Vehicle Integrated Systems under Battery-Exchange and Plug-in Mode
Deepak Pandit and Nga Nguyen
MV Propulsion Drive using Solid State Transformer (SST) Technology
Improved Phasor Characterization of Power System Transients Using Adaptive Spectral Adjustment
A Constant Frequency Based Torque Ripple Free Three level NPC Brushless Motor Drive 463 Akhil Raj R, Shreelakshmi M P and Saly George
Sizing and efficiency models for the conceptual design of electric powertrains
Solid State Condenser (SSC) - A New FACTS Device for Grid Inertia Support
A Method for Measuring the Power System Operation Modes in a Heavy Renewable Power Penetration
Deep Reinforcement Learning Framework for Short-Term Voltage Stability Improvement . 487 Muhammad Sarwar, Amarsagar Reddy Ramapuram Matavalam and Venkataramana Ajjarapu
Application of Surge Arrester in Limiting Voltage Stress at DC Breaker
Impact of Current Limiting Reactor on Bulk Power Network – A Case Study
Microgrid Optimal Energy Scheduling with Risk Analysis
Impact of Harmonics of Distributed Generators on the Harmonic Profiling of Distribution Networks
Review of Isolated DC-DC Converters for Applications in Data Center Power Delivery516 Rahman Syed, Halah Shehada and Irfan Ahmad Khan
Rational Approximation of a Three-Phase Photovoltaic System via TD-VF and NL-VF522 Jose E. Tamayo, Abner Ramirez and Juan M. Ramirez
Wind Resource Drought Identification Methodology for Improved Electric Grid Resiliency 527 Jessica Wert, Farnaz Safdarian, Alex Gonce, Thomas Chen, Dalton Cyr and Thomas Overbye

Undergraduate Research in Transmission Tower Physical Design for Synthetic Electric Grid Cases
A High-Frequency AC-Linked Active Multicell Balancing Topology for Series-Connected Batteries
Resilience-Enabling Load Flexibility and Resource Adequacy Investment in Microgrids 54 Samuel Yankson, S.M. Safayet Ullah, Shayan Ebrahimi, Farzad Ferdowsi, Kenneth A Ritter and Terrence L Chambers
Synthetic Geomagnetic Field Data Creation for Geomagnetic Disturbance Studies using Time-series Generative Adversarial Networks
Quality Analysis of Battery Degradation Models with Real Battery Aging Experiment Data