2017 IEEE PES PowerAfrica

Accra, Ghana 27-30 June 2017



IEEE Catalog Number: CFP17PES-POD ISBN: 978-1-5090-4747-5

Copyright © 2017 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:
 CFP17PES-POD

 ISBN (Print-On-Demand):
 978-1-5090-4747-5

 ISBN (Online):
 978-1-5090-4746-8

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

FAULT FEATURE EXTRACTION AND CLASSIFICATION METHOD USING DWT AND SVM IN A POWER DISTRIBUTION NETWORK	1
Xolani Magagula, Yskander Hamam, Adedayo Yusuff and Jacobus Jordaan	
Asynchronous Interconnection of the Proposed East Africa Power Pool (EAPP)	7
Effects of Renewable Energy on Frequency Stability: A Proposed Case Study of the Kenyan Grid	12
Moses Peter Musau, Terry Lumbasi Chepkania, Abungu Nicodemus Odero and Wekesa Wabuge Cyrus	
	16
Nnachi Gideon Ude, Aloys Oriedi Akumu, Dan Valentin Nicolae and Coneth Richards	
On-line Determination of Transient Stability Status Using MLPNN Emmanuel Frimpong, Philip Okyere and Johnson Asumadu	23
A CLOUD-BASED OPENFLOW FIREWALL FOR MITIGATION AGAINST DDoS ATTACKS IN SMART GRID AMI NETWORKS	28
Remigius Diovu and John Agee	
Providing Electricity to Remote Communities Using Solar PV Systems with DC Powered Devices	34
Aliyu Hassan and Yskandar Hamam	
TRANSMISSION SYSTEM RELIABILITY MODELING AND ASSESSMENT FOR NIGERIAN ELECTRIC GRID	40
Adegoke Melodi, James Momoh and Olawumi Oyinlola	
Effect of Improved Electricity Product Development on the Business Performance of a Public Electricity Transmission Company	46
Artificial Neural Network Technique for Transmission Line Protection on Nigerian Power System	52
Modeling and Simulation of a Gearless Variable Speed Wind Turbine System with PMSG Ghaeth Fandi, Famous O. Igbinovia, Ibrahim Ahmad, Jan Svec and Zdenek Muller	59
Control of a Direct-driven Permanent Magnet Synchronous Generator-based Wind Furbine to Achieve Maximum Wind-Power Extraction	65
Modeling and Control of a Doubly Fed Induction Generator Using a Back-to-Back	75
Converters in Grid Tied Wind Power System	75

Development of an Effective Restoration Scheme for a Ugandan Power System Using Hydro, Thermal and Co-Generation
Daniel Mabuggwe, Tlhoriso Matlokotsi and Sunetra Chowdhury
Technical Performance and Cost Analysis of a 600kV HVDC Link on South Africa's EHV Network
$\label{lifecycle} \mbox{Lifecycle Cost Optimization of Electric Utility Transmission and Distribution Assets.} 95 \\ Ashwin \ Maharaj \ and \ Innocent \ Davidson$
RELIABILITY ANALYSIS OF POWER SYSTEM NETWORK: A CASE STUDY OF TRANSMISSION COMPANY OF NIGERIA, BENIN CITY
Investigating the Charging Time of Supercapacitors Using Stern's Model
Dynamic Analysis of Southern Africa Power Pool (SAPP) Network
Prediction of Biochar Yield Using Adaptive Neuro-Fuzzy Inference System With Particle Swarm Optimization
Grid Energy Storage Devices
An Improvement of Voltage Unbalance in a Low Voltage 11/0.4 kV Electrical Power Distribution Network under 3-phase Unbalance Load Condition using Dynamic Voltage Restorer
Integration of solar photovoltaic distributed generation in Nigerian power system network 132 $John\ Nweke,\ Arthur\ Ekwue\ and\ Emenike\ Ejiogu$
Emerging Considerations of Rural Electrification Infrastructure Development in Africa 138 Kelechi Eke
Diesel Engine Generators Consumption/Emission Controls by Retrofitting for Sustainable Environment
Quasi Z-source NPC Inverter for PV Application
Effect of Lamp Technologies on the Power Quality of Electrical Distribution Network 159 Ayodeji Samson Ogunjuyigbe, Temitope Raphael Ayodele, Victor Idika and Olorunfemi Ojo
Neuro-Fuzzy Based Fault Detection Identification and Location in a Distribution Network 164 Oluleke Babayomi, Peter Oluseyi, Godbless Keku and Nkemdilim Ofodile

POSSIBLE INTERCONNECTIONS FOR THE KATSINA WIND FARM USING SYNCHRONOUS COMPENSATORS (STATCOM)
A Universal Fast Battery Charging and Management Solution for Stand-alone Solar Photovoltaic Home Systems in Sub-Saharan Africa
Analysis and Estimation of Generator Settings for Frequency Response within the WAPP Interconnected Power System
Computational Method for the Charging Time of Supercapacitors
Sector Performance Monitoring in Utility-Scale Solar Farms using Data Envelopment Analysis
Transforming the West African Regional Electricity Market – Lessons and Experiences 198 Enyo Agbodo, Babatunde Adeyemo, Ashwin Maharaj and Innocent Davidson
Optimisation of the Allocation of Solar PV Generation Capacity Using Grid Support Objectives
Drivers, Barriers and a Method for Evaluating the Feasibility of Residential Rooftop Solar PV in Durban - Part 1
Drivers, Barriers and a Method for Evaluating the Feasibility of Residential Rooftop Solar PV in Durban - Part 2
Study of Renewable Energy Resources Found Within Local Municipalities - An eThekwini Electricity Case Study
Influence of Deposition of Temperature in The Fabrication of CdTe Thin Films using RF Magnetron Sputtering
An Assessment of Voltage Rise Phenomenon on Existing eThekwini Electricity Low-Voltage Distribution Network
Load Characteristics of East African Microgrids
A Conceptual Framework For A Campus Power Management System Based on Lecture Schedules

Strengthening the Ghanaian Transmission System to Accommodate Variable Renewable Energies	8
Marilyn Winifred Asmah, Johanna Myrzik, Benjamin Kwame Ahunu and Rasheed Baisie	
Integration of Solar Energy into the Zambia Power Grid Considering Ramp Rate Constraints	4
Biomass-Based Clean Energy Generation for South African Farms and Rural Community. 26 Wandile Lamula, Jeanne-Gisele Bamukunde and Sunetra Chowdhury	0
A Review of the Performance of VSC-HVDC and MTDC Systems	7
A REVIEW OF THE IMPACTS AND MITIGATION STRATEGIES OF HIGH PV PENETRATION IN LOW VOLTAGE NETWORKS	4
PV-Battery-Diesel Microgrid Design for Buildings Subject to Severe Power Outages 28 Mohammed Hijjo, Felix Felgner and Georg Frey	0
Absorption Effeciency of two Fulleren Derivative Use as Acceptors in Organic Active Layer for Photovoltaic Device Made in Ambient Atmosphere	6
Electricity Demand Scenarios for Ghana's Long Term Development Plans	1
Communication Network Modeling for Real-Time HIL Power System Protection Test Bench	5
Charles Mawutor Adrah, Zhou Liu, Øivind Kure and Hans Kristian Høidalen	
Prediction of Transient Stability Status Using Walsh-Hadamard Transform and Support Vector Machine	1
Novel nonimaging solar concentrator for portable solar systems for developing countries 30 Daria Freier, Roberto Ramirez-Iniguez, Carlos Gamio, Tahseen Jafry and Firdaus Muhammad-Sukki	7
Fault Diagnosis in an Extra-High Voltage Power Line	1
Application of a Modified Perceptron Learning Algorithm to Monitoring and Control 31 Mathews Chibuluma and Kalezhi Josephat	7
Design of a Robust Power System Controller with Constraints	2
Impact of Large Scale Grid-connected Wind Generator on the Power System Network 32 Rm Mathe and Komla Folly	8
Phasor Measurement Units Applied to Controlled Separation of Power Systems	4

Vehicle-to-Grid Technology Assisted Microgrid in Ghana: Opportunities and Challenges 341 Olorunfemi Ojo and Onai Kuseso
Energy Saving System using a PIR sensor for Classroom Monitoring
Field Survey of Smart Metering Implementation using a Simple Random Method: Case Study of New Juaben Municipality in Ghana
Smart Industry Based Energy Framework for Pakistan Energy Sector
On the Phase Voltage Monotonic Property in Unbalanced Distribution Networks
A survey of differential flatness-based control applied to renewable energy systems 371 Kanzumba Kusakana, Elijah Didam Markus and Patrick Ngancha Bonja
Optimal operation of parallel-connected diesel generators for remote electrification through energy management approach
Overview of conduit hydropower in South Africa: Status and applications
Determination of the Optimal power factor at which DG PV should be Operated. Using ECG 33 kV Sub – Transmission Network as Case Study
An Algorithm for Micro-load Management in Generation Constrained Power System396 Julius Quarshie Azasoo, Eric Kuada, Kwame Osei Boateng and Michael Opoku Agyeman
Performance Improvement of Synchronous Reluctance Motors: A Review
Imbalance Energy in Southern African Power Pool
The effect of LED lamp invasion on the Utility grid: A case study of Nigerian market 413 Anthony Uwakhonye Adoghe and Eberechukw Chinemere Owuama
Implementation of solar water heating system for a sustainable environment in sub-sahara Africa
Anthony U. Adoghe, Abel E. Airoboman and Cladius Ojo Aremu Awosope
Capacity Optimization of a Community Microgrid for Rural Electrification
Electricity Access Options Appraisal in Malawi: Dedza District Case Study
Renewable Energy Access to the Ghana National Interconnected Transmission System435 Dr. Chris Mensah-Bonsu, William Amuna, Bernard T. Modey and Linda N. H. Baah

PowerAfrica 2017 Table of Contents

The Effect of Integration of Photovoltaic Generation on South African Grid	439
Design of a cost Effective Hybrid Renewable Energy System for Coastal and Inland Rural community in Africa	. 445
N.E. Lambani, C. Buque and Sunetra Chowdhury	
A 2nd order LPF Wavelet based Control Scheme for Shunt Active Power Filter	451
Energy Efficiency Awareness and Preparedness among Students	456
INVESTIGATING THE EFFECT OF STATIC SYNCHRONOUS COMPENSATOR (STATCOM) FOR VOLTAGE ENHANCEMENT AND TRANSMISSION LOSSES MITIGATION	462
Short Term Load Forecasting Using Hybrid Adaptive Fuzzy Neural System: The Performance Evaluation	468
A Proposal for a Microgrid Service in Urban Nigeria	474
CSIR's Single Axis Tracking Solar PV Plant Performance Analysis	479
Evaluation of User Participation Capabilities in Demand Response Programs for Smart Home Applications	. 483
Optimized Network Planning of Mini-Grids for the Rural Electrification of Developing Countries	489
Performances of buried permanent magnet synchronous generator with flux concentration for the wind system	. 495
A Simulation Model to Evaluate the Potential for Tidal Energy Extraction in Nigeria Using Tidal Current Turbine	500
Development of a Modeling Framework to Forecast Power Demands in Developing Regions: Proof of Concept Using Uganda	. 506
Efficient Remote Control System using SMS and WiFi Technology for Outdoor Security Lighting Applications	512
······································	

PowerAfrica 2017 Table of Contents

A Hybrid Thermo-Electric Solar based System for Energy Efficiency in Microgrids	518
Seventy Amp Mixed Current Control Unit	523
Performance Studies of Lead Acid Batteries for Transport Vehicles	528
PREVENTION OF VOLTAGE COLLAPSE ON THE NIGERIAN 330 kV GRID NETWORK USING UNDERFREQUENCY LOAD SHEDDING SCHEME	533
Smart Distribution Management System	538
Electrical energy and mobility issues in Africa: which complementarities?	544
Taming the Total Harmonic Distortion on the 132kV Arlington Traction Station	550
DESIGN AND TESTING OF FAST TRANSFER SCHEME FOR SASOL SECUNDA Mokhoana Kganyago, Banjo Aderemi, Gs Donev and Sp Chowdhury	555
Expansion of Wind Power Technology in South Africa: Challenges and Opportunities Paxis Roque and Sp Chowdhury	560
ELECTRICITY THEFT DETECTION SYSTEM WITH RF COMMUNICATION BETWEEN DISTRIBUTION AND CUSTOMER USAGE	566
Rendani Mutepe, Stafford Osuri, Mpho Lencwe and Sp Chowdhury	
An Investigative Study on Penetration Limits of Distributed Generation on Distribution Networks	573
Desmond Ampofo, Isaac Otchere and Emmanuel Frimpong	
Powering Africa through Shared Solar Energy	577
VOLTAGE CONTROL GRID CONNECTION REQUIREMENTS FOR RENEWABLE POWER PLANTS CONNECTED TO THE ELECTRICITY TRANSMISSION	
SYSTEM IN NIGERIA	584
Adaptive Discrete Wavelet Transform Based Technique for Load Frequency Control	589
Renewable Energy Supported Microgrid in Rural Electrification of Sub-Saharan Africa Yemeserach Mekonnen and Arif Sarwat	595
Simulating Energy Management Strategies for Microgrids with Smart Meter Demand Management	600
Wind Turbine Generators: Conventional and Emerging Technologies	606

PowerAfrica 2017	Table of Contents

A Smart Energy Management System for Residential use	
Dynamic simulation comparative study of energy needs for smart positive building using concrete blockwork and clay	
Salaheddine Benkaddour and Aawatif Hayar	