

9th International Conference on Renewable Power Generation (RPG Dublin Online 2021)

IET Conference Publications 783

Online
1 - 2 March 2021

ISBN: 978-1-7138-3807-4

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.

Copyright© (2021) by the Institution of Engineering and Technology
All rights reserved.

Printed with permission by Curran Associates, Inc. (2021)

For permission requests, please contact the Institution of Engineering and Technology
at the address below.

Institution of Engineering and Technology
P. O. Box 96
Stevenage, Hertfordshire
U.K. SG1 2SD

Phone: 01-441-438-767-328-328
Fax: 01-441-438-767-328-375

www.theiet.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

<p>MAXIMIZING THE PROFITS OF BATTERY ENERGY STORAGE SYSTEMS IN THE INTEGRATED SINGLE ELECTRICITY MARKET</p> <p style="padding-left: 20px;"><i>A. A. Raouf Mohamed, D. John Morrow, R. J Best</i></p> <p>OPERATION OF BATTERY STORAGE IN HYBRID POWER PLANT IN AUSTRALIAN ELECTRICITY MARKET</p> <p style="padding-left: 20px;"><i>J. Moolman, K. Das, P. Sørensen</i></p> <p>TOWARDS IMPOSING DAYPARTED RESTRICTIONS ON TOKENISED ENERGY WITHIN PEER-TO-PEER MARKETS.....</p> <p style="padding-left: 20px;"><i>A. de Villiers, P. Cuffe</i></p> <p>BENEFITS OF INTERCONNECTION IN THE 2030 INTEGRATED SINGLE ELECTRICITY MARKET (ISEM) WITH HIGH RENEWABLE GENERATION.....</p> <p style="padding-left: 20px;"><i>S. Wang, Y. Huang, I. Vorushylo, D. McLarnon, P. MacArtain, H. Chen, N. Hewitt</i></p> <p>GRID-FORMING INVERTERS-REAL-LIFE IMPLEMENTATION EXPERIENCE AND LESSONS LEARNED</p> <p style="padding-left: 20px;"><i>S.D. Rao, S. Dutta, M. Lwin, D. Howard, R. Konopinski, S. Achilles, J. MacDowell</i></p> <p>FAULT RIDE THROUGH CAPABILITY OF GRID FORMING WIND TURBINES: A COMPARISON OF CONTROL SCHEMES.....</p> <p style="padding-left: 20px;"><i>A. Arasteh, A. Jain, O. Göksu, L. Zeni, N. A. Cutululis</i></p> <p>SYNCHRONOUS CONVERTER ROLE IN A GRID FORMING SYSTEM</p> <p style="padding-left: 20px;"><i>P. Marinakis, N. Schofield</i></p> <p>DYNAMIC STUDIES FOR 100% CONVERTER-BASED IRISH POWER SYSTEM.....</p> <p style="padding-left: 20px;"><i>X. Zhao, D. Flynn</i></p> <p>EXPLOITING BIDIRECTIONAL POWER FLOW CONTROL TO CAPTURE WIND GUST POWER IN SMALL AND MEDIUM WIND TURBINES</p> <p style="padding-left: 20px;"><i>B. M. Gavvani, T. Staessens, J. V. Damme, J. D. M. De Kooning, D. Bozalakov, L. Vandeveld, G. Crevecoeur</i></p> <p>FAULT PREDICTION AND CLASSIFICATION FOR A DOUBLY-FED INDUCTION GENERATOR BASED WIND TURBINE BY USING RANDOM FOREST CLASSIFIER.....</p> <p style="padding-left: 20px;"><i>S. Zhang, M. Basu, E. Robinson, B. Fitzgerald, B. Basu</i></p> <p>A DISCRETE-TIME STATE SPACE MODELLING METHOD APPLYING TO SSO OF RENEWABLE POWER GENERATION.....</p> <p style="padding-left: 20px;"><i>Y. Han, H. Sun, B. Huang, Y. Yu</i></p> <p>REAL-TIME MODEL PREDICTIVE CONTROL OF BATTERY ENERGY STORAGE ACTIVE AND REACTIVE POWER TO SUPPORT THE DISTRIBUTION NETWORK OPERATION</p> <p style="padding-left: 20px;"><i>A. A. R. Mohamed, D. J. Morrow, R. J. Best</i></p> <p>SIMULATION ASSISTED CURRENT DENSITY MONITORING FOR LITHIUM-ION BATTERIES IN ELECTRIC VEHICLES</p> <p style="padding-left: 20px;"><i>M. Javadipour, S. A. Alavi, K. Mehran</i></p> <p>TRANSIENT CLUSTERING APPROACH FOR PQ MONITORING.....</p> <p style="padding-left: 20px;"><i>T. Streubel, A. Eisenmann, C. Kattmann, K. Rudion</i></p>	<p>1</p> <p>7</p> <p>13</p> <p>19</p> <p>24</p> <p>30</p> <p>35</p> <p>41</p> <p>47</p> <p>53</p> <p>59</p> <p>65</p> <p>71</p> <p>77</p>
---	---

A REVIEW OF COMMUNICATION AND ENERGY BALANCING SCHEMES IN LI-ION BATTERY MANAGEMENT SYSTEMS	82
<i>Y. Zhang, Y. Hu</i>	
EVALUATION OF DECENTRALIZED VOLTAGE HARMONIC MITIGATION THROUGH DRES CONVERTER ACTIVE FILTERING CAPABILITY	95
<i>Kyriaki-Nefeli D. Malamaki, Christos Tzouvaras, Manuel Barragán-Villarejo, Georgios C. Kryonidis, Charis S. Demoulias</i>	
IMPROVED SIGMA Z-SOURCE INVERTER-FED GRID SYSTEM FOR WIND POWER GENERATION	102
<i>Vivek Sharma, Jahangir Hossain, Yongheng Yang, Syed M N Ali, Muhammad Kashif</i>	
COMPARATIVE EVALUATION OF DYNAMIC PERFORMANCE OF A VIRTUAL SYNCHRONOUS MACHINE AND SYNCHRONOUS MACHINES	107
<i>Md Asif Uddin Khan, Qiteng Hong, Di Liu, Agusti Egea Alvarez, Adam Dyško, Campbell Booth, Djaved Rostom</i>	
APPLICATION OF AN ADVANCED SHORT CIRCUIT STRENGTH METRIC TO EVALUATE IRELAND'S HIGH RENEWABLE PENETRATION SCENARIOS.....	113
<i>W. Wes Baker, Deepak Ramasubramanian, Marta Val Escudero, Evangelos Farantatos, Anish Gaikwad</i>	
DYNAMIC WAKE ANALYSIS OF A WIND TURBINE PROVIDING FREQUENCY CONTAINMENT RESERVE IN HIGH WIND SPEEDS	119
<i>Narender Singh, Jeroen De Kooning, Lieven Vandeveld</i>	
DEVELOPMENT OF COST-FUNCTIONS FOR THE REMUNERATION OF NEW ANCILLARY SERVICES IN DISTRIBUTION NETWORKS	125
<i>Konstantinos Oureilidis, Kyriaki-Nefeli Malamaki, Spyros Gkavanoudis, Jose L. Martinez-Ramos, Charis Demoulias</i>	
FAST FREQUENCY RESPONSE PROVISION FROM COMMERCIAL DEMAND RESPONSE, FROM SCHEDULING TO STABILITY IN POWER SYSTEMS.....	131
<i>M. Saeed Misaghian, Ran Li, Damian Flynn</i>	
A STUDY ON THE FREQUENCY DYNAMICS OF THE ENTSO-E GRID WITH INCREASING SHARE OF RENEWABLE GENERATION	137
<i>Miguel Ramirez-Gonzalez, Felix R Segundo Sevilla, Petr Korba</i>	
IMPACT OF SYSTEM STRENGTH AND HVDC CONTROL STRATEGIES ON DISTANCE PROTECTION PERFORMANCE.....	143
<i>Di Liu, Qiteng Hong, Adam Dyško, Dimitrios Tzelepis, Guangya Yang, Campbell Booth, Ian Cowan, Bharath Ponnalagan</i>	
ISLANDING DEPENDENCIES AND DETECTION IN LOW-VOLTAGE GRIDS WITH GRID FORMING INVERTERS.....	149
<i>Björn O Winter, Florian Rauscher, Bernd Engel</i>	
HARDWARE-BASED INTRUSION DETECTION IN E-LAN BASED DISTRIBUTED DC MICROGRID: A VIRTUAL SENSOR APPROACH	155
<i>S. Madichetty, S. Patra, M. Basu</i>	
A FLEXIBLE REAL TIME NETWORK MODEL FOR EVALUATING HVDC SYSTEMS' IMPACT ON AC PROTECTION PERFORMANCE.....	161
<i>D. Liu, Q. Hong, A. Dyško, A. Egea Alvarez, L. Xu, C. Booth, I Cowan, B. Ponnalagan</i>	

POTENTIAL TECHNICAL AND ECONOMIC BENEFIT ANALYSIS OF ENERGY FLEXIBILITY IN BORNHOLMS HOSPITAL	167
<i>H. Thi Nguyen, P. Bromand Nørgård, M. Johansen</i>	
ECONOMIC DEMAND RESPONSE MANAGEMENT FOR SUSTAINABLE AGRICULTURE BY HYBRID POWER SYSTEMS	173
<i>S. Ratra, D. Singh, K. Singh, R. C. Bansal, R. Naidoo</i>	
MODERN METHODS OF CONSTRUCTION AN OPPORTUNITY FOR BIPV?	178
<i>C. C. Miet</i>	
QUANTIFICATION OF DEMAND-SIDE FLEXIBILITY FOR A SMART ACTIVE RESIDENTIAL BUILDING	185
<i>V. Stepaniuk, J.R. Pillai, B. Bak-Jensen</i>	
PV-BES INTEGRATED RESIDENTIAL SOCIETY GOVERNED ELECTRIC VEHICLE CHARGING STATION	191
<i>S. Nagar, V. Gupta, R. Kumar, R. C. Bansal, R. M. Naidoo</i>	
DECARBONISATION OF RURAL NETWORKS WITHIN MAINLAND SCOTLAND: IN SUPPORT OF INTENTIONAL ISLANDING	197
<i>C. McGarry, S. Galloway, G. Burt</i>	
ENHANCING NETWORK UTILISATION IN WIND-RICH REGIONS USING COORDINATED DYNAMIC LINE RATING, ENERGY STORAGE AND POWER FLOW CONTROL SCHEMES	203
<i>B. Keyvani, M. Power, D. Flynn</i>	
THE GROWTH OF DISTRIBUTED GENERATION IN GREAT BRITAIN AND ASSOCIATED CHALLENGES	209
<i>S.J. Gordon, C. McGarry, K. Bell</i>	
PROBABILISTIC APPROACH FOR DISTRIBUTION GRID PLANNING UNDER CONSIDERATION OF LINE LOADING INDICATORS	215
<i>M. Miller, K. Rudion, F. Fischer, H. Nägele</i>	
QUANTIFYING THE MARKET VALUE OF WAVE POWER COMPARED TO WIND&SOLAR - A CASE STUDY	221
<i>T. K. Vrana, H. G. Svendsen</i>	
DESIGN AND DYNAMIC MODELING OF MAGNETIC POWER SPLIT DEVICE FOR A TIDAL STREAM TURBINE.....	227
<i>A. Harris, B. McGilton, M. Mueller</i>	
ANALYSING WIND AND SOLAR POWER INTEGRATION WITH A MULTI-CARRIER ENERGY SYSTEM MODEL OF IRELAND.....	234
<i>J. Kiviluoma, C. O'Dwyer, J. Ikäheimo, R. Lahon, R. Li, D. Kirchem, N. Helistö, T. Rasku, E. Rinne, D. Flynn</i>	
IMPACT OF FAST WIND FLUCTUATIONS ON THE PROFIT OF A WIND POWER PRODUCER JOINTLY TRADING IN ENERGY AND RESERVE MARKETS	241
<i>S. A. Hosseini, J.-F. Toubreau, N. Singh, J. D. M. De Kooning, N. Kayedpour, G. Crevecoeur, Z. De Grève, Vallée, L. Vandeveld</i>	
EIRGRID'S MET MAST AND ALTERNATIVES STUDY	247
<i>C. Möhrlein, D. Ó Foghlú, S. Power, G. Nolan, K. Conway, E. Lambert</i>	

ENABLING FLEXIBLE OPERATION OF CCS PLANT WITHIN A HIGH RENEWABLES POWER SYSTEM	253
<i>C. O'Dwyer, I. Vorushylo, Y. Huang, N. Hewitt, D. Flynn</i>	
COST-BENEFIT ANALYSIS OF STORAGE DEVICES FOR PROVISION OF MULTIPLE SERVICES IN MV DISTRIBUTION NETWORKS	259
<i>A. Bagchi, R. Best, D. J. Morrow, A. Cupples, J. Pollock, I. Bailie</i>	
NETWORK LIMITS ON RESIDENTIAL HEAT PUMP CAPACITY AS AN ENABLING TECHNOLOGY TOWARDS RENEWABLES INTEGRATION.....	265
<i>Mohammad Afkousi-Paqaleh, Valentin Rigoni, Christopher Wilson, Neil Hewitt, Damian Flynn, Andrew Keane</i>	
FAULT CURRENT MANAGEMENT UNDER HIGH PENETRATION OF DISTRIBUTED GENERATION IN SMART GRIDS.....	271
<i>Mohamed A. Gabr, Tamer F. Megahed, Sobhy M. Abdelkader</i>	
AN INVESTIGATION ON FEATURE EXTRACTION AND FEATURE SELECTION FOR POWER QUALITY CLASSIFICATION WITH HIGH RESOLUTION AND RMS DATA	277
<i>Adrian Eisenmann, Tim Streubel, Krzysztof Rudion</i>	
VOLTAGE CONTROL IN LV DISTRIBUTION NETWORKS CONSIDERING INCREASING PENETRATION OF LOW CARBON TECHNOLOGIES.....	283
<i>Arijit Bagchi, Declan Bradley, Robert Best, D. John Morrow</i>	
A NON-WIRE SOLUTION FOR THE ACTIVE MANGAMENT OF DISTRIBUTION NETWORKS	289
<i>Alireza Nouri, Alireza Soroudi, Ronan Murphy, David Ryan, Miguel Ponce De Leon, Niall Grant, Andrew Keane</i>	
IMPACT OF NETWORK DELAYS ON QUALITY OF VOLTAGE CONTROL FOR DISTRIBUTION GRIDS UNDER STRESS	294
<i>Asma Farooq, Kamal Shahid, Yonghao Gui, Rasmus Løvenstein Olsen</i>	
EVALUATION OF A THREE-PHASE DISTRIBUTION SYSTEM STATE ESTIMATION FOR OPERATIONAL USE IN A REAL LOW VOLTAGE GRID.....	300
<i>Heiner Früh, Krzysztof Rudion, Alix von Haken, Daniel Groß, Bartholomäus Wasowicz</i>	
AUTOMATED APPROACH TO POWER SYSTEM OPERATIONAL PLANNING AND CONGESTION MANAGEMENT FOR A SYSTEM WITH HIGH LEVELS OF RENEWABLE GENERATION	306
<i>Dairíne Frawley, John Ging</i>	
OPTIMIZATION OF CONTROLLER PARAMETERS FOR GRID PHOTOVOLTAIC SYSTEM AT FAULTY NETWORK USING EMPEROR PENGUIN OPTIMIZER.....	312
<i>Abeer S. Omar, Walid H. A. El-Hameed, Hany M. Hasanien</i>	
MICROGRID MONITORING AND SUPERVISION: WEB-BASED SCADA APPROACH	319
<i>Mohamed A Ali, Mahmoud M Barakat, Masoud M Abokhalaf, Yasmin H Fadel, Mohamed Kandil, Mariam W Rasmy, Osama N Ali, Hassan M Emara, Ahmed Bahgat, Ahmed H Besheer</i>	
DYNAMIC MAXIMUM POWER POINT TRACKING OF PHOTOVOLTAIC ARRAYS BASED ON SIMPLIFIED RIPPLE CORRELATION CONTROL	325
<i>Cedric Caruana, Ahmed Al Durra, S.M. Muyeen</i>	

INVESTIGATION OF ANOMALY DETECTION TECHNIQUE FOR WIND TURBINE PITCH SYSTEMS.....	331
<i>Conor McKinnon, James Carroll, Alasdair McDonald, Sofia Koukoura, Charlie Plumley</i>	
EFFECTIVE BACKTRACKING ALGORITHM FOR HALF-CUT CELL SOLAR PANELS	337
<i>Filippo Cheein, Dale S L Dolan, Salter H Patrick</i>	
INVESTIGATION OF THE EFFECT OF DIFFERENT BOUNDARY CONDITIONS ON THE ISLANDING OF MICROGRIDS	341
<i>Matthias Buchner, Krzysztof Rudion</i>	
GRID FORMING CONTROL FOR POWER SYSTEMS WITH UP TO 100% INVERTER BASED GENERATION	347
<i>Panagiotis Marinakis, Nigel Schofield</i>	
RELIABILITY OF SMART GRIDS WITH SMART ASSETS AND LARGE WIND FARMS	353
<i>Peju A Oyewole, Dilan Jayaweera</i>	
DESIGN AND FEASIBILITY STUDY OF A BIOMASS/DIESEL/PV/BATTERY MICROGRID SYSTEM FOR AN OFF-GRID APPLICATION	359
<i>T. Adefarati, R. C. Bansal, R. Naidoo</i>	
A NEW MODULAR THREE-PHASE INVERTER BASED ON SEPIC-CUK COMBINATION CONVERTER FOR PHOTOVOLTAIC APPLICATIONS	365
<i>S. Alotaibi, A. Darwish, X. Ma, B. W. Williams</i>	
TRI-STATE CUK INVERTER WITH POWER DECOUPLING FOR PHOTOVOLTAIC APPLICATIONS.....	371
<i>A. Darwish, S. Alotaibi, M. A. Elgenedy</i>	
MACHINE-LEARNING BASED APPROACH OF PROPORTIONAL REACTIVE POWER DISPATCH UNDER IMPOSING VOLTAGE CONSTRAINT.....	377
<i>Y. Yoo, J.-H. Lee, S. Jung, G. Jang</i>	
BATTERY AGING DUE TO 100 HZ CURRENT RIPPLE OF POWER CONVERTERS	383
<i>S. Barcellona, L. Piegari</i>	
UNIFIED POWER QUALITY EVALUATION OF CHARGING ELECTRICAL VEHICLES ON ELECTRICAL GRID.....	388
<i>T. F. Megahed, M. R. Elkallah, S. M. Abdelkader</i>	
PROJECTIONS OF ENERGY STORAGE IN FUTURE HIGH RENEWABLE ELECTRICAL ENERGY SYSTEMS.....	394
<i>Y. Hu, N. Schofield, N. Zhao</i>	

Author Index