

# IEEE TRANSACTIONS ON POWER SYSTEMS



IEEE POWER & ENERGY SOCIETY

MARCH 2016

VOLUME 31

NUMBER 2

ITPSEG

(ISSN 0885-8950)

---

## PAPERS

Scheduling Non-Preemptive Deferrable Loads .....	<i>G. O'Brien and R. Rajagopal</i>	835
Real-Time Markets for Flexiramp: A Stochastic Unit Commitment-Based Analysis .....	<i>B. Wang and B. F. Hobbs</i>	846
Dynamics of Market Power in ERCOT System: A Fundamental CSFE With Network Constraints .....	<i>C. A. Díaz, M. D. Webster, J. Villar, and F. A. Campos</i>	861
Optimization and Allocation of Spinning Reserves in a Low-Carbon Framework .....	<i>K. Bruninx, K. Van den Bergh, E. Delarue, and W. D'haeseleer</i>	872
Privacy-Preserving Energy Theft Detection in Microgrids: A State Estimation Approach .....	<i>S. A. Salinas and P. Li</i>	883
Distributed Stochastic Market Clearing With High-Penetration Wind Power .....	<i>Y. Zhang and G. B. Giannakis</i>	895
Dimension-Adaptive Sparse Grid Interpolation for Uncertainty Quantification in Modern Power Systems: Probabilistic Power Flow .....	<i>J. Tang, F. Ni, F. Ponci, and A. Monti</i>	907
An Efficient Parallel Krylov-Schur Method for Eigen-Analysis of Large-Scale Power Systems .....	<i>Y. Li, G. Geng, and Q. Jiang</i>	920
Adaptive Online Disturbance Location Considering Anisotropy of Frequency Propagation Speeds .....	<i>H. Zhang, F. Shi, Y. Liu, and V. Terzija</i>	931
Mixed Transient Stability Analysis Using AC and DC Models .....	<i>S. Kim and T. J. Overbye</i>	942
Stochastic Optimization of Sub-Hourly Economic Dispatch With Wind Energy .....	<i>H. Gangammanavar, S. Sen, and V. M. Zavala</i>	949
Optimal Distributed Generation Allocation in Distribution Systems for Loss Minimization .....	<i>K. Mahmoud, N. Yorino, and A. Ahmed</i>	960
Toward Cost-Efficient and Reliable Unit Commitment Under Uncertainty .....	<i>H. Pandžić, Y. Dvorkin, T. Qiu, Y. Wang, and D. S. Kirschen</i>	970
Comprehensive Cost Minimization in Distribution Networks Using Segmented-Time Feeder Reconfiguration and Reactive Power Control of Distributed Generators .....	<i>S. Chen, W. Hu, and Z. Chen</i>	983
Short- and Mid-Term Forecasting of Baseload Electricity Prices in the U.K.: The Impact of Intra-Day Price Relationships and Market Fundamentals .....	<i>K. Maciejowska and R. Weron</i>	994
Missing Data Recovery by Exploiting Low-Dimensionality in Power System Synchrophasor Measurements .....	<i>P. Gao, M. Wang, S. G. Ghiocel, J. H. Chow, B. Fardanesh, and G. Stefopoulos</i>	1006
Congestion Avoidance for Recharging Electric Vehicles Using Smoothed Particle Hydrodynamics .....	<i>Q. R. Hamid and J. A. Barria</i>	1014

(Contents Continued on Page 833)

Coupon-Based Demand Response Considering Wind Power Uncertainty: A Strategic Bidding Model for Load Serving Entities .....	X. Fang, Q. Hu, F. Li, B. Wang, and Y. Li	1025
Optimal Compensation of Transmission Lines Based on Minimisation of the Risk of Subsynchronous Resonance .....	A. Adrees and J. V. Milanović	1038
Multi-Objective Reconfiguration of Radial Distribution Systems Using Reliability Indices .....	N. G. Paterakis, A. Mazza, S. F. Santos, O. Erdinç, G. Chicco, A. G. Bakirtzis, and J. P. S. Catalão	1048
Efficient Estimation of the Probability of Small-Disturbance Instability of Large Uncertain Power Systems .....	R. Preece and J. V. Milanović	1063
Subsynchronous Resonance Monitoring Using Ambient High Speed Sensor Data .....	H. Khalilinia and V. Venkatasubramanian	1073
A Game Theoretical Pricing Mechanism for Multi-Area Spinning Reserve Trading Considering Wind Power Uncertainty .....	Q. Xu, N. Zhang, C. Kang, Q. Xia, D. He, C. Liu, Y. Huang, L. Cheng, and J. Bai	1084
Economic Analysis of Transmission Expansion Planning With Price-Responsive Demand and Quadratic Losses by Successive LP .....	Ö. Özdemir, F. D. Munoz, J. H. Ho, and B. F. Hobbs	1096
Residential Demand Response: Dynamic Energy Management and Time-Varying Electricity Pricing .....	M. Muratori and G. Rizzoni	1108
Load-Damping Characteristic Control Method in an Isolated Power System With Industrial Voltage-Sensitive Load .....	S. Liao, J. Xu, Y. Sun, W. Gao, X.-Y. Ma, M. Zhou, Y. Qu, X. Li, J. Gu, and J. Dong	1118
Droop Control as an Alternative Inertial Response Strategy for the Synthetic Inertia on Wind Turbines .....	J. Van de Vyver, J. D. M. De Kooning, B. Meersman, L. Vandevenne, and T. L. Vandoorn	1129
Placement of Remote-Controlled Switches to Enhance Distribution System Restoration Capability .....	Y. Xu, C.-C. Liu, K. P. Schneider, and D. T. Ton	1139
Utility Oriented Demand Side Management Using Smart AC and Micro DC Grid Cooperative .....	N. Kinhekar, N. P. Padhy, F. Li, and H. O. Gupta	1151
Stability Analysis of Electricity Markets Using TSK Fuzzy Modeling .....	S. Jafarzadeh, M. S. Fadali, and H. Livani	1161
Market-Based Coordination of Thermostatically Controlled Loads—Part I: A Mechanism Design Formulation .....	S. Li, W. Zhang, J. Lian, and K. Kalsi	1170
Market-Based Coordination of Thermostatically Controlled Loads—Part II: Unknown Parameters and Case Studies .....	S. Li, W. Zhang, J. Lian, and K. Kalsi	1179
The Swiss Reserve Market: Stochastic Programming in Practice .....	F. Abbaspourtorbati and M. Zima	1188
Oscillation Energy Analysis of Inter-Area Low-Frequency Oscillations in Power Systems .....	Y. Yu, S. Grijalva, J. J. Thomas, L. Xiong, P. Ju, and Y. Min	1195
Excitation Voltage Control for Emergency Frequency Regulation of Island Power Systems With Voltage-Dependent Loads .....	T. Cui, W. Lin, Y. Sun, J. Xu, and H. Zhang	1204
Managing Flexibility in Multi-Area Power Systems .....	M. A. Bucher, S. Chatzivassileiadis, and G. Andersson	1218
Demand Response Application by Strategic Wind Power Producers .....	N. Mahmoudi, T. K. Saha, and M. Eghbal	1227
Comprehensive Value Assessment of Wind Power by Layer .....	C. Du, X. Wang, X. Wang, and C. Shao	1238
Energy Exchange Between Electric Vehicle Load and Wind Generating Utilities .....	A. Tavakoli, M. Negnevitsky, D. T. Nguyen, and K. M. Muttaqi	1248
A New Mathematical Model for the Restoration Problem in Balanced Radial Distribution Systems .....	R. Romero, J. F. Franco, F. B. Leão, M. J. Rider, and E. S. de Souza	1259
Lyapunov Functions Family Approach to Transient Stability Assessment .....	T. L. Vu and K. Turitsyn	1269
Optimal Transmission Switching With Short-Circuit Current Limitation Constraints .....	Z. Yang, H. Zhong, Q. Xia, and C. Kang	1278
Improving State Estimation With Real-Time External Equivalents .....	E. W. S. Ângelos and E. N. Asada	1289
Promises of Conic Relaxation for Contingency-Constrained Optimal Power Flow Problem .....	R. Madani, M. Ashraphijuo, and J. Lavaei	1297
FACTS Devices Allocation via Sparse Optimization .....	C. Duan, W. Fang, L. Jiang, and S. Niu	1308
Pinning-Based Distributed Cooperative Control for Autonomous Microgrids Under Uncertain Communication Topologies .....	W. Liu, W. Gu, W. Sheng, X. Meng, S. Xue, and M. Chen	1320
A Multi-Objective Distribution System Expansion Planning Incorporating Customer Choices on Reliability .....	S. M. Mazhari, H. Monsef, and R. Romero	1330
A Method for Ranking Critical Nodes in Power Networks Including Load Uncertainties .....	A. M. Leite da Silva, J. L. Jardim, L. R. de Lima, and Z. S. Machado	1341
Tight and Compact MIP Formulation of Configuration-Based Combined-Cycle Units .....	G. Morales-España, C. M. Correa-Posada, and A. Ramos	1350
Identifying Useful Statistical Indicators of Proximity to Instability in Stochastic Power Systems .....	G. Ghanavati, P. D. H. Hines, and T. I. Lakoba	1360
Determining the Optimal Reserve Capacity in a Microgrid With Islanded Operation .....	S. Y. Lee, Y. G. Jin, and Y. T. Yoon	1369
Demand Response With Capacity Constrained Supply Function Bidding .....	Y. Xu, N. Li, and S. H. Low	1377
Robust ESS-Based Stabilizer Design for Damping Inter-Area Oscillations in Multimachine Power Systems .....	L. Shi, K. Y. Lee, and F. Wu	1395

Robust SCUC Considering Continuous/Discrete Uncertainties and Quick-Start Units: A Two-Stage Robust Optimization With Mixed-Integer Recourse .....	B. Hu and L. Wu	1407
Offering Strategy of Wind-Power Producer: A Multi-Stage Risk-Constrained Approach ...	L. Baringo and A. J. Conejo	1420
Time Series Shapelet Classification Based Online Short-Term Voltage Stability Assessment .....	L. Zhu, C. Lu, and Y. Sun	1430
Strengthened MILP Formulation for Certain Gas Turbine Unit Commitment Problems .....	K. Pan, Y. Guan, J.-P. Watson, and J. Wang	1440
Transmission Congestion Relief Using Privately Owned Large-Scale Energy Storage Systems in a Competitive Electricity Market .....	H. Khani, M. R. Dadash Zadeh, and A. H. Hajimiragha	1449
Tutorial on Stochastic Optimization in Energy—Part I: Modeling and Policies .....	W. B. Powell and S. Meisel	1459
Tutorial on Stochastic Optimization in Energy—Part II: An Energy Storage Illustration .....	W. B. Powell and S. Meisel	1468
Transmission Expansion Planning for Wind Turbine Integrated Power Systems Considering Contingency .....	F. Ugranli and E. Karatepe	1476
Evolutionary Algorithms for Dynamic Economic Dispatch Problems .....	M. F. Zaman, S. M. Elsayed, T. Ray, and R. A. Sarker	1486
A Fundamental Study of Applying Wind Turbines for Power System Frequency Control .....	F. Wilches-Bernal, J. H. Chow, and J. J. Sanchez-Gasca	1496
Coordination of Distributed Energy Resources and Demand Response for Voltage and Frequency Support of MV Microgrids .....	M. Bayat, K. Sheshyekani, M. Hamzeh, and A. Rezazadeh	1506
Preventive Control Design for Voltage Stability Considering Multiple Critical Contingencies .....	M. R. Mansour, L. F. C. Alberto, and R. A. Ramos	1517
BFS Algorithm for Voltage-Constrained Meshed DC Traction Networks With Nonsmooth Voltage-Dependent Loads and Generators .....	P. Arboleya, B. Mohamed, C. González-Morán, and I. El-Sayed	1526
An Improved Corrective Security Constrained OPF With Distributed Energy Storage ...	J. Cao, W. Du, and H. F. Wang	1537
A Droop Control Design for Multiterminal HVDC of Offshore Wind Farms With Three-Wire Bipolar Transmission Lines .....	A. S. Abdel-Khalik, A. E. B. Abu-Elanien, A. A. Elserougi, S. Ahmed, and A. M. Massoud	1546
Stochastic Scheduling With Inertia-Dependent Fast Frequency Response Requirements .....	F. Teng, V. Trovato, and G. Strbac	1557
A Non-Stationary Analysis of Low-Frequency Electromechanical Oscillations Based on a Refined Margenau-Hill Distribution .....	M. Hatami, M. Farrokhisfard, and M. Parniani	1567
Robust Stability Assessment in the Presence of Load Dynamics Uncertainty .....	H. D. Nguyen and K. Turitsyn	1579
Fuzzy-Logic Based Frequency Controller for Wind Farms Augmented With Energy Storage Systems .....	S. Zhang, Y. Mishra, and M. Shahidehpour	1595
Research on Resilience of Power Systems Under Natural Disasters—A Review .....	Y. Wang, C. Chen, J. Wang, and R. Baldick	1604
Sliding Mode Robust Control Based Active-Power Modulation of Multi-Terminal HVDC Transmissions .....	G. Tang, Z. Xu, H. Dong, and Q. Xu	1614
Spinning Reserve Assessment Under Transmission Constraints Based on Cross-Entropy Method .....	A. M. Leite da Silva, J. F. Costa Castro, and R. A. González-Fernández	1624
Feeder Reconfiguration for Unbalanced Distribution Systems With Distributed Generation: A Hierarchical Decentralized Approach .....	F. Ding and K. A. Loparo	1633
One Markov Model for Spare Analysis of Distribution Power Transformers .....	G. A. Hamoud and C. Yiu	1643

---

POWER ENGINEERING LETTERS

Downside Risk Constrained Probabilistic Optimal Power Flow With Wind Power Integrated .....	Y. Z. Li and Q. H. Wu	1649
Fast SVD Computations for Synchrophasor Algorithms .....	T. Wu, S. A. Nezam Sarmadi, V. Venkatasubramanian, A. Pothen, and A. Kalyanaraman	1651
Sufficient Conditions for Exact Relaxation of Complementarity Constraints for Storage-Concerned Economic Dispatch ..	Z. Li, Q. Guo, H. Sun, and J. Wang	1653
Optimal Power Flow With the Consideration of Flexible Transmission Line Impedance .....	T. Ding, R. Bo, F. Li, and H. Sun	1655
A Scenario Optimal Reduction Method for Wind Power Time Series .....	J. Li, F. Lan, and H. Wei	1657
Transmission Contingency Screening Considering Impacts of Distribution Grids ...	Z. Li, J. Wang, H. Sun, and Q. Guo	1659
Load Modeling Under Unbalanced Disturbances .....	V. V. S. Chakrabarti, and S. C. Srivastava	1661
Analogy and Convergence of Levenberg's and Lyapunov-Based Methods for Power Flow Analysis .....	F. Milano	1663
Effect of Detailed Reactive Power Limit Modeling on Islanded Microgrid Power Flow Analysis ....	M. M. A. Abdelaziz	1665