

International Association of Science  
and Technology for Development

**5<sup>th</sup> IASTED International  
Conference on Power  
and Energy Systems**

EuroPES 2005

June 15-17, 2005  
Benalmádena, Spain

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571  
[www.proceedings.com](http://www.proceedings.com)

**ISBN: 978-1-60423-939-3**

**Some format issues inherent in the e-media version may also appear in this print version.**

International Association of Science  
and Technology for Development

5<sup>th</sup> IASTED International Conference on Power and Energy Systems  
2005

## TABLE OF CONTENTS

### **POWER FLOW SOLUTIONS AND POWER QUALITY**

<b>A Distributed Optimal Power Flow Algorithm .....</b>	1
<i>S.-Y. Lin and C.-H. Lin (Taiwan)</i>	
<b>A Study of Interline Power Flow Analysis based on a New Mathematical Model of Interconnected Power System with IPC .....</b>	7
<i>X. Liu, Q. Wang, S. Zhou, and Z. Liu (PRC)</i>	
<b>Optimal Power Flow Solution using Evolutionary Programming .....</b>	13
<i>T. Doraiswamy, R. Ravikumar, A. Ramya, S. Charles, M.S. Vandhana, and S. Swarupini (India)</i>	
<b>Restoring Power Flow Solutions – An Approach via Newton Optimization Technique .....</b>	19
<i>L.V. Barboza, R. Salgado, and A.A.P. Lerm (Brazil)</i>	
<b>Reusing Balanced Power Flow Object Components for Developing Harmonic Power Flow .....</b>	25
<i>S. Nadarajah, K.M. Nor, and M. Abdel-Akher (Malaysia)</i>	
<b>New Synchronization Method for Three-Phase Four-Wire PWM Converters under Unbalance and Harmonics in the Grid Voltages .....</b>	31
<i>R.F. de Camargo and H. Pinheiro (Brazil)</i>	
<b>Power Factor Decomposition Depending on the Type of Disturbance .....</b>	37
<i>A. Ortiz, M. Mañana, C. Renedo, S. Pérez, and I. Eguíluz (Spain)</i>	
<b>Prospects for 400 kV Submarine Interconnection between Croatian and Italian Power Systems .....</b>	43
<i>G. Majstrovic, D. Bajs, and N. Dizdarevic (Croatia)</i>	

### **ALTERNATIVE ENERGY SOURCES**

<b>Fuel-Cell based Inverter for Residential Systems .....</b>	49
<i>S. Meo, A. Perfetto, and F. Esposito (Italy)</i>	
<b>Energy Assessment on Photovoltaic Distributed Generation in LV Distribution Networks .....</b>	55
<i>S. Conti, S. Raiti, and G. Tina (Italy)</i>	
<b>Grid Connection Transients of Slip-Ring Induction Generator using Direct Voltage Control Method .....</b>	61
<i>G. Iwanski and W. Koczara (Poland)</i>	
<b>Optimized Solar Water Pumping System based on an Induction Motor Driving a Centrifugal Pump .....</b>	67
<i>A. Betka and A. Moussi (Algeria)</i>	

<b>Turbines and Generators for Floating Solar Chimney Power Stations.....</b>	73
<i>C.D. Papageorgiou (Greece)</i>	
<b>Analog Low Cost Maximum Power Point Tracking PWM Circuit for DC Loads.....</b>	81
<i>J. Soler, E. Daroqui, F.J. Gimeno, S. Seguí-Chilet, and S. Orts (Spain)</i>	
<b>The Effect of Statistical Fluctuations of Solar Radiation on PV-System Sizing.....</b>	86
<i>S. Kaplanis and E. Kaplani (Greece)</i>	

## **MODELING AND SIMULATION I**

<b>Predicting Magnetic Field in Proximity of Power Transmission Lines using Artificial Neural Networks .....</b>	92
<i>M.A. Elhimbawy, A.M. Qabazard, and O.A. Al-Sayegh (Kuwait)</i>	
<b>Occupational Magnetic Field Exposure in Electric Distribution Substations .....</b>	97
<i>T. Keikko, R. Seesvuori, and P. Järventausta (Finland)</i>	
<b>Electric Field Assessment in High Voltage Systems: Application to Live Working on Overhead Lines .....</b>	102
<i>H. Moulai, S. Belkhir, and F. Soukeur (Algeria)</i>	
<b>Modeling Lightning caused Transmission Line Outages in Alberta .....</b>	106
<i>M. Wu, S.S.P. Shen, and D.O. Koval (Canada)</i>	
<b>A Lighting System Model for Maximum Energy Efficiency and Cost Savings.....</b>	112
<i>C. Boccaletti, S. Elia, and E. Santini (Italy)</i>	
<b>Estimation of Energy Consumption in Hospitals .....</b>	118
<i>J.S. Katsanis, P.G. Halaris, G.N. Malahias, and P.D. Bourkas (Greece)</i>	
<b>The Performance Assessment of Enthalpy Desiccant Wheel .....</b>	128
<i>A. Al-Mulla Ali (Kuwait)</i>	
<b>Segregated Residential Air Conditioner Load Model Behavior with Temperature and Humidity .....</b>	132
<i>C.A. Belhadj and S. El Ferik (Saudi Arabia)</i>	
<b>Analysis of Subsynchronous Resonance with Five Level Diode-Clamped VSI based SSSC .....</b>	138
<i>G.N. Pillai and H.O. Gupta (India)</i>	

## **PROTECTION SYSTEMS AND ELECTRICAL CIRCUITS**

<b>Investigating the Effect of Tightening Torque on Crossing Resistance of Screw Couplings.....</b>	143
<i>E.G. Psarros, A.D. Polykrati, K.N. Vasilakis, and G.K. Konstantinidis (Greece)</i>	
<b>Design of an Effective Lightning Protection System .....</b>	147
<i>R. Tommasini, E. Pons, and S. Toja (Italy)</i>	
<b>Monitoring of Capacitor-Type Bushings Considerations Regarding the Influence of Thermal Field Distribution on Dielectric Losses .....</b>	153
<i>D. Nedelcut, M. Bica, and M. Talu (Romania)</i>	
<b>The Dynamics and the Transient States in the Closing Contacts .....</b>	157
<i>S.J. Kulas (Poland)</i>	

<b>Designing the DC Inductance for ICPT Power Pick-Ups.....</b>	162
<i>P. Si and A.P. Hu (New Zealand)</i>	
<b>Ionization Process during Pre-Breakdown and Breakdown of Solid Organic Insulating Materials, Immersed in Insulating Oil .....</b>	168
<i>E.G. Psarros, A.D. Polykrati, C.G. Karagiannopoulos, and P.D. Bourkas (Greece)</i>	
<b>Torque Optimization of Switched Reluctance Motors by Changing Rotor Pole Geometry .....</b>	173
<i>W. Aljaism, M. Nagrial, and J. Rizk (Australia)</i>	
<b>Investigation of the Current Interruption Process in Fusible Wires using High Frequency A/D Converters.....</b>	178
<i>C.S. Psomopoulos, C.G. Aronis, D. Diamadopoulos, C.G. Karagiannopoulos, and P.D. Bourkas (Greece)</i>	

## **WIND ENERGY**

<b>A Review of the Future for Wind and Tidal Power Generation in the UK.....</b>	184
<i>I.F. Bitterlin (UK)</i>	
<b>Reliability Evaluation for Offshore Wind Farms .....</b>	192
<i>M. Zhao, Z. Chen, and F. Blaabjerg (Denmark)</i>	
<b>Unit Sizing Probabilistic Optimal of a Grid-Linked Hybrid Solar/Wind Power System .....</b>	198
<i>S. Gagliano, S. Raiti, and G. Tina (Italy)</i>	
<b>New Control to Improve the Voltages Stability of the Wind Generators in the Failure Events.....</b>	204
<i>M.V.A. Nunes, J.P.A. Vieira, and U.H. Bezerra (Brazil)</i>	
<b>Experimental Validation of Algorithms to Integrate a Variable Speed Wind-Turbine in the Electrical Grid .....</b>	210
<i>G. Abad, M. Rodriguez, G. Almandoz, and M. Santos (Spain)</i>	
<b>Voltage Stability of Wind Power Systems using Bifurcation Analysis .....</b>	216
<i>S.A. El-Kashlan, M. Abdel-Rahman, H. El-Desouki, and M.M. Mansour (Egypt)</i>	

## **MODELING AND SIMULATION II**

<b>Modeling of the Performance of a Coal-Fired Power Plant in Real-Time.....</b>	222
<i>S.S. Munukutla and R.P.M. Craven (USA)</i>	
<b>Analytical Study of a Linear Induction Motor by Spatial Harmonic Series: Validation by Finite Element Method .....</b>	228
<i>A.J. Escalada, J. Poza, S. Luri, and A. González (Spain)</i>	
<b>Mathematical Model of Driving System with 2H Converter for Investigations of Transient Phenomena and Sensitivity .....</b>	234
<i>Z. G?owacz and K. Jaracz (Poland)</i>	
<b>Distributed-Computing Technique for Modelling the Equivalent Circuit of Photovoltaic Modules .....</b>	239
<i>L. Sandrolini, U. Reggiani, and M. Artioli (Italy)</i>	
<b>A Novel Technique for Power System Dynamic Oscillations Analysis.....</b>	245
<i>K.M. El-Naggar and W.M. Al-Hasawi (Kuwait)</i>	

<b>An Optimization Technique for the Choice of Advanced Automotive Electrical Systems .....</b>	251
<i>V. Isastia, S. Meo, and F. Esposito (Italy)</i>	
<b>Africa Method – A Massive Parallel Processing Routine for Macroeconomic Planning .....</b>	257
<i>P.A. Chakalisa, R.J. Charakupa, D. Mapolelo, and D.M. Totev (Botswana)</i>	
<b>Estimating Synchronizing and Damping Torque Coefficients using Particle Swarm Optimization.....</b>	263
<i>A.K. AL-Othman and K.M. EL-Nagger (Kuwait)</i>	

## **DISTRIBUTION NETWORKS**

<b>Hydropower Systems Planning in Distribution Networks based on GIS .....</b>	268
<i>I.J. Ramírez-Rosado, P. Zorzano-Santamaría, L.A. Fernández-Jiménez, E. García-Garrido, E. Zorzano-Alba, P.M. Lara-Santillan, and M. Mendoza-Villena (Spain)</i>	
<b>The Research of Methods of Multi-Criteria Analysis for Increase of Reliability of Distribution Networks by Remote-Controlled Elements .....</b>	274
<i>Z. Hradílek and P. Krejčí (Czech Republic)</i>	
<b>Advanced Model for Expansion of Natural Gas Distribution Networks based on Geographic Information Systems .....</b>	280
<i>I.J. Ramírez-Rosado, L.A. Fernández-Jiménez, E. García-Garrido, P. Zorzano-Santamaría, E. Zorzano-Alba (Spain), V. Miranda, and C. Monteiro (Portugal)</i>	
<b>Designing Urban Distribution Systems using Value-based Probabilistic Models .....</b>	285
<i>A.A. Chowdhury (USA) and D.O. Koval (Canada)</i>	
<b>A Multi-Functional Power Compensator for Single-Phase Three-Wire Distribution System .....</b>	294
<i>T. Fujita and S. Iida (Japan)</i>	
<b>Magnetic Induction Measurements in Distribution Transformers Cores .....</b>	300
<i>A.A.P. Paraskevopoulos, P.D. Bourkas, and D. Paparigas (Greece)</i>	
<b>Adhesion and Electrical Performance by Plasma Treatment of Semiconductive Silicone Rubber .....</b>	306
<i>K.-T. Lee, S.-M. Hwang, Y.-J. Seo, J.-I. Hong, C.-H. Hwang, and C.-S. Huh (Korea)</i>	
<b>Fault Location Techniques for Electrical Distribution Networks: A Literature Survey .....</b>	311
<i>H. Díaz R. (Chile) and M. López T. (Spain)</i>	

## **POWER GENERATION**

<b>Technology of Distributed Power Generation in Finland Point of View.....</b>	319
<i>T. Keikko, P. Poikonen, and S. Valkealahti (Finland)</i>	
<b>Cogeneration – Grid Interconnection: Two Solutions to Optimize the Power Generation in the Arab World .....</b>	325
<i>M.A. Dashash and R. Mahfoudhi (Saudi Arabia)</i>	
<b>Analysis of a Three Phase Tubular Permanent Magnet Linear Generator.....</b>	329
<i>K.M. Nor, H. Arof, and Wijono (Malaysia)</i>	

<b>VSIG – Variable Speed Integrated Generator System for Distributed Generation .....</b>	335
<i>W. Koczara, E. Ernest (Poland), and N. Al. Khayat (UK)</i>	
<b>Privatization of the Electricity Sector in Jordan: A Case Study of On-Site Power Generation .....</b>	341
<i>A.-H. Bassam and W.A. Massarweh (Jordan)</i>	
<b>NN-based Gas Power Plant Simulator .....</b>	346
<i>M.R. Hesamzadeh, A. Salehi, A.R. Seifi, and A.A. Safavi (Iran)</i>	
<b>Optimization of a Micro Combined Heat and Power Fleet .....</b>	352
<i>C. Mondon and D. Faille (France)</i>	
<b>A Dynamical Model of a Gas Microturbine Generator for Distributed Generation.....</b>	358
<i>C. Boccaletti, S. Elia, and E. Nisticò (Italy)</i>	

## **POWER FILTERING AND CONTROL SYSTEMS**

<b>Neural Network based AC Voltage Sensor Less Selective and Controlled Active Harmonic Filtering in Single Phase System.....</b>	364
<i>S. Sareen, P. Singh, A. Vohra, and R. Varma (India)</i>	
<b>New Injection Current Controller in Three-Phase Active Power Filters .....</b>	370
<i>A. Pigazo and V. Moreno (Spain)</i>	
<b>3D-3B SVPWM Active Filter based on IEEE Standard 1459 .....</b>	374
<i>S. Orts, F.J. Gimeno, A. Abellán, S. Seguí, M. Alcañiz and R. Masot (Spain)</i>	
<b>Harmonic Filter Design Consideration for a Tire-Rubber Factory .....</b>	380
<i>A. Zebardast and H. Mokhtari (Iran)</i>	
<b>Substation Control System – Croatian Distribution Utilities Experiences .....</b>	384
<i>M. Govor?in, I. ?uri?, and G. Leci (Croatia)</i>	
<b>Scale Factor Self Tuning Fuzzy Controller.....</b>	388
<i>N. Boonpirom and K. Paitoonwattanakij (Thailand)</i>	
<b>A Novel Approach to Power System State Estimation and Controller Design.....</b>	393
<i>A. Mohammadi, N. Pariz, H.M. Shanechi, M. Hesamzadeh, H. Seifi, and H. Keivani (Iran)</i>	
<b>Operating Characteristics of Single-Phase Shunt Active Power Filter with Hysteresis-Current Control .....</b>	399
<i>M.H. Antchev and M.P. Petkova (Bulgaria)</i>	

## **FORECASTING, MANAGEMENT, AND EDUCATION**

<b>Electric Peak Power Forecasting by the Year 2025 .....</b>	406
<i>O.A. Alsayegh, O.A. Al-Matar, F.A. Fairouz, and A. Al-Mulla Ali (Kuwait)</i>	
<b>Early Experience in Centralized Real Time Energy Market .....</b>	411
<i>Z. Alaywan, L. Hernandez, and M. Martin (USA)</i>	
<b>Short Term Load Forecasting using Neuro-Fuzzy Networks .....</b>	417
<i>M. Hoffman, A. Hasan, and D. Martinez (USA)</i>	
<b>Regional Supply Shortages in Interconnected Liberalized Electricity Markets .....</b>	422
<i>L. Meeus, K. Purchala, K. Verhaegen, and R. Belmans (Belgium)</i>	

<b>Impact and Benefits of Prepaid Electricity Service in Botswana.....</b>	428
<i>A. Obok Opok and G.O. Anderson (Botswana)</i>	
<b>A Data Mining Approach to Understanding UK Fuel Poverty .....</b>	431
<i>K.J. Brazier, W. Wang, G. Richards, and C. Waddams (UK)</i>	
<b>A Proposal for an Integrated Utilities Engineering Management ME Program .....</b>	437
<i>F.S. Barnes, E.F. Fuchs, J.S. Tietjen, J. Silverstein, H.-Y. Ko, T. Lookabaugh, T.X. Brown, and D.C. Sicker (USA)</i>	

## **LOAD MANAGEMENT**

<b>Critical Bus Voltage Distortion in High Power UPS Systems.....</b>	443
<i>I.F. Bitterlin (UK)</i>	
<b>Effects on Distribution Feeders from Electronic Loads based on Future Peak-Load Growth, Part I: Measurements .....</b>	449
<i>E.F. Fuchs (USA), M.A.S. Masoum, and M. Ladjevardi (Australia)</i>	
<b>Effects on Distribution Feeders from Electronic Loads based on Future Peak-Load Growth, Part II: Evaluation .....</b>	455
<i>E.F. Fuchs (USA), M.A.S. Masoum, and M. Ladjevardi (Australia)</i>	
<b>Simple Measures to Improve the Performances of the Backward/Forward Method for Radial Distribution Network Analysis .....</b>	461
<i>A. Augugliaro, L. Dusonchet, S. Favuzza, M.G. Ippolito, and E. Riva Sanseverino (Italy)</i>	
<b>Active Compensation of Unbalanced Currents and Current Harmonics Taken by a Non Linear Unbalanced Load Fed by a Distorted AC Mains .....</b>	468
<i>F. Labrique, A. Bricteux, and B. Janssens (Belgium)</i>	
<b>Coordination of Residential Load Control for Reducing System Peak in Rural Electric Power Distribution .....</b>	474
<i>G. Hadjee and D. Sadarnac (France)</i>	
<b>Energy Labeling in Electrical Lamps and Effects in Load Management in Iran.....</b>	480
<i>R. Effatnejad and H.R. Niesaz (Iran)</i>	
<b>To Solve Bottle-Necks in the European Transmission Net .....</b>	485
<i>H. Koch (Germany)</i>	

## **ENERGY CONVERSION, CONSERVATION, AND SAFETY**

<b>Investigation on Performance of Laboratory based DI Diesel Engine using Semi-Stable Diesel-Sesame Seed Oil Emulsion and with Neat Sesame Seed Oil .....</b>	490
<i>S. Chandra Prasad, I.N. Niranjan Kumar, S.K. Bhatti, and B.V.A. Rao (India)</i>	
<b>An Overall Approach to Energy Conservation .....</b>	497
<i>D.F. Dyer (USA)</i>	
<b>Application of Ice Storage for Peak Power Reduction.....</b>	501
<i>G.P. Maheshwari, A.E.H. Hajiah, and H. Al-Taqi (Kuwait)</i>	
<b>Comparative Numerical Investigation of a Wood Residues Indirectly Fired Gas Turbine .....</b>	506
<i>G.D. Ngoma (Canada)</i>	

<b>The Italian Approach to the Classification of Areas Where Combustible Dusts May be Present.....</b>	512
<i>R. Tommasini, E. Pons, and S. Toja (Italy)</i>	
<b>Data Mining Application in Industrial Energy Audit for Lighting.....</b>	518
<i>N.M. Maricar, G.C. Kim, and N. Jamal (Malaysia)</i>	

## **SPECIAL SESSION: ADDRESSING BIRD INTERACTIONS WITH POWER LINES**

<b>Impact of Bird Streamers on Quality of Supply on Transmission Lines: A Case Study .....</b>	524
<i>J. Smallie and C. van Rooyen (South Africa)</i>	
<b>Managing Raptor Interactions with Transmission Lines in South Africa .....</b>	529
<i>A. Jenkins, C.S. van Rooyen, J.H. de Goede, and M.T. Matshikiza (South Africa)</i>	
<b>Raptor Nest Management on Power Lines .....</b>	534
<i>R.E. Harness (USA)</i>	
<b>An Automated System for Monitoring Bird Collisions with Power Lines and Tower Guys....</b>	539
<i>R.G. Carlton (USA)</i>	

## **Author Index**