

2009 8th International Symposium on Advanced Electromechanical Motion Systems

(ELECTROMOTION 2009)

**Lille, France
1 – 3 July 2009**



IEEE Catalog Number: CFP0910I-PRT
ISBN: 978-1-4244-5150-0

TABLE OF CONTENTS

ORAL SESSION OS1: 'DESIGN AND ANALYSIS OF PERMANENT-MAGNET MOTORS'

<p>Cogging Torque Analysis of Interior-Type Permanent-Magnet Brushless DC Motor Used in Washers..... 1 <i>Y. Dommezer, L.T. Ergene</i></p> <p>An Analytical Model for Interior Permanent-Magnet Synchronous Machine with Circumferential Magnetization Design..... 7 <i>X. Jannot, J.C. Vannier, J. Saint-Michel, M. Gabsi, C. Marchand, D. Sadarnac</i></p> <p>Claw-Pole Line-Start Permanent-Magnet Synchronous Motor Design and Development..... 13 <i>L. Melescu, M.V. Cistelecan, M. Popescu, O. Craiu, S. Gheorghe</i></p> <p>Acoustic Noise Calculation for High-Speed Permanent-Magnet Motors..... 18 <i>M. Mirzaei, A. Binder, B. Funieru</i></p> <p>Comparison of Optimization Algorithms for the Design of a Brushless DC Machine with Travel-Time Minimization..... 24 <i>T.D. Nguyen, V. Lanfranchi, C. Doc, J.P. Vilain</i></p> <p>Detent Force Reduction in Permanent-Magnet Linear Synchronous Motor Utilizing Auxiliary Poles 30 <i>Y.W. Zhu, Y.H. Cho</i></p>

ORAL SESSION OS2/ SPECIAL SESSION: 'RENEWABLE ENERGIES FOR ELECTRICITY PRODUCTION I'

<p>Influence of Model Parameters on the Diagnosis of the Wind Turbine Generator..... 36 <i>O. Bennouna, N. Heraud, H. Chafouk, G. Notton</i></p> <p>Integration and Optimization of Alternative Sources of Energy in a Remote Region 41 <i>P. Berberi, S. Thodhorjani, R. Aleti</i></p> <p>Some Characteristics of Electricity Production by Stationary Parabolic, Cylindrical Solar Concentrator 45 <i>M. Bojic, N. Marjanovic, I. Miletic, J. Malesevic, A. Mitic</i></p> <p>Summer Electrical Energy Consumption for Different Cooling Systems 49 <i>I. Colda, A. Damian, C. Croitoru</i></p> <p>Statistical Evaluation of the Daily, Monthly and Yearly Solar Radiation 52 <i>N. Mihailov, I. Stoyanov</i></p> <p>Analysis of Torsional Oscillation of the Drive Train in Horizontal-Axis Wind Turbine 56 <i>M. Todorov, I. Dobrev, F. Massouh</i></p>
--

ORAL SESSION OS3: 'MODELLING AND POWER MANAGEMENT IN ELECTRIC TRANSPORT SYSTEMS'

<p>Modelling and Control of a Vehicle with Tire-Road Interaction Using Power-Oriented-Graph and Energetic-Macroscopic-Representation Formalisms 63 <i>F. Grossi, W. Lhomme, R. Zanasi, A. Bouscayrol</i></p> <p>STATCOM to Enhance Power Quality and Security of Rail Traction Supply 69 <i>R. Grunbaum, J.P. Hasler, T. Larsson, M. Meslay</i></p> <p>Modelling and Control of a Double Parallel Hybrid Electric Vehicle Using Energetic Macroscopic Representation 75 <i>T. Letrouve, P. Delarue, A. Bouscayrol</i></p> <p>Implementing the CANopen Protocol for the Distributed Control of a Hybrid Electric Vehicle 81 <i>G. Livint, V. Horga, M. Ratoi, M. Albu, G. Chiriac</i></p> <p>Quantification of Technical Impacts and Environmental Benefits of Electric Vehicles Integration on Electricity Grids..... 87 <i>J.A. Pecas Lopes, F.J. Soares, P.M. Rocha Almeida, P.C. Baptista, C.M. Silva, T.L. Farias</i></p> <p>Power Management Strategies in a Local DC Power Distribution System of More Electric Aircraft with the Help of Hybrid Storage and Dissipation Systems..... 93 <i>H. Zhang, H. Fakham, C. Saudemont, B. Robyns</i></p>
--

ORAL SESSION OS4: ‘PERFORMANCE ANALYSIS AND IMPROVEMENT OF AC MOTORS’

Part-Winding Starting Improvement of Three-Phase Squirrel-Cage Induction Motor	100
<i>M.V. Cistelecan, H.B. Cosan, M. Popescu</i>	
Modeling and Simulation of AC Machines Behaviour in Dynamic Operation – Critical Analysis	106
<i>T. Dordea, R. Munteanu, A. Campeanu</i>	
External Search Coil as a Means of Measuring Rotor Speed of an Induction Motor	114
<i>H.B. Ertan, O. Keysan</i>	
Condition Monitoring of an Inverter-Driven Induction Motor Using Wavelets	120
<i>L.P. Georgakopoulos, E.D. Mitronikas, A.N. Safacas</i>	
Iron Losses in Salient-Pole Synchronous Machines Considering Unidirectional and Elliptic Magnetization	125
<i>G. Traxler-Samek, G. Ardley</i>	
Efficiency Optimization Considerations for Standard Induction Motor Fed by PWM Inverter	131
<i>E.M. Tsambouris, A.G. Kladas</i>	

ORAL SESSION OS5/ SPECIAL SESSION: ‘FUEL CELL SYSTEMS: MODELLING, CONTROL AND DESIGN’

Fuel Cell-based Hybrid Systems	137
<i>B. Davat, S. Astier, T. Azib, O. Bethoux, D. Candusso, G. Coquery, A. De Bernardinis, F. Druart, B. François, M. Garcia Arregui, F. Harel, D. Hissel, J-P. Martin, M-C. Péra, S. Pierfederici, S. Raël, D. Riou, S. Sailler, Y. Bultel, T. Creuzet, C. Turpin</i>	
Control and Operational Management of a Fuel-Cell Supply System for Electric Bicycle	148
<i>M. Bertoluzzo, G. Buja, L. Cavalletto</i>	
Diagnosis and Modelling of Proton-Exchange-Membrane Fuel Cell via Electrochemical-Impedance-Spectroscopy and Acoustic-Emission Measurements	154
<i>B. Legros, P.X. Thivel, F. Druart, Y. Bultel, R. Nogueira</i>	
A Reduced-Order Model and a Higher-Order Sliding-Mode Control of the Air Supply System of a Proton-Exchange-Membrane Fuel Cell with Experimental Validation	160
<i>R. Talj, D. Hissel, R. Ortega, M. Becherif, M. Hilairet</i>	
First Results Obtained with an Impedance Meter Developed for the Diagnosis of Large Proton-Exchange-Membrane Fuel-Cell Stacks	166
<i>S. Wasterlain, F. Harel, D. Candusso, D. Hissel, X. Francois</i>	

ORAL SESSION OS6: ‘POWER SUPPLY AND MOTION CONTROL OF INDUSTRIAL DRIVES’

Position Control of Switched Reluctance Motors by Using an Online Fine-Tuning Regulator	172
<i>C. Mademlis, I. Kioskeridis</i>	
Self-Commissioning Feedforward Control for Industrial Servo Drive	178
<i>F. Mink, A. Bahr, S. Beineke</i>	
Electrically-Driven Compressors on Turbocharged Engines with High-Speed Synchronous Motors	184
<i>L. Novak, J. Novak, M. Novak</i>	
Master-Slave Control for Milling Rotary Tables with Flexible Reduction Stages	190
<i>O. Zirn, A. Fink</i>	

ORAL SESSION OS7: ‘ELECTRIC VEHICLE AND TRACTION DRIVES’

Dynamics of a Feedback Optimal-Current-Vector Flux-Weakening Strategy for Traction Permanent-Magnet Synchronous Motors	196
<i>R. Dolecek, J. Simanek, J. Novak, O. Cerny</i>	
Wide-Speed Direct Torque and Flux Controlled Interior Permanent-Magnet Synchronous Motor Drive Using a Combined Adaptive Sliding-Mode Observer and High-Frequency Signal Injection	202
<i>G. Foo, M.F. Rahman</i>	
Comparison of Internal and Surface Permanent-Magnet Motor Topologies for Electric Vehicle Applications	209
<i>K.I. Laskaris, A.G. Kladas</i>	

Torque Analysis and Control of a Double-Layer Interior Permanent-Magnet Synchronous Motor for Electric Vehicle Propulsion Applications.....	213
<i>A. Muntean, M.M. Radulescu, A. Miraoui</i>	
Setting-up 3D Finite Element Analysis of an Inverse Reluctance Motor for Driving Light Electric Vehicles.....	221
<i>V. Trifa, C. Marginean, O.G. Trifa</i>	

ORAL SESSION OS8/ SPECIAL SESSION: ‘ENERGY MANAGEMENT AND POWER CONTROL OF HYBRID POWER SYSTEMS’

Control of a Doubly-Fed Induction Generator in Wind Park During and After Line-Voltage Distortion.....	227
<i>K. Blecharz, Z. Krzeminski, E. Bogalecka</i>	
LabVIEW Modelling and Simulation of a Hydrogen Based Photovoltaic/Wind Energy System	233
<i>M.L. Doumbia, K. Agbossou, C.L. Pronix</i>	
A Novel DC Voltage Regulation Scheme for Dual-Inverter Grid-Connected Photovoltaic Plants	239
<i>G. Grandi, D. Ostojic, D. Casadei</i>	
Short-Circuit Current Capability for Remote Power Control of a Stand-Alone Variable-Speed Generation Set.....	245
<i>W. Koczara, A. Krasnodebski</i>	
Strategic framework of an Energy Management of a Microgrid with a Photovoltaic-Based Active Generator	252
<i>D. Lu, B. Francois</i>	
Hybrid Trigeneration System Management with a Double DC-Bus Configuration on the Electrical Side.....	258
<i>L. Petrucci, C. Boccaletti, B. Francois, P. Di Felice</i>	

ORAL SESSION OS9: ‘CONTROL OF PERMANENT-MAGNET SYNCHRONOUS MOTOR DRIVES’

Application of a Voltage Adaptive Sensorless Current Controller to a Multi-Phase Permanent-Magnet Synchronous Machine	264
<i>F.M.L. De Belie, J.A. Melkebeek</i>	
An Extended Rotor-Flux Model for Sensorless Direct Torque and Flux Control of Interior Permanent-Magnet Synchronous Motor Drives	270
<i>G. Foo, M.F. Rahman</i>	
Modelling and Torque Control of a Five-Phase Permanent-Magnet Synchronous Motor Using Tooth-Concentrated Winding Technology.....	276
<i>C.H. Sneessens, T. Labbe, F. Baudart, F. Labrique, E. Matagne</i>	
Flux Weakening of Surface Permanent-Magnet Machines in Over-Torque Operation Mode	282
<i>G. Ugalde, J. Poza, G. Almadoz, A. Gonzalez</i>	
Detent Force Suppression for Permanent-Magnet Linear Synchronous Motor Utilizing Feed-Forward Control Method.....	287
<i>Y.W. Zhu, Y.H. Cho</i>	

ORAL SESSION OS10/ SPECIAL SESSION: ‘RENEWABLE ENERGIES FOR ELECTRICITY PRODUCTION II’

Photovoltaic Energy Generation under Partially Shading Conditions	293
<i>I. Caluianu, G. Notton, I. Colda, S. Caluianu, A. Damian</i>	
Grid-Connected Multi-Source System Sizing.....	299
<i>V. Lazarov, G. Notton, L. Stoyanov</i>	
Reliability of Electrical Distribution Network with Decentralized Production	304
<i>S. Nedeltcheva, G. Notton, P. Poggi, K. Stoyanova, V. Tchobanov</i>	
Simulation of Electrical Loads in Electrical Network Nodes with Decentralized Productions	308
<i>S. Nedeltcheva, G. Stamov, G. Notton, P. Poggi, M. Matsankov</i>	
Grid-Connected Photovoltaic System: Optimization of the Inverter Size Using an Energy Approach	313
<i>G. Notton, V. Lazarov, L. Stoyanov, N. Heraud</i>	

ORAL SESSION OS11: ‘NOVEL ACTUATORS AND MICROELECTROMECHANICAL SYSTEMS’

Linear Permanent-Magnet Valve Actuator –The Dynamic Model: Digital Simulations, Open-Loop U/f and I/f Operation and Position Estimation Performance, with Experiments	320
<i>S.C. Agarlita, I. Boldea, F. Marignetti, L. Tutelea</i>	
Modeling and Control Strategies for a Tubular Permanent-Magnet Linear Synchronous Motor Drive System.....	325
<i>I.B. Salem, L. El Amraoui Ouni, M. Benrejeb, F. Gillon, P. Brochet</i>	
Design of a Ferrofluid Micropump Using a Topology Optimization Method.....	330
<i>J. Denies, H.B. Ahmed, B. Dehez</i>	
Design of Controllers: Vibration Damping of Switched Reluctance Machine by Piezoelectric Actuators	336
<i>X. Ojeda, X. Mininger, M. Gabsi, C. Kulcsar, H.F. Raynaud, M. Lecrivain</i>	
A Novel Globular Magnetic Actuator for Movement inside Complex Pipe.....	342
<i>H. Yaguchi, N. Sato</i>	

ORAL SESSION OS12: ‘DISTRIBUTED ENERGY GENERATION SYSTEMS’

Islanding Detection Methods for a Micro-Hydro Power Station – Simulation and Experimental Results.....	346
<i>S. Breban, B. Robyns, M.M. Radulescu</i>	
Simulation of a Doubly-Fed Induction Generator with Hydro Turbine for Electrical Energy Production.....	352
<i>M.B. Camara, B. Dakyo, C. Nichita, G. Barakat</i>	
Didactic Platform for the Study of Hybrid Wind-Hydro Power Plants	358
<i>F. Leach, R.A. Munteanu, I. Vadu, D. Capatana</i>	
A Comparison of Maximum-Power-Point Tracking Control Techniques for Low-Power Variable-Speed Wind Generators	364
<i>C. Patsios, A. Chaniotis, M. Rotas, A.G. Kladas</i>	
Dynamic Performance Analysis of a LC-Filter Grid-Connected Gas Turbine under Voltage-Sag Operation.....	370
<i>F. Salha, F. Colas, X. Guillaud</i>	
An Optimized Photovoltaic System Using an Effective Energy Conversion.....	376
<i>T.A. Singo, A. Martinez, S. Saadate, S. Rael</i>	

DIALOGUE SESSION DS1: ‘DESIGN AND ANALYSIS OF ELECTROMAGNETIC DEVICES’

3D Analytical Calculation of Forces Between Linear Halbach-Type Permanent-Magnet Arrays	382
<i>H. Allag, J.P. Yonnet, M.E.H. Latrache</i>	
Design and Analysis of a Permanent-Magnet Electrodynami c Vibrator	388
<i>A. Botezan, S. Darie, I. Vadu, H. Balan, R. Tirnavan</i>	
Analytical Estimation of the Roebel Bar Losses.....	394
<i>T. Dordea, I. Torac, G. Madescu, M. Mot, L.C. Ocolisan</i>	
Topology Optimization Method Applied to the Design of Electromagnetic Devices: Focus on Convexity Issues.....	398
<i>T. Labbe, F. Glineur, B. Dehez</i>	
Compensation of Unbalanced Magnetic Force in Switched Reluctance Motor with Airgap Nonuniformity.....	404
<i>J. Li, D. Choi, Y.H. Cho</i>	
Research on Reduction of Vibration and Acoustic Noise in Switched Reluctance Motors.....	410
<i>J. Li, X.G. Song, D. Choi, Y.H. Cho</i>	
Analytical and Numerical Development of the Electromagnetic Interference Between a High-Voltage Power Line and a Metallic Underground Pipeline.....	416
<i>D.D. Micu, A. Ceclan, L. Darabant, D. Stet</i>	
Synchronous Reluctance Machine with Magnetically-Coupled, Double Three-Phase Windings	422
<i>A.S.O. Ogunjuyigbe, E.S. Obe, D.V. Nicolae, A.A. Jimoh</i>	
Experimental Validation of the Circulating- Bearing-Currents Mathematical Theory in the 20 MHz Frequency Range	428
<i>D.M. Postariu, C. Chillet, J. Roudet, B. Boualem, R. Periot</i>	

Design of a 42 V Automotive Alternator with Integrated Switched-Mode Rectifier.....	432
<i>D. Stoia, M. Cernat</i>	

DIALOGUE SESSION DS2: 'ADVANCED CONTROL OF POWER CONVERTERS AND MOTOR DRIVES'

On the Potentialities of Reduced Structure Inverters Integrated in Automotive Electric Motor Drives	440
<i>B. El Badsi, A. Ben Rhouma, A. Driss, A. Guermazi, A. Masmoudi</i>	
FPGA-Based Fault-Tolerant Current Controllers for Induction Machine	446
<i>I. Bahri, J. Arbi, I. Slama-Belkhodja, E. Monmasson</i>	
Enslavement and Control of the Multi DC-Bus Link Voltages Using Adaptive Fuzzy.....	452
<i>F. Bouchafaa, D. Beriber, M.S. Boucherit, E.M. Berkouk</i>	
Balancing DC Link Using the Redundant States Method in Selective Harmonics Elimination PWM.....	459
<i>K. Imarazene, H. Chekireb, E.M. Berkouk</i>	
A New Method of Speed-Sensorless Control of Induction Motor at Very Low Speed.....	464
<i>Y. Li, S. Wu</i>	
A Maximum-Power-Point Tracking Algorithm Applied to a Photovoltaic Water-Pumping System.....	469
<i>R. Marouani, F. Bacha</i>	
Design and Stability Study of an Induction Motor Vector Control System with Extended Rotor-Flux and Rotor-Resistance Gopinath Observer.....	475
<i>O. Stoicuta, T.C. Pana</i>	
Flying-Capacitor Multilevel Converter Voltage Balance Dynamics for Pure Resistive Load.....	483
<i>S. Thielemans, A. Ruderman, J.A. Melkebeek</i>	
Fuzzy-Neural Networks Controller-Based Adaptation Mechanism for MRAS Sensorless Induction Motor Drives	489
<i>M. Zerikat, S. Chekroun, A. Mechernene</i>	
Author Index	