

5th IET International Conference on Power Electronics, Machines and Drives 2010

(PEMD 2010)

IET Conference Publications 563

**Brighton, United Kingdom
19-21 April 2010**

Volume 1 of 2

ISBN: 978-1-61738-716-6

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© (2010) by the Institution of Engineering and Technology
All rights reserved.

Printed by Curran Associates, Inc. (2010)

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: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

VOLUME 1

FPGA-based Generalized Scalar Pulse-width-modulation for Matrix Converters	1
<i>F. Bradaschia, E. Ormaetxea, J. Andreu, M.C. Cavalcanti, S. Apinaniz</i>	
Power Device Technology Countering Climate Change	7
<i>Gourab Majumdar</i>	
Comparison of Losses in IGBT Based Voltage and Current Source Converters Using a Single Switching Pole Approach	25
<i>C.R. Avery, S.G. Burrow, P.H. Mellor</i>	
Saving Energy Using Energy Efficient Motors: A Case Study	31
<i>Khushdeep Singh Salana, Tejinder Singh, Navjeevanjot Singh</i>	
Optimal Flux Loss Model Based of Speed Sensorless Vector Control Induction Motor	35
<i>E. Hussein, Peter Mutschler</i>	
A New Compact High Power, Low Voltage Variable Speed Drive for the Renewable and Offshore Markets	41
<i>J.V. Perrier, J.P. Starkey, N. Elliott</i>	
Current Signature Analysis of Induction Machine Rotor Faults Using the Fast Orthogonal Search Algorithm	46
<i>Gregory King, Mohammed Tarbouchi, Donald McGaughey</i>	
Nanocrystalline Cored Transformer Design and Implementation for a High Current Low Voltage DC/DC Converter	51
<i>Z.M. Shafik, K.H. Ahmed, S.J. Finney, B.W. Williams</i>	
High Step-up Boost Converter with Coupled Inductor and Switched Capacitor	57
<i>Yi Zhao, Wuhua Li, Yan Deng, Xiangning He, S. Lambert, V. Pickert</i>	
Performance Analysis of ZVT Interleaved High Step-up Converter with Built-in Transformer	63
<i>Weichen Li, Wuhua Li, Xiangning He, S. Lambert, V. Pickert</i>	
Design and Implementation of a VRM Based on Secondary-side Controller LM5035A	69
<i>Yongkai Liao, Shuilin Tian, Jiande Wu, Yan Deng, Xiangning He</i>	
Adaptive Control of a Switch Mode DC-DC Power Converter Using a Recursive FIR Predictor	75
<i>Maher Algreer, M. Armstrong, D. Giaouris</i>	
A Simple Predictive Control Technique of Power Electronic Transformers with High Dynamic Features	81
<i>G. Brando, A. Dannier, A. Del Pizzo</i>	
Sliding Mode Observation of Capacitor Voltage in Multilevel Power Converters	87
<i>Masoud Almaleki, P. Wheeler, J. Clare</i>	
A New Synchronous Frame Single-phase PLL Algorithm with a Decoupling Network	93
<i>Min Sun, Yongdong Li, J. Wang, Xinghua Tao</i>	
Single Stage Grid Converters for Battery Energy Storage	99
<i>I. Trintis, S. Munk-Nielsen, R. Teodorescu</i>	
Robust Repetitive Feedback Control of a Three-phase Grid Connected Inverter	105
<i>M. Jamil, S.M. Sharkh, M. Abusara, R.J. Boltryk</i>	
Novel Permanent Magnet Linear Generator Topology for Wave Energy Conversion	111
<i>R. Vermaak, M.J. Kamper</i>	
Power Conversion for Wave Energy Applications	117
<i>J.K.H. Shek, D.E. Macpherson, M. Mueller</i>	
Thermal Model of an Induction Generator in Oscillating Water Column Wave Energy Converter	123
<i>N. Hodgins, M. Mueller, W.K. Tease, D. Staton</i>	
C-GEN, A Lightweight Direct Drive Generator for Marine Energy Converters	129
<i>O. Keysan, A. McDonald, M. Mueller, R. Doherty, M. Hamilton</i>	
Design and Commissioning of a 30 kW Direct Drivewave Generator	135
<i>P.C.J. Clifton, R. McMahon, H-P. Kelly</i>	
Induction Rim-Drive for a Marine Propulsor	141
<i>P.M. Tuohy, A.C. Smith, M. Husband</i>	

Investigation of Superconducting Fault Current Limiter Application in a Power-dense Marine Electrical Network	147
<i>S.M. Blair, N.K. Singh, I.M. Elders, C.D. Booth, G. Burt, J. McCarthy</i>	
Design and Analysis of a Pseudo Direct-drive Propulsion Motor	153
<i>D.J. Powell, S.D. Calverley, F. de Wildt, K. Daffey</i>	
Integration of a Mean-torque Diesel Engine Model Into a Hardware-in-the-loop Shipboard Network Simulation	155
<i>A.J. Roscoe, I.M. Elders, J.E. Hill, G. Burt</i>	
Condition Monitoring of a Wind Turbine DFIG by Current or Power Analysis	161
<i>C.J. Crabtree, S. Djurovic, P.J. Tavner, A.C. Smith</i>	
Faulty Operation Analysis of Permanent Magnet Synchronous Generator Drives for Wind Turbine Applications	167
<i>Jorge O. Estima, Jose L.J. Fernandes, A.J. Marques Cardoso</i>	
Sensor and Open-phase Fault Detection and Isolation for Three-phase AC Drives	173
<i>Fabien Meinguet, Johan Gyselinck</i>	
A Park Transform-based Method for Condition Monitoring of Three-phase Electromechanical Systems	179
<i>Christopher Laughman, Steven B. Leeb, Leslie K. Norford, Steven R. Shaw, Peter R. Armstrong</i>	
Enhanced Algorithm for Motor Rotor Broken Bar Detection	185
<i>Jakov Vico, Dragan Stankovic, Ilia Voloh, Zhiying Zhang, Daniel Swigost</i>	
Steady-state Analysis of Full-bridge Series Resonant Converter with Phase-shift and Frequency Control	199
<i>A.A. Aboushady, K.H. Ahmed, S.J. Finney, B.W. Williams</i>	
Reduced Synchronous-rectifier Losses in Off-line Resonant Converters Using the LCC Topology	205
<i>A.J. Skinner, C.P. Bennett</i>	
Resonance Behaviour of a Pulsed Electronic Control Gear for Dielectric Barrier Discharges	210
<i>M. Meisser, M. Paravia, W. Heering, R. Kling</i>	
Comparative Analysis of Three Starting Methods for Parallel Resonant Current Source Inverter	216
<i>R. Fuentes, J. Juliet, F. Campana, F. Ahumada, C. Silva, J. Estrada</i>	
Practical Evaluations of ZCS-PWM Boost DC-DC Converter with Active Edge-resonant Cell Using Si-IGBT/SiC-SBD Hybrid Power Devices	222
<i>Tomokazu Mishima, Shuji Miyake, M. Nakaoka</i>	
Series Compensation for Increased Power Transmission Capacity	228
<i>R. Grunbaum, P. Halvarsson, P. Jones</i>	
Reducing the Cost of Domestic Microgrids	234
<i>T. Feehally, M. Barnes</i>	
Zero-current Zero-voltage Switching for On-load Tap Changers	240
<i>Daniel J. Rogers, T.C. Green</i>	
Four-quadrant Operation of AC Machines Powered by Inverters That Mimic Synchronous Generators	246
<i>Qing-Chang Zhong</i>	
A Decoupled Control of Grid Connected Voltage Source Inverter for Wind Power Generating	252
<i>B. Vasanth Reddy, B. Chitti Babu</i>	
DC-link Voltage Ripple Reduction for a Transformerless Modular Wind Generator System	258
<i>X.B. Yuan, Y.D. Li, J. Y. Chai, J. Wang</i>	
Wind Energy Systems with Power-electronic Converters and Fractional-order Controllers	264
<i>R. Melicio, V.M.F. Mendes, J.P.S. Catalao</i>	
Stalling Region Instability Compensation for Constant Power Soft Stalling Control	270
<i>Ashraf Ahmed, Li Ran, Jim R. Bumby</i>	
Optimum Component Technology Selection for an Explosive Wing De-icing System	276
<i>T. Wijekoon, F. Abdesselam, A. Castellazzi, M. Johnson, N. Picco, P. Wheeler</i>	
Improving Aircraft Engine Operability Through Electric System Design and Operation	282
<i>P.J. Norman, S.J. Galloway, G. Burt, J.E. Hill</i>	
Conceptual Design of an Electric Helicopter Powertrain	287
<i>S.R. Durkee, A. Muetze</i>	
DC-BUS Power Quality for UCX Systems During Generator Fault Conditions	293
<i>R. Todd, A. Forsyth</i>	

Fast Functional Modelling of the Aircraft Power System Including Line Fault Scenarios	299
<i>T. Wu, S.V. Bozhko, G. Asher, D.W. Thomas</i>	
Fault Tolerant Design of a High Speed Permanent Magnet Machine	306
<i>T. Raminosoa, D. Gerada, C. Gerada</i>	
Novel Fault Tolerant Design of Flux Switching Machines	312
<i>T. Raminosoa, C. Gerada</i>	
Comparative Study of Current Vector Control Performance of Alternate Fault Tolerant Inverter Topologies for Three-phase PM Brushless AC Machine with One Phase Open – Circuit Fault	317
<i>K.D. Hoang, Z.Q. Zhu, M.P. Foster, D.A. Stone</i>	
Application of Hybrid Frame Current Regulators to Multiphase Vector Controllers with Missing Phases	323
<i>A. David Graham</i>	
Fault Ride Through Control for a Delta Connected Induction Motor with an Open Winding Fault by Controlling the Zero Sequence Voltage	329
<i>O. Jasim, M. Sumner, C. Gerada, J. Arellano-Padilla</i>	
A Novel Soft-switching Boost Power Factor Correction Converter with an Active Snubber	335
<i>Matada Mahesh, A.K. Panda, H.N. Pratihari</i>	
Digitally-controlled Power Factor Corrector with Interleave Transition Current Mode Control	341
<i>Chia-An Yeh, Kung-Min Ho, Yen-Shin Lai</i>	
Ancillary Services of VSC Interfaced Energy Sources – Voltage Harmonics Compensation	347
<i>F. Hassan, R. Critchley</i>	
Simple Digital Control of a Two-stage PFC Converter Using DSPIC30F Microprocessor	353
<i>Lajos Torok, S. Munk-Nielsen</i>	
Open Circuit Voltage Distortion in Salient Pole Synchronous Generators with Damper Windings	357
<i>P.A. Hargreaves, B.C. Mecrow, R. Hall</i>	
Comparison of Flux Switching and Surface Mounted Permanent Magnet Generators for Aerospace Applications	363
<i>A.S. Thomas, Z.Q. Zhu, G.W. Jewell</i>	
Synchronous Machine Parameter Identification Using Particle Swarm Optimization	368
<i>G.I. Hutchison, B. Zahawi, K. Harmer, B. Stedall, D. Giaouris</i>	
Experimental Performance Assessment of Multi-phase Alternators Supplying Multiple AC/DC Power Converters	372
<i>A. Tessarolo</i>	
Cybergen: Modelling the Design Challenges for Small Embedded Synchronous Generators Connected to Increasingly Unstable Networks	378
<i>Neil L. Brown, Alex Michaelides</i>	
C – Core Topology for PM Wind Generators with Non-overlap Iron-cored Stator Windings	382
<i>J.H. van Wijk, M.J. Kamper</i>	
Synchronous Machine Wind Turbine Modelling Fidelity	388
<i>Jarrold Esau Mohammed, M. Barnes</i>	
Electromagnetic and Mechanical Optimisation of Direct-drive Generators for Large Wind Turbines	394
<i>A. Zavvos, A. McDonald, M. Mueller</i>	
Losses in Hybrid and Active Magnetic Bearings Applied to Long Term Flywheel Energy Storage	400
<i>L. Bakay, M. Dubois, P. Viarouge, J. Ruel</i>	
Voltage Versus Power Factor Regulation for Enhancement of Renewable Generation Capacity	406
<i>A.R. Ahmadi, T.C. Green</i>	
Conception of Robust Neural Networks for Hybrid Control of Asynchronous Motor Drives	412
<i>M.M. Krishan, L. Barazane, A. Khwaldeh</i>	
Comparative Analysis of On-line and Off-line Explicit Solutions, Applied in Predictive Direct Current	418
<i>Juan C. Ramirez Martinez, Ralph Kennel, N. AL Sheakh Ameen</i>	
Scalable Simulation for Preliminary Design of Electrified Power Trains	424
<i>Dominik Buecherl, Hans-Georg Herzog</i>	
Kalman Filter Based Sensorless Control of a Tubular Permanent Magnet Machine for Active Vehicle Suspension	430
<i>J. Wang, W. Wang, K. Atallah</i>	
Active Power Reversal in the Main Winding of a Single Phase Induction Motor	436
<i>J. Peuteman, G. Van Heerswynghels</i>	

Simplified Design of PM Machine for Spacecraft Electro-mechanical Batteries	442
<i>B. Abdi, J. Milimonfared, J.S. Moghani</i>	
Effect of Inter-layer Interface Quality on Electrical and Thermal Characteristics of IMS	446
<i>J.D. Holmes, D.A. Stone, M.P. Foster</i>	
Investigation of the Impact of Speed-ripple and Inertia on the Steady-state Current Spectrum of a DFIG with Unbalanced Rotor	450
<i>S. Djurovic, S. Williamson</i>	
PSPICE and SIMULINK Co-simulation for High Efficiency DC-DC Converter Using SNRU Interface Software	456
<i>O.A. Ahmed, J.A.M Bleijs</i>	
Development of a Laboratory Simulating System to Investigate the Effect of Mechanical Malfunctions in a Twin AC Drive for Cement Kilns	462
<i>I. Bogiatzidis, A. Safacas, E.Mitronikas</i>	
Fuel Cell-supercapacitor System for Telecommunications	468
<i>E. Ribeiro, A.J. Marques Cardoso, C. Boccaletti</i>	
Voltage Control of Three-stage Hybrid Multilevel Inverter Using Vector Transformation	474
<i>M.N. Abdul Kadir, S. Mekhilef, M. Nakaoka</i>	
Artificial Intelligence and Fuzzy Logic Based Comprehensive Motor Testing Technique	480
<i>Subrahmanyam Sista, Avinash Sista, Valarmathi Manoharan</i>	
Modelling and Control of Variable Frequency Multiphase Multi-machine AC-DC Power Conversion Systems	485
<i>W.U.N. Fernando, M. Barnes, O. Marjanovic</i>	
Condition Monitoring for Mechanical Faults in Motor Drive Systems Using the Rectifier Input Currents	491
<i>Jing Li, M. Sumner, J. Arellano-Padilla, Greg Asher</i>	
Fuzzy Control of Micro Hydro Power Plants	497
<i>I. Salhi, S. Doubabi, N. Essounboui</i>	
Fuzzy Logic Control of Brushless Doubly Fed Induction Generator	503
<i>Sayed O. Madbouly, Hussein F. Soliman, Hany M. Hasanien, M. A. Badr</i>	
A Finite-element Model for Induction Machines Incorporating Winding Faults	510
<i>P.J. Holik, S.M. Holik</i>	
Analysis of Various Control Strategy Performances of BDCM for Industrial Applications	513
<i>H. Zeroug, N. Tadrst, B. Boukais</i>	
Model Based Power and Energy Management System for Pem Fuel CELL/LI-ION Battery Driven Propulsion System	519
<i>Lakmal Karunarathne, J.T. Economou, K. Knowles</i>	
Performance Analysis of a New Modular Nano-crystalline Core Transformer Based Converter for Medium Voltage DC Transmission Applications	525
<i>A.A. Aboushady, K.H. Ahmed, S.J. Finney, B.W. Williams, Z.M. Shafik</i>	
Topologies for Wound-field Three-phase Segmented-rotor Flux-switching Machines	531
<i>A. Zulu, B.C. Mecrow, M. Armstrong</i>	
Analysis of a Combined Radial-axial Magnetic Bearing for a High-speed Drive System	537
<i>Philipp Imoberdorf, T. Nussbaumer, J.W. Kolar</i>	
Five-phase Permanent Magnet Machines, Advantages and Applications	543
<i>M.T. Mohammad, J.E. Fletcher</i>	
A Hybrid Voltage Source Converter Arrangement for HVDC Power Transmission and Reactive Power Compensation	548
<i>R. Feldman, M. Tomasini, J. Clare, P. Wheeler, D.R. Trainer, R.S. Whitehouse</i>	
GRID Integration of Offshore Wind Farms Using Multi-terminal DC Transmission Systems (MTDC)	554
<i>O.A. Giddani, Grian. P. Adam, O. Anaya-Lara, K.L. Lo</i>	
Efficiency Evaluation of a DC Transmission System Based on Voltage Source Converters	560
<i>O.A. Giddani, Grian. P. Adam, O. Anaya-Lara, K.L. Lo</i>	
Comparative Investigation of Losses in a Reduced Matrix Converter for Off-shore Wind Turbines	566
<i>A. Garces, M. Molinas</i>	
Converter Performance of Grid Connected Wind Power Generating Systems	572
<i>B. Chitti Babu, K.B. Mohanty</i>	
Power Converters Used in Grid Connected Small Wind Turbines: Analsys of Alternatives	578
<i>I. Kortabarria, E. Ibarra, I. Martínez de Alegria, Jon Andreu, Ainhoa Ascarza</i>	

Design of Permanent-magnet Generators for Wind Energy Applications	584
<i>M.H. Nagrial, J. Rizk, A. Hellany</i>	
Battery and Super Capacitor Combination for a Series Hybrid Electric Vehicle	589
<i>A.M. Jarushi, N.Schofield</i>	
Design of On-board Charger for Plug-in Hybrid Electric Vehicle	595
<i>M. Grenier, M.G. Hosseini Aghdam, T. Thiringer</i>	
Hardware-in-the-loop Evaluation of Electric Vehicle Drives	601
<i>J.M. Apsley, E. Varrone, N. Schofield</i>	

VOLUME 2

Power Boost Unit for Automotive Electric Power Steering Systems	607
<i>Edward Christopher, M. Sumner, Adrian Szabo, Ernest Introvicz</i>	
Parameter Estimation of an Induction Machine Using a Chaos Particle Swarm Optimization Algorithm	612
<i>D.C. Huynh, M.W. Dunnigan</i>	
Perfromce of VFT When Connecting Two Power Grids Operating Under Different Frequencies	618
<i>E.T. Raslan, A.S. Abdel-Khalik, M.A. Abdulla, M.Z. Mustafa</i>	
Optimum Flux Distribution with Harmonic Injection for Multiphase Induction Machine	624
<i>Ayman S. Abdel-Khalik, Mahmoud. I. Masoud, B.W. Williams</i>	
A Four-leg Voltage Source Inverter Fed Asymmetrical Two-phase Induction Motor Drives	630
<i>Y. Kumsuwan, W. Srirattanawichaikul, S. Premrudeepreechacharn, H.A. Toliyat</i>	
Sensorless Control of High Power Induction Motors Using Multilevel Converters	636
<i>K. Saleh, M. Sumner, G. Asher, Q. Gao</i>	
Influence of Converter Capacitance in Resonance-based Sensorless Switched Reluctance Drives	642
<i>K.R. Geldhof, A. Van den Bossche, J.A.A. Melkebeek</i>	
Adaptive Sensorless Position Estimation of a Field-weakened Permanent Magnet Machine Over an Extended Temperature Range	648
<i>W. Drury, D. Holliday, D. Drury, P.H. Mellor</i>	
Online Cross-coupling and Self Incremental Inductances Determination of Salient Permanent Magnet Synchronous Machines	652
<i>G. El-Murr, D. Giaouris, J.W. Finch</i>	
Compensation of Nonlinear Distortion Effects for Signal Injection Based Sensorless Control	656
<i>Daniel Salt, D. Drury, D. Holliday</i>	
Analysis of Measured Impedance by Distance Relay in Presence of SSSC	662
<i>A. Shojaei, S.M. Madani</i>	
Opacity Meter for Transparency Measurements	668
<i>Awadhesh Kumar Singh, Sunanda Gupta</i>	
Comparison of Supercapacitor and Lithium-Ion Capacitor Technologies for Power Electronics Applications	674
<i>S. Lambert, V. Pickert, J. Holden, X. He, W. Li</i>	
Power Electronics and Energy Management of Hybrid Power Sources with Supercapacitors	679
<i>J. Leuchter, P. Bauer, Ahmed F. Zobia</i>	
A New Duty Cycle Based Efficiency Estimation Method for a Super Capacitor Stack Under Constant Power Operation	685
<i>P. Kulsangcharoen, C. Klumpner, M. Rashed, G. Asher</i>	
VTNC Battery Parameter Identification Using Pseudo Random Binary Sequences (PRBS)	691
<i>A.J. Fairweather, M.P. Foster, D.A. Stone</i>	
Modelling a Reversible Solid Oxide Fuel Cell to Be Used As a Storage Device Within AC Power Networks	697
<i>Jiancong Ren, A.J. Roscoe, Stephen Gamble, G. Burt</i>	
Simplified Models of Forward Conduction for SiC Power PiN and Schottky Diodes with Temperature Dependency	703
<i>Ibrahim Abuishmais, Tore M. Undeland</i>	
Parameter Extraction and Calorimetric Validation for a Silicon Carbide JFET PUREG Model	709
<i>Santosh Kumar Singh, Florent Guedon, R. McMahon, Sven Weier</i>	

Real Time, on Line, Age Calculation of IGBT Power Modules	715
<i>P. James, A. Forsyth</i>	
Accelerated Testing of IGBT Power Modules to Determine Time to Failure.....	719
<i>P. James, A. Forsyth</i>	
Battery-supercapacitors Mixed As Electrical Power Buffers.....	723
<i>J. Leuchter, P. Bauer, V. Stekly</i>	
Dynamic Performance of SVCVEQO Under Line to Ground Faults in Power System	729
<i>Y. Suresh, A.K. Panda</i>	
Input Filter Pre-charge Scheme for High Power PWM-CSRs Connected to a Weak Utility Supply	735
<i>M. Tomasini, R. Feldman, P. Wheeler, J. Clare</i>	
Design Optimization of Passive DC Filters for Aerospace Applications	741
<i>A. Griffio, J. Wang</i>	
New Control Method for Distribution Network Distributed Static Series Compensator	747
<i>A. Pashaei, B. Zahawi, D. Giaouris</i>	
A Novel Single-phase Transformerless Photovoltaic Inverter Connected to GRID	752
<i>Bo Yang, Wuhua Li, Yan Deng, Xiangning He, S. Lambert, V. Pickert</i>	
A Modular PV Charger with Maximum Power Point Tracking and Pulse-charging Schemes	758
<i>Ting-Peng Lee, Sen-Tung Wu, Jian-Min Wang, Huang-Jen Chiu, Yu-Kang Lo</i>	
Wide Voltage-range Parallel Boost Inverters with Reduced Circulating Currents	764
<i>E.K. Hussain, C.M. Bingham</i>	
Automated AC Winding Design	769
<i>A.C. Smith, D. Delgado</i>	
Benefits of Increasing the Number of Stator Phases in Terms of Winding Construction Technology in High-power Electric Machines	775
<i>A. Tassarolo</i>	
Co-simulation of Complex Belt Conveyor Drive Systems	781
<i>N. Vijayakumar, G. Eltaliawi, A. Seeliger</i>	
Validating FEA Models of Complex Generator and Gearbox Assemblies using Experimental Modal Analysis.....	787
<i>X. Fan, S. Bradley, J.M.J. Pomfret</i>	
A Semi-permeable Containment Sleeve for High-speed PM Machines.....	792
<i>J.M. Yon, P.H. Mellor, R. Wrobel, J.D. Booker, S.G. Burrow</i>	
Novel Bearingless Brushless Motor in Exterior Rotor Construction for Stirred Bioreactors.....	798
<i>T. Reichert, T. Nussbaumer, J.W. Kolar</i>	
Prediction and Measurement of Heat Transfer in Air-cooled Disc-type Electrical Machines	804
<i>David A. Howey, Andrew S. Holmes, Keith R. Pullen</i>	
Thermal Modelling of Water-cooled Axial-flux Permanent Magnet Machine	810
<i>Erik Odvarka, Neil L. Brown, Abdeslam Mebarki, Martin Shanel, Sridhar Narayanan, Cestmir Ondrusek</i>	
Active Stator, An Innovative Variable Speed Drive Topology.....	815
<i>D.N. Lee, S. Loddick, U. Mupambireyi, S. Ouchouche</i>	
Enclosure Design for a High-speed Permanent Magnet Rotor	817
<i>A. Borisavljevic, H. Polinder, J.A. Ferreira</i>	
Self-precharge for Single-leg Odd-level Multilevel Converter.....	823
<i>S.Thielemans, A. Ruderman, B. Reznikov, J.A.A. Melkebeek</i>	
Analysis and Testing on the Switching States Transitions of Hybrid Clamped Multilevel Inverters.....	829
<i>Jing Zhao, Xiangning He, Yunlong Han, Yan Deng, Rongxiang Zhao</i>	
Performance Comparison of Single-Phase Current-Fed Inverters	835
<i>B. Hassan, V. Pickert, B. Zahawi</i>	
New Configuration of Stacked Multicell Converter with Reduced Number of DC Voltage Sources	840
<i>S.H. Hosseini, A. Khoshkbar Sadigh, M. Sabahi</i>	
Experimental Validation of a Space Vector Modulation Method for a 4-leg Matrix Converter	846
<i>R. Cardenas, R. Pena, P. Wheeler, J. Clare</i>	
A Speed Loop Autotuning Method Based on Signal Injection for Electrical Drives.....	852
<i>A. Costabeber, P. Mattavelli, L. Peretti, M. Zigliotto</i>	
Direct Power Control of Brushless Doubly-Fed Reluctance Machines	858
<i>Hamza Chaal, Milutin Jovanovic</i>	
A Linear Time-invariant Model for a Vector-controlled Two-phase Stepping Motor	864
<i>S. Derammelaere, B. Vervisch, F. De Belie, J. Cottyn, G. Van den Abeele, P. Cox, K. Stockman, L. Vandeveldde</i>	

On the Stator Flux Linkage Estimation of an PO UO with Extended Kalman Filters	869
<i>T.J. Vyncke, R.K. Boel, J.A.A. Melkebeek</i>	
Minimal Configuration PI Fuzzy Gain Scheduling Speed Controller in Indirect Vector Controls Scheme	875
<i>Dragan Matic, Boris Dumnić, Filip Kulic, Vladimir Bugarski</i>	
An ICE/HPM Generator Range Extender in a Series Hybrid Electric Vehicle	881
<i>A.S. Al-Adsani, A.M. Jarushi, N. Schofield</i>	
A High-power, Totally Enclosed, Permanent Magnet, Axial Flux Machine for Engine Integration	887
<i>Abdeslam Mebarki, Krzysztof Wejrzanowski, Martin Shanel, Neil L. Brown</i>	
Design of 12-slot 10-pole Permanent Magnet Flux-switching Machine with Hybrid Excitation for Hybrid Electric Vehicle	893
<i>E. Sulaiman, T. Kosaka, Y. Tsujimori, N. Matsui</i>	
Effect on Regenerative Braking Efficiency with Deceleration Demand and Terrain Condition	898
<i>P. Suntharalingam, J.T. Economou, K. Knowles</i>	
Study of the Electric Loading Aspects of the BDFM Using a Lumped Parameter Thermal Model	904
<i>M.E. Matheka, R. McMahon, S. Shao, D. Staton</i>	
Modal Parameters Identification of Elastic Drive Systems Using the Wavelet Transform	910
<i>H. Loussifi, K. Nouri, R. Dhaouadi</i>	
Investigating the Cooling Performance of the End Region of a Small Totally Enclosed Fan Cooled (TEFC) Induction Motor	916
<i>A. Saliba, C. Micallef</i>	
Rotor Losses in Axial-flux Permanent-magnet Machines with Non-overlapped Windings	922
<i>J.L. Colton, D.J. Patterson, J. Hudgins</i>	
Combined Complex Permeance and Sub-domain Model for Analytical Predicting Electromagnetic Performance of Surface-mounted PM Machines	928
<i>L.J. Wu, Z.Q. Zhu, D. Staton, M. Popescu, D. Hawkins</i>	
Simplified Design of Slotless Halbach Machine for Micro-satellite Electro-mechanical Batteries	934
<i>B. Abdi, J. Milimonfared, J.S. Moghani</i>	
Back-EMF Influence in BDCM Design for Commutation Torque Ripple Reduction	939
<i>B. Boukais, H. Zeroug</i>	
Design Concept of Short-circuit Fault-tolerance Permanent Magnet Machine	945
<i>Y. Pang, Z.Q. Zhu, X.J. Chen, S. Channon</i>	
High-dynamics Low-cost Flow Control with Solenoid Actuator for Ultra-high Purity Applications	949
<i>B. Warberger, J. Feller, C. Guntermann, T. Nussbaumer, J.W. Kolar</i>	
A Comparative Study Between Different Structures of Rail and Actuator Used in Electromagnetic Levitation Systems	954
<i>S. Banerjee, P. Biswas, R. Bhaduri, P. Sarkar</i>	
Open-circuit Fault Mitigation for Multiphase Induction Motors with a Unified Control Structure	960
<i>J.M. Apsley</i>	
Vibration Analysis and Backlash Identification of a Twin AC Drive for a Cement Kiln	966
<i>I. Bogiatzidis, A. Safacas</i>	
A Fault Tolerant Matrix Converter Motor Drive Under Open Phase Faults	972
<i>S. Khwan-On, L. DeLillo, L. Empringham, P. Wheeler</i>	
A Fault Tolerant Electric Drive for an Aircraft Nose Wheel Steering Actuator	978
<i>J.W. Bennett, B.C. Mecrow, D.J. Atkinson, C. Maxwell, M. Benarous</i>	
Device Temperature Projection Technique for IMS Based Systems	984
<i>J.D. Holmes, D.A. Stone, M.P. Foster</i>	
An Experimental and Computational Study of Water Cooled Heatsinks for HEV's	989
<i>V. Pickert, H. Cheng, L. Pritchard, D.J. Atkinson</i>	
Loss Comparison of Two and Three-level Inverter Topologies	995
<i>G.I. Orfanoudakis, S.M. Sharkh, M.A. Yuratich, M.A. Abusara</i>	
Temperature Rise Determination of an Induction Motor Under Blocked Rotor Conditions	1001
<i>Martin Hettegger, Oszkar Bíró, Andrej Stermecki, Georg Ofner</i>	
Ripple Current Reduction by Optimizing Load Dependent Switching Losses Using Adaptive Current Control	1006
<i>T.M. Wolbank, R. Stumberger, A. Lechner, J. Machl</i>	

Adaptive Control Scheme for a Practical Bidirectional DC-DC Converter with a 80 Khz Switching and a 10 Khz Sampling Frequency	1012
<i>S. De Breucker, K. Engelen, P. Tant, J. Driesen</i>	
Synthesizing Power Electronic Switching Waveforms for Reduced EMI Generation	1018
<i>N.F. Oswald, B.H. Stark, C. Hargis, W. Drury, D. Holliday</i>	
Torque Ripple Minimization of Switched Reluctance Drives - A Survey	1024
<i>Jebarani Evangeline, Suresh Kumar</i>	
Analysis and Design of Permanent Magnet Assisted Synchronous Reluctance Machines	1030
<i>R. Karimagako, M.H. Nagrial, J. Rizk</i>	
New Designs of Switched Reluctance Motors with Segmental Rotors	1036
<i>Xiaoyuan Chen, Zhiquan Deng, Xiaolin Wang, Jingjing Peng, Xiangsheng Li</i>	
A New Switching Technique for DC-link Capacitor Minimisation in Switched Reluctance Machine Drives	1042
<i>W. Suppharangsarn, J. Wang</i>	
Comparison of Two Switched Reluctance Motors with Bipolar Excitation	1048
<i>Xiaoyuan Chen, Zhiquan Deng, Jingjing Peng, Xiangsheng Li</i>	
Harmonic Distortion Factor of Space Vector PWM for a Five-phase Inverter	1054
<i>Drazen Dujic, Martin Jones, Emil Levi</i>	
Frequency Response Based Dynamic Performance Analysis of Switched Mode Power Amplifiers Used in Electromagnetic Levitation Systems	1060
<i>S. Banerjee, R. Bhaduri, P. Biswas</i>	
Bidirectional DC-DC Converter for Aircraft Electric Energy Storage Systems	1065
<i>R.T. Naayagi, A. Forsyth</i>	
A Novel Variable Duty Cycle Half-forward Converter Having Low Current Harmonics and High Power Factor	1071
<i>Q.A. Naman, O.F. Abu Mohareb, Q.M. Jaber</i>	
Optimal Design of CUK Step-up Converter for Photovoltaic Energy Systems	1077
<i>B. Chong, L. Zhang, A. Dehghani</i>	
Analysis of Phase Current Reconstruction Precision for PWM-VSI	1083
<i>Hongyan Ma, Qing Wei, Kai Sun, Lipei Huang</i>	
Characterisation and Modelling of Magnetic Couplings and Gears for Servo Control Systems	1088
<i>R.G. Montague, C.M. Bingham, K. Atallah</i>	
Real-Time DSP Implementation of DTC Neural Network-Based for Induction Motor Drive	1094
<i>Y. Sayouti, A. Abbou, M. Akherraz, H. Mahmoudi</i>	
Communication Topology in a Modular Servo-drive System Based on Long Stator Permanent Magnet Synchronous Linear Motor	1099
<i>Sorin Silaghiu, Peter Mutschler</i>	
Analysis of Fast-scale Instability in DC Drives with Full-bridge Converter Using Filippov's Method	1105
<i>N.C. Okafor, D. Giaouris, B. Zahawi, S. Banerjee</i>	
A Custom-designed Limited-angle Actuator for an Electromechanical Engine Valve Drive Part I: Conceptual Design	1110
<i>Yihui Qiu, David J. Perreault, John G. Kassakian, Thomas A. Keim</i>	
A Custom-designed Limited-angle Actuator for an Electromechanical Engine Valve Drive Part II: Fabrication and Evaluation	1116
<i>Yihui Qiu, David J. Perreault, John G. Kassakian, Thomas A. Keim</i>	
Performance Analysis of a Tubular Linear Motor Applied in Compressors	1122
<i>C. Pompermaier, A. Zambonetti, F.J.H. Kalluf, M.V. Ferreira da Luz, N. Sadowski</i>	
Energy Harvesting with Di-Electro Active Polymers	1126
<i>Jens Due, S. Munk-Nielsen, Rasmus O. Nielsen</i>	
A Neutral Leg Independently Controlled Current-Regulated Delta Modulator for Four-Leg Switching Power Amplifier	1132
<i>Xiangsheng Li, Zhiquan Deng, Zhida Chen, Qingzhao Fei, Xiaoyuan Chen</i>	
Limitations of PWM Rectifier Under Unbalanced Voltage Supply	1137
<i>M. Chomat, L. Schreier, J. Bendl</i>	
Inverter Control Using a Simplified Fuzzy PI Controller	1143
<i>S.M. Ayob, Z. Salam, N.A. Azli</i>	
Spread Spectrum Scheme for Two-level Inverters Using Space Vector Sigma-delta Modulation	1149
<i>Biji Jacob, M.R. Baiju</i>	

A Simple Modulationstrategy to Controltheneutral Point Voltage Deviation in Three-level NPC Inverters	1155
<i>Fan Yue, N. Elliott</i>	
Comparison of Optimal Design and Performance of PM Machines Having Non-overlapping Windings and Different Rotor Topologies	1160
<i>D. Evans, Z. Azar, L.J. Wu, Z.Q. Zhu</i>	
Influence of Rotor Configuration on Iron and Magnet Losses of Fractional-slot IPM Machines	1167
<i>Z. Azar, L.J. Wu, D. Evans, Z.Q. Zhu</i>	
Design Aspects on Magnet Placement in Permanent-magnet Assisted Synchronous Reluctance Machines	1173
<i>Kashif Khan, Mats Leksell, Oskar Wallmark</i>	
Modelling of a Line-start Permanent Magnet Motor Using Finite Element Method	1178
<i>F.J.H. Kalluf, C. Pompermaier, M.V. Ferreira da Luz, N. Sadowski</i>	
A Fast and Accurate Simulation Method for Matrix Converters	1182
<i>E. Ibarra, I. Kortabarria, J. Andreu, E. Planas, I. Martínez de Alegria</i>	
A Matrix Converter Control Embedded in a Single System on Chip Based on a FPGA	1188
<i>E. Ormaetxea, J. Andreu, I. Kortabarria, I. Martínez de Alegria, E. Robles</i>	
A Fault Tolerant Modulation Strategy for Matrix Converters	1194
<i>P. Potamianos, E. Mitronikas, A. Safacas</i>	
Repetitive Control for a Four Leg Matrix Converter	1200
<i>Wesam M. Rohouma, Saul Lopez Arevalo, Pericle Zanchetta, P. Wheeler</i>	
Author Index	