

2006 10th IEEE Workshop on Computers in Power Electronics

**Troy, NY
July 16-19, 2006**



**IEEE Catalog Number: 06TH8893
ISBN: 0-7803-9724-X**

Table of Contents

Interleaving and Harmonic Cancellation Effects in Modular Three-Phase Voltage-Sourced Converters.....	1
<i>Carlos Casablanca, Jian Sun</i>	
Active Compensation of the Input Filter Capacitor Current in Single-Phase PFC Boost Converters	8
<i>Konstantin P. Louganski, Jih-Sheng Lai</i>	
Steady State Electro-Thermal Modeling For DC-DC Converters.....	15
<i>Rosa Ciprian, Brad Lehman</i>	
Modeling and Simulation of Solar PV Arrays under Changing Illumination Conditions	21
<i>Dzung D Nguyen, Brad Lehman</i>	
Computer-Controlled Characterization of High-Voltage, High-Frequency SiC Devices	26
<i>J. M. Ortiz-Rodríguez, A. R. Hefner, Jr., D. Berning, C. Hood, S. Olcum</i>	
A Circuit Simulation Model of a Novel Silicon	
Lateral Trench Power MOSFET for High Frequency Switching Applications.....	32
<i>K.R. Varadarajan, A. Sinkar, T.P. Chow</i>	
An Assessment of Coupled Inductor Modeling for a Multi-output Flyback Converter.....	36
<i>F. Farahmand, F. P. Dawson, J. D. Lavers</i>	
A Reconfiguration Technique for Multilevel Inverters Incorporating a Diagnostic System Based on Neural Network	43
<i>Surin Khomfoi, Leon M. Tolbert</i>	
Current Sense Circuit for a DC Powered Three Phase Servo Motor Controller.....	50
<i>Donald E. Fulton</i>	
Deriving New Topologies of DC-DC Converters Featuring Basic Switching Cells.....	54
<i>Faisal H. Khan, Leon M. Tolbert, Fang Z. Peng</i>	
GUI-Based Laboratory Architecture for Teaching and Research in Digital Control of SMPS	59
<i>Arseniy Dolgov, Botao Miao, Regan Zane, Dragan Maksimovic</i>	
FPGA-Based Digital Network Analyzer for Digitally Controlled SMPS.....	63
<i>Botao Miao, Regan Zane, Dragan Maksimovic</i>	
Modeling and simulation of a digital control design approach for power supply systems.....	69
<i>V. Boscaino, G. Capponi, G.M. Di Blasi, P. Liverri, F. Marino</i>	
The Full Digital Control based Switched Mode Power Supply	73
<i>Xin Chen, ChunYing Gong, HuiZheng Wang</i>	
Hybrid Digital Control for Three Phase Rectifier-Inverter System.....	78
<i>H. Gueldner, S. Mohan, J. Losansky, M. Rentzsch</i>	
An Efficient Discontinuous-Mode Model of a Switch Pole.....	83
<i>Jonathan W. Kimball</i>	
Dynamics Characterization of Coupled-Inductor Boost DC-DC Converters	87
<i>Suman Dwari, Saurabh Jayawant, Troy Beechner, Stephanie K. Miller, Anu Mathew, Min Chen, Jonathan Riehl, Jian Sun</i>	
Considering Source Dynamics in Computer-Aided Parameteric Average-Value Modeling of PWM Converters	93
<i>Ali Davoudi, Patrick L. Chapman, Alireza Khaligh, Juri Jatskevich</i>	
Simulating a Multi-Agent based Self-Reconfigurable Electric Power Distribution System	98
<i>Janeth G. Gómez-Gualdrón, Miguel Vélez-Reyes</i>	
A Universal Controller for Distributed Control of Power Electronics Conversion Systems	105
<i>Gerald Francis, Rolando Burgos, Fred Wang, Dushan Boroyevich</i>	

Table of Contents

Study of Different Implementation Approaches for a Maximum Power Point Tracker.....	112
<i>Florent Boico, Brad Lehman</i>	
Dynamic Loop Analysis for Modular Masterless Multi-Phase DC-DC Converters	119
<i>Yang Zhang, Regan Zane, Dragan Maksimovic</i>	
Envelope Following Analysis of an Autonomous Power Electronic System.....	126
<i>Toshiji Kato, Kaoru Inoue, Yoshinori Kanda</i>	
Double-Integral Fourier Analysis of Interleaved Pulse Width Modulation	131
<i>Saurabh Jayawant, Jian Sun</i>	
Trajectory Paths for Dc - Dc Converters and Limits to Performance	137
<i>Grant E. Petel, Philip T. Krein</i>	
Feasibility of Geometric Digital Controls and Augmentation for Ultrafast Dc-Dc Converter Response	145
<i>Philip T. Krein</i>	
Optimal Control of the Parallel Interleaved Buck dc-dc Converter	154
<i>A. Giovanni Beccuti, Georgios Papafotiou, Manfred Morari</i>	
Stochastic Polynomial-Chaos-Based Average Model of Twelve-Pulse Diode Rectifier for Aircraft Applications.....	161
<i>Qianli Su, Kai Strunz</i>	
Input Impedance Modeling of Line-Frequency Rectifiers by the Method of Impedance Mapping.....	166
<i>Jian Sun, Jorge Colon</i>	
Mathematical Model and Control Design for Sensorless Vector Control of Permanent Magnet Synchronous Machines.....	173
<i>Rolando P Burgos, Parag Kshirsagar, Alessandro Lidozzi, Fred Wang, Dushan Boroyevich</i>	
D-Q-0 Synchronous Frame Average Model for Three-Phase Arrays Of Single-Phase PFC Converter Loads.....	180
<i>Bin Huang, Rolando Burgos, Fred Wang, Dushan Boroyevich</i>	
Large- and Small-Signal Evaluation of Average Models for Multi-Pulse Diode Rectifiers	186
<i>Sebastian Rosado, Rolando Burgos, Fred Wang, Dushan Boroyevich</i>	
On the Stability of Distributed Circuit Simulations	192
<i>Carlos Gonzalez, Arindam Das, Mehran Mesbahi</i>	
Digital Power: from Marketing Buzzword To Market Relevance	199
<i>Francesco Carobolante</i>	
Design and Implementation of a Wide-bandwidth Digitally COnrolled 16-Phase Converter.....	203
<i>Xu Zhang, Yang Zhang, Regan Zane, Dragan Maksimovic</i>	
Self-Programmable PID Compensator for Digitally Controlled SMPS.....	209
<i>Zhenyu Zhao, Aleksandar Prodi, Paolo Mattavelli</i>	
Sensorless Current-Sharing in Multiphase Power Converters.....	214
<i>Raymond F. Foley, Richard C. Kavanagh, William P. Marnane, Michael G. Egan</i>	
Virtual Prototyping and Automatic Code Generation for DSP-based Digital Control of Power Electronics Equipment	220
<i>Guanglei Wang, Donghong Li, Antonello Monti, Enrico Santi</i>	
Comparison of Two Different High Performance Mixed Signal Controllers for DC/DC Converters	226
<i>Lars T. Jakobsen, Michael A. E. Andersen</i>	
Digital Sliding Mode Pulsed Current Averaging IC Drivers for High Brightness Light Emitting Diodes	233
<i>Anindita Bhattacharya, Brad Lehman, Anatoly Shteynberg, Harry Rodriguez</i>	
Hybrid DPWM with Digital Delay-Locked Loop	239
<i>Vahid Yousefzadeh, Toru Takayama, Dragan Maksimovic</i>	

Table of Contents

Digital Pulse-Frequency/Pulse-Amplitude Modulator for Improving Efficiency of SMPS Operating Under Light Loads	246
<i>Nabeel Rahman, Kun Wang, Aleksandar Prodic</i>	
Digitally controlled 10 MHz monolithic buck converter	251
<i>Toru Takayama and Dragan Maksimovic</i>	
Implementation of a 16 Phase Digital Modulator in a 0.35 μm Process.....	256
<i>Tony Carosa, Regan Zane, Dragan Maksimovic</i>	
A Preliminary Investigation of Computer-Aided Schwarz-Christoffel Transformation for Electric Machine Design and Analysis	263
<i>Timothy C. O'Connell, Philip T. Krein</i>	
General Adaptive Schemes for Resistance and Speed Estimation in Induction Motor Drives.....	270
<i>Han Li, Wen Xuhui, Chen Guilan</i>	
DSP Control of Multi-Use Induction Machines with Multiple Stator Windings: Closed-Loop Voltage Regulation and Speed	276
<i>Al-Thaddeus Avestruz, Steven B. Leeb</i>	
Experimental High Performance Control of Two Permanent Magnet Synchronous Machines in an Integrated Drive for Automotive Applications.....	283
<i>Lixin Tang, Gui-jia Su, Xianghui Huang</i>	
Toward a System for Automatic Extraction of Low-Order Models for Magnetic Devices.....	290
<i>Liyan Qu, Patrick L. Chapman</i>	
System Modeling and Characterization of SiC Schottky Power Diodes	296
<i>Hui Zhang, Leon M. Tolbert, Burak Ozpineci</i>	
Automated Parameter Extraction Software for High-Voltage, High-Frequency SiC Power MOSFETs	302
<i>Tam H. Duong, Allen R. Hefner, David W. Berning</i>	
SPICE Model of SiC JFETs for Circuit Simulations.....	309
<i>Yi Wang, Callaway J. Cass, T. Paul Chow, Fred Wang, Dushan Boroyevich</i>	
Analysis and Optimization of Switched-Capacitor DC-DC Converters	313
<i>Michael D. Seeman, Seth R. Sanders</i>	
Small signal modeling of hysteretic current mode control using the PWM switch model	322
<i>J. H. Park, B. H. Cho</i>	
Small-signal Discrete-time Modeling of Digitally Controlled DC-DC Converters.....	328
<i>Dragan Maksimovic, Regan Zane</i>	