

2019 20th Workshop on Control and Modeling for Power Electronics (COMPEL 2019)

**Toronto, Ontario, Canada
17 – 20 June 2019**



**IEEE Catalog Number: CFP19COM-POD
ISBN: 978-1-7281-1843-7**

**Copyright © 2019 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP19COM-POD
ISBN (Print-On-Demand):	978-1-7281-1843-7
ISBN (Online):	978-1-7281-1842-0
ISSN:	1093-5142

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) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

SHARING INERTIA BETWEEN VSC-HVDC INTERCONNECTED WEAK AC SYSTEMS WITH A SELF-GOVERNING CONTROL SCHEME	1
<i>Jian Xu ; Tiankai Lan ; Siyang Liao ; Deping Ke ; Fan Cheng ; Yuanzhang Sun</i>	
REDUCED-ORDER MODEL FOR THE CLAMPED-RESONANT INTERLEAVED BOOST CONVERTER	7
<i>Giorgio Spiazzi ; Luca Corradini</i>	
LQR APPROACH FOR REGULATING VOLTAGE AND POWER FLOW THROUGH THE PORTS OF A MEDIUM VOLTAGE QUAD ACTIVE BRIDGE SOLID STATE TRANSFORMER	14
<i>Mohammed Hatatah ; Brandon M. Grainger</i>	
SYMMETRICAL COMPONENT MODEL FOR A TRANSFORMERLESS, GRID-TIED CURRENT CONTROLLED INVERTER UNDER UNBALANCED CONDITIONS	21
<i>Thibaut Harzig ; Hashim A. Al Hassan ; Brandon M. Grainger</i>	
RELIABILITY MODELING OF POWER ELECTRONIC CONVERTERS: A GENERAL APPROACH	27
<i>Saeed Peyghami ; Zhongxu Wang ; Frede Blaabjerg</i>	
AN EFFICIENT REDUCED-ORDER MODEL FOR STUDYING SYNCHRONIZATION STABILITY OF GRID-FOLLOWING CONVERTERS DURING GRID FAULTS	34
<i>Mads Graungaard Taul ; Xiongfei Wang ; Pooya Davari ; Frede Blaabjerg</i>	
MONOLITHICALLY INTEGRATED GATE DRIVER FOR MHZ SWITCHING WITH AN EXTERNAL INDUCTOR AS A CURRENT SOURCE	41
<i>Junichiro Nagao ; Yuki Yamashita ; Jun Furuta ; Kazutoshi Kobayashi ; Steve Stoffels ; Niels Posthuma ; Stefaan Decoutere</i>	
LOW THDI CONTROLLER FOR CURRENT SENSORLESS SINGLE PHASE RECTIFIERS USING A TWO-SAMPLE PHASE LOCKED LOOP	47
<i>Paula Lamo ; Gustavo A. Ruiz ; Alberto Pigazo ; Francisco J. Azcondo</i>	
VIRTUAL IMPEDANCE DESIGN FOR POWER QUALITY AND HARMONIC SHARING IMPROVEMENT IN MICROGRIDS	52
<i>Fredrik Göthner ; Ole-Morten Midtgård ; Raymundo Torres-Olguin ; Javier Roldan-Perez</i>	
SENSORLESS IPMSM CONTROL BASED ON IMPROVED SLIDING MODE OBSERVER BY USING SYNCHRONOUS REFERENCE FRAME FILTER	59
<i>Qipeng Tang ; Bao Chen ; Xiangning He ; Anwen Shen</i>	
ON THE OPTIMAL INPUT VOLTAGE OF A CLASS-E POWER AMPLIFIER WITH GAN HEMTS AT MHZ FREQUENCY OPERATION	64
<i>Kawin Surakitbovorn ; Lei Gu ; Juan Rivas-Davila</i>	
DESIGN AND SIMULATION OF A MPPT DC-DC BOOST CONVERTER FOR A PEROVSKITE SOLAR CELL MODULE FOR ENERGY HARVESTING APPLICATION	72
<i>Daniel Castillo ; Juanita Hidalgo ; Yessica Africano ; Andres Felipe Guarmino ; Jose Fernando Jimenez ; Pablo Ortiz ; Maria Teresa Cortés ; Michael Bressan</i>	
COMPARATIVE ANALYSIS ON MINIMUM OUTPUT IMPEDANCE OF FIXED-RATIO HYBRID SWITCHED CAPACITOR CONVERTERS	77
<i>Wen Chuen Liu ; Zichao Ye ; Robert C. N. Pilawa-Podgurski</i>	
COMPUTATION OF FREQUENCY CHARACTERISTICS OF GRID INVERTERS BY GENERAL SMALL-SIGNAL ANALYSIS METHOD	84
<i>Akinobu Kaneko ; Ko Oue ; Toshiji Kato ; Kaoru Inoue</i>	
DELAY MITIGATION IN HIGH FREQUENCY DUAL CURRENT PROGRAMMED MODE CONTROL GAN-BASED ZVS INVERTER	91
<i>Kamal Sabi ; Daniel Costinett</i>	
DESIGN OF PLL GAINS TO INCREASE THE STABILITY MARGINS OF THREE-PHASE CONVERTERS CONNECTED TO WEAK GRIDS	98
<i>André Nicolini ; Fernanda Carnielutti ; Jorge Massing ; Humberto Pinheiro</i>	
STABILITY ANALYSIS OF GRID-FORMING INVERTER IN DQ FREQUENCY DOMAIN	105
<i>K. Oue ; S. Sano ; T. Kato ; K. Inoue</i>	
EXTENSIONS TO TWO-PORT NETWORK MODELING METHOD AND ANALYSIS OF MULTIPLE-VSC-BASED SYSTEMS	113
<i>Shih-Feng Chou ; Xiongfei Wang ; Frede Blaabjerg</i>	
A COMPACT 45 V-TO-54 KV MODULAR DC-DC CONVERTER	121
<i>Sanghyeon Park ; Lei Gu ; Juan Rivas-Davila</i>	

A GENERALIZED SIMULATION-BASED MULTI-FUNCTIONAL DIFFERENTIAL MODE AND COMMON MODE LCL FILTER DESIGN METHOD	128
<i>Xinmin Zhang ; Mahshid Amirabadi ; Brad Lehman</i>	
AN INVESTIGATION INTO THE CAUSES OF COSS LOSSES IN GAN-ON-SI HEMTS.....	136
<i>Jia Zhuang ; Grayson Zulauf ; Jaume Roig ; James D. Plummer ; Juan Rivas-Davila</i>	
ENUMERATION AND ANALYSIS OF DC-DC CONVERTER IMPLEMENTATIONS BASED ON PIEZOELECTRIC RESONATORS.....	143
<i>Jessica D. Boles ; Joshua J. Piel ; David J. Perreault</i>	
MULTIPHASE GAN CLASS-D RESONANT AMPLIFIER FOR HIGH-INTENSITY FOCUSED ULTRASOUND	151
<i>Lei Gu ; Quintin Stedman ; Morten Rasmussen ; Chi-Nan Pai ; Kevin Brenner ; Bo Ma ; Arif Sanli Ergun ; Butrus Khuri-Yakub ; Juan Rivas Davila</i>	
VOLTAGE RIPPLE ANALYSIS BASED ON DC-LINK CURRENT HARMONICS FOR VOLTAGE SOURCE INVERTERS.....	157
<i>Cornelius Rettner ; George Jacob ; Maximilian Schiedermeier ; Andreas Apelsmeier ; Martin März</i>	
AUTOMOTIVE LED DRIVER BASED ON RESONANT DC-DC CONVERTER WITH WIDE INPUT AND OUTPUT VOLTAGE RANGES	163
<i>Satyaki Mukherjee ; Alihossein Sepahvand ; Vahid Yousefzadeh ; Montu Doshi ; Dragan Maksimovic</i>	
AC RESISTANCE REDUCTION USING ORTHOGONAL AIR GAPS IN HIGH FREQUENCY INDUCTORS.....	169
<i>Satyaki Mukherjee ; Yucheng Gao ; Regina Ramos ; Vivek Sankaranarayanan ; Branko Majmunovic ; Rahul Mallik ; Soham Dutta ; Gab-Su Seo ; Brian Johnson ; Dragan Maksimovic</i>	
DEADTIME IMPACT ON THE SMALL-SIGNAL OUTPUT IMPEDANCE OF SINGLE-PHASE POWER ELECTRONIC CONVERTERS.....	175
<i>Matias Berg ; Tuomas Messo ; Tomi Roinila ; Paolo Mattavelli</i>	
SIMPLIFIED SVPWM METHOD FOR THE VIENNA RECTIFIER	183
<i>Ali Sunbul ; Vijay K. Sood</i>	
A PASSIVE CELL CAPACITOR VOLTAGE CONTROL METHOD FOR THE CURRENT SHAPING MODULAR MULTILEVEL DC/DC CONVERTER.....	191
<i>P. A. Gray ; P. W. Lehn</i>	
REVISITING "PARTIAL POWER ARCHITECTURES" FROM THE "DIFFERENTIAL POWER" PERSPECTIVE	198
<i>Cheng Li ; Yann E. Bowvier ; Antonio Berrios ; Pedro Alou ; Jesús A. Oliver ; José A. Cobos</i>	
GENERALIZED DC-DC-AC MMC STRUCTURE FOR MVDC AND HVDC APPLICATIONS.....	206
<i>Yuan Li ; Dalu Liu ; Gregory J. Kish</i>	
2-LEVEL SI IGBT CONVERTER WITH PARALLEL PART-RATED SIC CONVERTER PROVIDING PARTIAL POWER TRANSFER AND ACTIVE FILTERING.....	214
<i>Paul D. Judge ; Stephen Finney</i>	
DESIGN CRITERIA AND MODULATION STRATEGIES FOR COMPLETE ZVS OPERATION OF THE BIDIRECTIONAL INTERLEAVED BOOST CONVERTER WITH COUPLED INDUCTORS.....	221
<i>Francesco Toniolo ; Paolo Mattavelli ; Giorgio Spiazzi</i>	
FUZZY CONTROL OF ENERGY STORAGE SYSTEMS IN DC MICROGRIDS.....	227
<i>R. D. Smith ; J. T. Lukowski ; W. W. Weaver</i>	
DIGITAL PREDICTIVE PEAK CURRENT-MODE CONTROL FOR THREE-LEVEL BUCK CONVERTERS	234
<i>Giovanni Bonanno ; Luca Corradini</i>	
A LOSS MINIMIZATION ANALYSIS IN A NEW INTERLEAVED DC-DC BUCK CONVERTER WITH VERY HIGH STEP-DOWN RATIO.....	241
<i>Mauricio Dalla Vecchia ; Simon Ravyts ; Giel Van Den Broeck ; Leonie Halleman ; Jeroen Tant ; Johan Driesen</i>	
MITIGATING VOLTAGE FLUCTUATIONS IN BATTERY ENERGY STORAGE SYSTEMS	248
<i>Roosa-Maria Sallinen ; Tuomas Messo ; Tomi Roinila</i>	
MODELLING AND CONTROL OF THE HL-LHC NESTED MAGNET CIRCUITS AT CERN.....	254
<i>Samer Yammine ; Hugues Thiesen</i>	
DECOMPOSITION METHOD FOR EVENT-DETECTION STATE VECTOR SIMULATION OF SWITCHED-MODE POWER SUPPLIES.....	260
<i>Collin Reiman ; Elyse Rosenbaum</i>	
GENERAL PROPERTIES AND SYNTHESIS OF TRANSFORMERLESS STACKED ACTIVE BRIDGE CONVERTERS.....	266
<i>Jianglin Zhu ; Roman Schuess ; Dragan Maksimovic</i>	

LOW-LOSS GATE DRIVING TECHNIQUES OF THE CASCODE GAN/SIC POWER DEVICE AT HIGH FREQUENCIES.....	272
<i>Jiale Xu ; Lei Gu ; Juan Rivas-Davila</i>	
DC ARC FAULT MODEL SUPERIMPOSING MULTIPLE RANDOM ARC NOISE STATES ON AN AVERAGE MODEL.....	278
<i>Jonathan C. Kim ; Brad Lehman ; Roy Ball</i>	
RELIABILITY ANALYSIS OF A 3-LEG 4-WIRE INVERTER UNDER UNBALANCED LOADS AND HARMONIC INJECTION.....	286
<i>Tomàs Lledó-Ponsati ; Amir Sajjad Bahman ; Francesco Iannuzzo ; Daniel Montesinos-Miracle ; Samuel Galceran Arellano</i>	
DESIGN AND ANALYSIS OF A NOVEL TRANS-INVERSE DC-DC CONVERTER.....	294
<i>Jing Yuan ; Zhan Shen ; Yongheng Yang ; Ali Mostaan ; Frede Blaabjerg</i>	
MODELING OF MULTI-LOOPS RELATED DEVICE TURN-ON OVERVOLTAGE IN 3L-ANPC CONVERTERS.....	299
<i>Handong Gui ; Ruirui Chen ; Ren Ren ; Jiahao Niu ; Fred Wang ; Leon M. Tolbert ; Daniel J. Costinett ; Benjamin J. Blalock ; Benjamin B. Choi</i>	
SYSTEMATIC DERIVATION OF SIMPLIFIED ACTIVE-NEUTRAL-POINT-CLAMPED MULTILEVEL CONVERTER THROUGH MATRIX MODELS.....	305
<i>Yuzhuo Li ; Hao Tian ; Yun Wei Li</i>	
MULTI-LEVEL VOLTAGE SOURCE PARALLEL INVERTERS USING COUPLED INDUCTORS.....	313
<i>Sukhjot Singh ; John Salmon</i>	
DRIVE-CYCLE OPTIMIZED 99% EFFICIENT SIC BOOST CONVERTER USING PLANAR INDUCTOR WITH ENHANCED THERMAL MANAGEMENT.....	321
<i>Yucheng Gao ; Vivek Sankaranarayanan ; Ercan M. Dede ; Aritra Ghosh ; Dragan Maksimovic ; Robert W. Erickson</i>	
PWM CONTROL OF A DUAL INVERTER DRIVE USING A FLOATING CAPACITOR INVERTER.....	328
<i>Sukhjot Singh ; Chatumal Perera ; Gregory J. Kish ; John Salmon</i>	
CONTROL AND MODULATION OF A BIPOLAR MULTI-LEVEL ACTIVE POWER PULSATION BUFFER FOR SINGLE-PHASE CONVERTERS.....	336
<i>Zitao Liao ; Robert C. N. Pilawa-Podgurski</i>	
NONLINEAR BACKSTEPPING CONTROLLER FOR SINGLE-PHASE GRID-CONNECTED INVERTERS.....	343
<i>Moath Alqatamin ; Michael L. McIntyre</i>	
EQUIVALENT CIRCUIT MODELS OF VOLTAGE-CONTROLLED DUAL ACTIVE BRIDGE CONVERTERS.....	349
<i>R. Mallik ; B. Majmunovic ; S. Mukherjee ; S. Dutta ; G.-S. Seo ; D. Maksimovic ; B. Johnson</i>	
IDENTIFICATION OF CRITICAL PARAMETERS AFFECTING THE SMALL-SIGNAL STABILITY OF CONVERTER-BASED MICROGRIDS.....	353
<i>Huoming Yang ; Hendrik Just ; Sibylle Dieckerhoff</i>	
IMPEDANCE-BASED STABILITY ANALYSIS OF MULTI-PARALLEL INVERTERS APPLYING TOTAL SOURCE ADMITTANCE.....	359
<i>Henrik Alenius ; Matias Berg ; Roni Luhtala ; Tomi Roinila ; Tuomas Messo</i>	
A SERIES-RESONANT CHARGE-PUMP-BASED RECTIFIER WITH INHERENT PFC CAPABILITY.....	367
<i>Ahmed M. Ammar ; Frederik M. Spleid ; Yasser Nour ; Arnold Knott</i>	
DYNAMIC MODELLING AND PERFORMANCE ASSESSMENT OF A SINGLE BATTERY ELECTRIC VEHICLE POWERTRAIN SYSTEM EMPLOYING AN INDUCTION MOTOR.....	372
<i>Najmeh Rezaei ; Kamyar Mehran</i>	
SINGLE-VARIABLE ACCURATE LOAD ESTIMATION FOR OPTIMIZED TRANSIENT MITIGATION IN BOOST-TYPE CONVERTERS.....	380
<i>Tom Urkin ; Mor Mordechai Peretz</i>	
PLUG-AND-PLAY OPTIMAL TRANSIENT MITIGATION CONTROL CIRCUITRY FOR HIGH-POWER HIGH-PERFORMANCE VRM.....	386
<i>Bar Halivni ; Mor Mordechai Peretz</i>	
MODULATION SCHEME OPTIMIZATION FOR A DUAL THREE-PHASE ACTIVE BRIDGE (D3AB) PFC RECTIFIER TOPOLOGY.....	392
<i>M. J. Heller ; F. Krismer ; J. W. Kolar</i>	
MULTI-OBJECTIVE PARAMETER OPTIMIZATION OF MULTIPLE VSG AND DROOP CONTROLLED INVERTERS FOR GRID-CONNECTED AND ISLANDED OPERATION.....	400
<i>Malte Eggers ; Huoming Yang ; Hendrik Just ; Sibylle Dieckerhoff ; Hang Yin</i>	

MULTILEVEL HIGH-VOLTAGE MODULAR RAPID CAPACITOR CHARGER	407
<i>Doodi Dayan ; Michael Evzelman ; Mor Mordechai Peretz</i>	
THERMAL ANALYSIS OF POWER MODULE PACKAGING USING POWER-SYSTEM-IN-INDUCTOR (PSI²) TECHNOLOGY	415
<i>Andrew Yurek ; Wenbo Liu ; Yan-Fei Liu</i>	
A SINGLE STAGE TRANSFORMER-LESS MICRO INVERTER WITH INTEGRATED BATTERY STORAGE SYSTEM FOR RESIDENTIAL APPLICATIONS	423
<i>Fahad Alhuwaishel ; Prasad Enjeti</i>	
A DC-DC CONVERTER-BASED SINGLE-SOURCE TRANSFORMER-LESS MULTILEVEL INVERTER	430
<i>Hossein Khoun Jahan ; Amin Mohammadpour Shotorbani ; Alireza E. Khosroshahi ; Liwei Wang ; Frede Blaabjerg ; Mehdi Abapour ; Kazem Zare</i>	
A NOVEL INTEGRATED MULTI-LAYER COOLING (IMLC) STRUCTURE FOR HIGH POWER DENSITY APPLICATIONS	438
<i>Andrew Yurek ; Wenbo Liu ; Yang Chen ; Bo Sheng ; Xiang Zhou ; Yan-Fei Liu</i>	
WINDING SHAPE OPTIMIZATION IN TRANSFORMERS	445
<i>Ralf H. Carestia ; Aaron L. F. Stein ; Charles R. Sullivan</i>	
COMPUTATIONAL HEAT TRANSFER PLATFORM FOR FREQUENCY DOMAIN RELIABILITY DESIGN	451
<i>Jacob A. Free ; Timothy A. Polom ; Robert D. Lorenz</i>	
NEW SYNERGETIC CONTROL OF A 20KW ISOLATED VIENNA RECTIFIER FRONT-END EV BATTERY CHARGER	458
<i>J. Azurza Anderson ; M. Haider ; D. Bortis ; J. W. Kolar ; M. Kasper ; G. Deboy</i>	
SIMULATION-BASED OPTIMISATION OF LCC-HVDC CONTROLLER PARAMETERS USING SURROGATE MODEL SOLVERS	466
<i>Aaron S. C. Leavy ; Lie Xu ; Shaahin Filizadeh ; Aniruddha M. Gole</i>	
POWER SHARING BASED ALGORITHM FOR SIZING COMPONENTS IN FUEL CELL HYBRID ELECTRIC VEHICLES	474
<i>Marium Rasheed ; Baljit Riar ; Regan Zane</i>	
AN EFFECTIVE AVERAGE VALUE MODEL FOR MODULAR MULTILEVEL CONVERTERS UNDER STARTUP PROCESS	482
<i>Jinling Qi ; Haihao Jiang ; Weixing Li ; Xiaozhe Wang ; Boon-Teck Ooi</i>	
OPTIMAL LOAD DISCHARGE OF A CAPACITIVE ENERGY STORAGE DEVICE	489
<i>Eddy H. Trinklein ; Wayne W. Weaver ; Gordon G. Parker ; Matthew J. Heath ; Rush D. Robinett ; David G. Wilson</i>	
NATURAL BALANCING OF FLYING CAPACITOR MULTILEVEL CONVERTERS AT NOMINAL CONVERSION RATIOS	494
<i>Ziyu Xia ; Benjamin L. Dobbins ; Jason T. Stauth</i>	
A NEW COUPLED INDUCTOR-BASED HIGH STEP-UP DC-DC CONVERTER FOR PV APPLICATIONS	502
<i>Alireza Eyvazizadeh Khosroshahi ; Amin Mohammadpour Shotorbani ; Hoda Dadashzadeh ; Amir Farakhor ; Liwei Wang</i>	
DESIGN CONSIDERATIONS FOR PLANAR MAGNETIC TERMINATIONS	509
<i>Mike K. Ranjram ; Pedro Acosta ; David J. Perreault</i>	
A NOVEL DQ IMPEDANCE MEASUREMENT METHOD IN THREE-PHASE BALANCED SYSTEMS	517
<i>Ye Tang ; Rolando Burgos ; Bo Wen ; Dushan Boroyevich ; Jacob Verhulst ; David Vrtachnik ; Mohamed Belkhatat</i>	
ACCURATE OPEN-LOOP IMPEDANCE MODEL OF SINGLE-PHASE VOLTAGE SOURCE INVERTER (VSI) CONSIDERING THE DEAD-TIME EFFECTS	522
<i>Mengfan Zhang ; Dongsheng Yang ; Xiongfei Wang</i>	
SMALL SIGNAL MODEL FOR VERY-LARGE-SCALE MULTI-ACTIVE-BRIDGE DIFFERENTIAL POWER PROCESSING (MAB-DPP) ARCHITECTURE	527
<i>Ping Wang ; Yanan Chen ; Youssef Elasser ; Minjie Chen</i>	
INTERLEAVED BUCK-BOOST INTEGRATED DC FAST CHARGER WITH BIDIRECTIONAL FAULT BLOCKING CAPABILITY	535
<i>Caniggia Viana ; Milad Keshani ; Peter W. Lehn</i>	
A HIGH-POWER HIGH-RATIO DC-DC CONVERTER WITH DC FAULT BLOCKING CAPABILITY	542
<i>Sixing Du ; Reza Iravani</i>	
ONLINE MEASUREMENT OF OFFSHORE WIND FARM IMPEDANCE FOR ADAPTIVE CONTROL OF HVDC TRANSMISSION SYSTEMS	547
<i>Ignacio Vieto ; Pengxiang Huang ; Tommi Reinikka ; Hamed Nademi ; Christoph Buchhagen ; Jian Sun</i>	

SPARSE OPERATION OF MULTI-WINDING TRANSFORMER IN MULTI-PORT-AC-COUPLED CONVERTERS	555
<i>Youssef Elasser ; Yenan Chen ; Ping Wang ; Minjie Chen</i>	
MODELING AND COMPARISON OF PASSIVE COMPONENT VOLUME OF HYBRID RESONANT SWITCHED-CAPACITOR CONVERTERS.....	563
<i>Zichao Ye ; Seth R. Sanders ; Robert C. N. Pilawa-Podgurski</i>	
ANALYTICAL MODELING OF MMCS WITH ASYMMETRIC CELL VOLTAGES FOR UTILITY-SCALE RENEWABLE ENERGY INTEGRATION.....	571
<i>Abhijit Kshirsagar ; Anushree Ramanath ; Jeyaram Durga Manian Deivanayagam ; Sreekanth Thamballa ; Ned Mohan</i>	
SMALL-SIGNAL STATE-SPACE ANALYSIS OF INDUCTIVE BATTERY CHARGING SYSTEM IN OFF-RESONANT OPERATION	578
<i>Ernst Torsgård ; Giuseppe Guidi ; Jon Are Suul</i>	
IMPROVING ACTIVE-POWER TRANSFER CAPACITY OF VIRTUAL SYNCHRONOUS GENERATOR IN WEAK GRID	586
<i>Shuan Dong ; Yu Christine Chen</i>	
ONLINE IMPEDANCE MEASUREMENT OF THE BATTERIES AND LOADS CONNECTED TO A MODULAR MULTI-ACTIVE BRIDGE CONVERTER	593
<i>Cristina Fernandez ; Leonardo Ortega ; Marlon Granda ; Pablo Zumel ; Andrés Barrado</i>	
DISCRETE TIME SYNCHRONIZATION MODELING FOR ACTIVE RECTIFIERS IN WIRELESS POWER TRANSFER SYSTEMS.....	599
<i>Spencer Cochran ; Daniel Costinett</i>	
CIRCUIT-EQUIVALENT MODELS FOR CURRENT-CONTROLLED INVERTERS.....	607
<i>Brian Johnson ; Minghui Lu ; Victor Purba ; Sairaj Dhople</i>	
OPTIMAL POWER MANAGEMENT FOR GRID-CONNECTED MICROGRID CONSIDERING MODELLING OF DIFFERENT ELECTRICITY COST AND BATTERY DEGRADATION COST	612
<i>Ya Guo ; Su Sheng ; Norma Anglani ; Brad Lehman</i>	
CASCADED DUAL-ACTIVE BRIDGE CELL BASED PARTIAL POWER CONVERTER FOR BATTERY EMULATION	619
<i>Sanchit Mishra ; Sreekanth Tamballa ; Manikanta Pallantala ; Siddharth Raju ; Ned Mohan</i>	
IMPEDANCE-BASED CHARACTERIZATION OF DIGITAL CONTROL DELAY AND ITS EFFECTS ON SYSTEM STABILITY	626
<i>Jian Sun ; Ignacio Vieto ; Einar V. Larsen ; Christoph Buchhagen</i>	
ANALYSIS OF SUBMODULE CAPACITOR VOLTAGE RIPPLE AND SECOND-HARMONIC CURRENT IN MMCS	634
<i>Xianghua Shi ; Shaahin Filizadeh ; Liwei Wang</i>	
DISCRETE MODEL OF DUAL ACTIVE BRIDGE SERIES RESONANT CONVERTER	642
<i>Pablo Zumel ; Leonardo D. Ortega ; Cristina Fernandez ; Ruben Rodriguez ; Andres Barrado</i>	
TRACKING AGGREGATE ACTIVE-AND REACTIVE-POWER SETPOINTS FOR A COLLECTION OF DISPATCHABLE INVERTERS	649
<i>Abdullah Al-Digs ; Victor Purba ; Sairaj V. Dhople ; Yu Christine Chen</i>	
3-D PRINTED AIR-CORE TOROIDAL TRANSFORMER FOR HIGH-FREQUENCY POWER CONVERSION	654
<i>Zikang Tong ; Weston D. Braun ; Juan M. Rivas-Davila</i>	
IMPEDANCE-BASED STABILITY MODELING AND ANALYSIS OF NETWORKED CONVERTER SYSTEMS	661
<i>Haijiao Wang ; Jian Sun</i>	
DECENTRALIZED CARRIER INTERLEAVING IN CASCADED MULTILEVEL DC-AC CONVERTERS	669
<i>Soham Dutta ; Rahul Mallik ; Branko Majmunovic ; Satyaki Mukherjee ; Gab-Su Seo ; Dragan Maksimovic ; Brian Johnson</i>	
A TEST DRIVEN DESIGN APPROACH TO BENCHMARK CURRENT CONTROLLERS FOR GRID-TIED INVERTERS.....	675
<i>Henrique Magnago ; Tiarles Guterres ; Fernanda Carnielutti ; Jorge Massing ; Rodrigo Vieira ; Humberto Pinheiro</i>	
LEGO-POL: A 93.1% 54V-1.5V 300A MERGED-TWO-STAGE HYBRID CONVERTER WITH A LINEAR EXTENDABLE GROUP OPERATED POINT-OF-LOAD (LEGO-POL) ARCHITECTURE.....	683
<i>Jaeil Baek ; Ping Wang ; Shuai Jiang ; Minjie Chen</i>	
TURBO-MMC: MINIMIZING THE SUBMODULE CAPACITOR SIZE IN MODULAR MULTILEVEL CONVERTERS WITH A MATRIX CHARGE BALANCER.....	691
<i>Yenan Chen ; Youssef Elasser ; Ping Wang ; Jaeil Baek ; Minjie Chen</i>	

MRI COMPATIBLE DC MODULATOR FOR AN ENVELOPE TRACKING TRANSMITTER	699
<i>Weston D. Braun ; Lei Gu ; Greig Scott ; Juan Rivas-Davila</i>	
CONVERTER ANALYSIS USING DISCRETE TIME STATE-SPACE MODELING	703
<i>Jared A. Baxter ; Daniel J. Costinett</i>	
ACTIVE SEGREGATED INDUCTOR FOR CODE DIVISION MULTIPLE ACCESS WIRELESS POWER TRANSFER	711
<i>Akshay Sarin ; Al-Thaddeus Avestruz</i>	
ACTIVE SEGMENTATION AT 100 MHZ FOR 12 W VHF WIRELESS POWER TRANSFER	719
<i>Xin Zan ; Al-Thaddeus Avestruz</i>	
A 5 MHZ HIGH-SPEED SATURATING INDUCTOR DC-DC CONVERTER USING CYCLE-BY-CYCLE DIGITAL CONTROL	727
<i>Xiaofan Cui ; Christopher Keller ; Al-Thaddeus Avestruz</i>	
TWO-PORT UP/DOWN DC-DC CONVERTER FOR TWO-DIMENSIONAL MAXIMUM POWER POINT TRACKING OF DIFFERENTIAL DIFFUSION CHARGE REDISTRIBUTION SOLAR PANEL	735
<i>Alireza Ramyar ; Xiaofan Cui ; Al-Thaddeus Avestruz</i>	
CONTROLLER HARDWARE-IN-THE-LOOP VALIDATION OF A MODULAR CONTROL ARCHITECTURE FOR A COMPOSITE DC-DC CONVERTER	743
<i>Vivek Sankaranarayanan ; Mariko Shirazi ; Yucheng Gao ; Aritra Ghosh ; Robert W. Erickson ; Dragan Maksimovic</i>	
MODELING OF CAPACITOR VOLTAGE IMBALANCE IN FLYING CAPACITOR MULTILEVEL DC-DC CONVERTERS	750
<i>Janko Celikovic ; Ratul Das ; Hanh-Phuc Le ; Dragan Maksimovic</i>	
CONTROL OF A GAN-BASED HIGH-POWER-DENSITY SINGLE-PHASE ONLINE UNINTERRUPTIBLE POWER SUPPLY	758
<i>Danish Shahzad ; Saad Pervaiz ; Nauman Zaffar ; Khurram K. Afridi</i>	
CONTROL OF A MERGED-ENERGY-BUFFER BASED TWO-STAGE ELECTROLYTIC-FREE OFFLINE LED DRIVER	764
<i>Mausamjeet Khatua ; Saad Pervaiz ; Khurram K. Afridi</i>	
ELECTROMAGNETIC MODEL-BASED FOREIGN OBJECT DETECTION FOR WIRELESS POWER TRANSFER	770
<i>Sung Yul Chu ; Al-Thaddeus Avestruz</i>	
CLOSED-LOOP CONTROL OF A DYNAMIC CAPACITIVE WIRELESS POWER TRANSFER SYSTEM	778
<i>Sreyam Sinha ; Khurram K. Afridi</i>	
VOLTAGE SHARING OF SERIES CONNECTED BATTERY MODULES IN A PLUG-AND-PLAY DC MICROGRID	784
<i>Mohamed Kamel ; Regan Zane ; Dragan Maksimovic</i>	
DEMYSTIFYING CAPACITOR VOLTAGES AND INDUCTOR CURRENTS IN HYBRID CONVERTERS	791
<i>Ratul Das ; Janko Celikovic ; Siamak Abedinpour ; Mark Mercer ; Dragan Maksimovic ; Hanh-Phuc Le</i>	
IMPACT OF NONLINEAR DYNAMICS ON CONVERTER DQ IMPEDANCE MEASUREMENT	799
<i>Hong Gong ; Dongsheng Yang ; Xiongfei Wang</i>	
HIGH FREQUENCY LINK ISOLATED MULTI-PORT CONVERTER FOR ACTIVE CELL BALANCING APPLICATIONS	805
<i>Dorai Babu Yelaverthi ; Mohamed Kamel ; Rohail Hassan ; Regan Zane</i>	
GENERATION AND DERIVATION OF PRACTICAL OPTIMIZATION-ORIENTED MODELS OF INDUCTORS	812
<i>Andrija Stupar ; Didier Flumian ; Basile Gouédard ; Thierry Meynard</i>	
Author Index	