

# Oral Sessions & Keynote Speeches

Monday, July 13, 2015

8:30 am – 8:45 am OPENING AND WELCOME WORDS, AND TECHNICAL COMMITTEE REPORT

## Keynote Speech 1

8:45 am – 9:30 am	HIGH-VOLTAGE DC TRANSMISSION FOR OFFSHORE WIND FARMS – SYSTEM INTEGRATION AND FUTURE OPPORTUNITIES Jochen Jung <sup>1</sup> , and Jian Sun <sup>2</sup> ; <sup>1</sup> Tennet, Germany, <sup>2</sup> Rensselaer Polytechnic Institute.
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## Oral Session 1: Modeling and Control of Wind Energy and HVDC Systems

Chairs: Farid Mosallat and Shaahin Filizadeh

<b>01-1 (ID: 129)</b> 9:30 am – 9:50 am	WIND POWER GENERATION WITH DOUBLY FED INDUCTION GENERATOR FOR DC CONNECTED OFFSHORE WIND FARM Takahiro So, Noriyuki Kimura, Toshimitsu Morizane, and Hideki Omori; Osaka Institute of Technology.
<b>01-2 (ID: 73)</b> 9:50 am – 10:10 am	PERFORMANCE IMPROVEMENT OF STEADY-STATE AND TRANSIENT OPERATION OF OFF-SHORE WIND-FARM HVDC POWER TRANSMISSION Reza Safaeian <sup>1</sup> , Seyyedmilad Ebrahimi <sup>2</sup> , and Mostafa Pamiani <sup>1</sup> ; <sup>1</sup> Sharif University of Technology, <sup>2</sup> The University of British Columbia.
<b>01-3 (ID: 22)</b> 10:10 am – 10:30 am	STABILITY ANALYSIS FOR GRID-CONNECTED THREE-PHASE INVERTER WITH LCL FILTERS Toshiji Kato, Kaoru Inoue, Yusuke Akiyama, and Koki Ohashi; Doshisha University.
<b>01-4 (ID: 86)</b> 10:30 am – 10:50 am	DAMPING OF SUBSYNCHRONOUS RESONANCE INVOLVING TYPE-III WIND TURBINES Ignacio Vieto and Jian Sun; Rensselaer Polytechnic Institute.

Coffee Break: 10:50 am – 11:20 am

## Oral Session 2: Modeling and Control of Multilevel Converters

Chairs: Aniruddha Gole and Liwei Wang

<b>02-1 (ID: 35)</b> 11:20 am – 11:40 am	REDUCED DYNAMIC MODEL OF A MODULAR MULTILEVEL CONVERTER IN POWERFACTORY C.E. Spallarossa, M.M.C. Merlin, Y. Pipelzadeh, and T.C. Green; Imperial College London.
<b>02-2 (ID: 88)</b> 11:40 am – 12:00 pm	MODEL-BASED DESIGN OF MODULAR MULTILEVEL CONVERTER WITH MINIMIZED DESIGN MARGINS Nillofar Rashidi Mehrabadi, Rolando Burgos, Christopher Roy, and Dushan Boroyevich; Virginia Tech.
<b>02-3 (ID: 41)</b> 12:00 pm – 12:20 pm	POWER QUALITY IMPROVEMENT USING ADVANCED CONTROL OF A FOUR-LEG MULTILEVEL CONVERTER Ionel Vechiu <sup>1</sup> , Aitor Etxeberria <sup>1,2</sup> , Quentin Tabart <sup>1,3</sup> , and Seddik Bacha <sup>3</sup> ; <sup>1</sup> ESTIA Institute of Technology, France, <sup>2</sup> UPV/EHU, Spain, <sup>3</sup> G2ELab, France.
<b>02-4 (ID: 114)</b> 12:20 pm – 12:40 pm	AN ANALYTICAL METHOD TO EVALUATE FLYING CAPACITOR MULTILEVEL CONVERTERS AND HYBRID SWITCHED-CAPACITOR CONVERTERS FOR LARGE CONVERSION RATIOS Yutian Lei and Robert Pilawa-Podgurski; University of Illinois, Urbana-Champaign.

Lunch: 12:40 pm – 2:00 pm

Tuesday, July 14, 2015

## Keynote Speech 2

8:30 am – 9:10 am	SIMULATION TECHNOLOGIES FOR MODERN POWER SYSTEMS WITH POWER ELECTRONIC CONVERTERS Aniruddha Gole; University of Manitoba.
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## Oral Session 3: Switching Control of Three-Phase Converters

Chairs: Rolando Burgos and Martin Ordonez

03-1 (ID: 28) 9:10 am – 9:30 am	NOVEL MODULATION CONCEPT OF THE SWISS RECTIFIER PREVENTING INPUT CURRENT DISTORTIONS AT SECTOR BOUNDARIES Lukas Schrittwieser <sup>1</sup> , Johann W. Kolar <sup>1</sup> , and Thiago Soeiro <sup>2</sup> ; <sup>1</sup> ETH Zurich, Switzerland, <sup>2</sup> ABB Corporate Research, Switzerland.
03-2 (ID: 21) 9:30 am – 9:50 am	ON-LINE REDUCTION OF SWITCHING LOSSES AND COMMON-MODE VOLTAGES OF MULTI-LEVEL PWM INVERTER BY A NEW SPACE VECTOR MODULATION Toshiji Kato, Kaoru Inoue, Ariyasu Aki, and Masashi Azabu; Doshisha University.
03-3 (ID: 138) 9:50 am – 10:10 am	GENERALIZED MULTIVARIABLE SMALL-SIGNAL MODEL OF THREE-PHASE GRID-CONNECTED INVERTER IN DQ-DOMAIN Tuomas Messo, Aapo Aapro, and Teuvo Suntio; Tampere University of Technology.
03-4 (ID: 125) 10:10 am – 10:30 am	THREE PHASE TRANSFORMATION FOR SIMPLIFIED SPACE VECTOR CONTROL OF MULTILEVEL INVERTERS Markus Schäfer <sup>1</sup> , Wolf Goetze <sup>2</sup> , Martin Hofmann <sup>1</sup> , Daniel Montesinos-Miracle <sup>3</sup> , and Ansgar Ackva <sup>1</sup> ; <sup>1</sup> Department of Electrical Engineering University of Applied Sciences Würzburg-Schweinfurt, <sup>2</sup> Department of Electronic Engineering, Jopp Automotive GmbH, <sup>3</sup> Centre d'Innovació Tecnològica en Convertidors Estàtics i Accionaments (CITCEA-UPC), Departament d'Enginyeria Elèctrica, Universitat Politècnica de Catalunya.

Coffee Break: 10:30 am – 10:50 am

## Oral Session 4: Modeling and Control of Three-Phase Converters

Chairs: Jian Sun and Regan Zane

04-1 (ID: 84) 10:50 am – 11:10 am	OSCILLATORY PHENOMENA BETWEEN WIND FARMS AND HVDC SYSTEMS: THE IMPACT OF CONTROL Mohammad Amin <sup>1</sup> , Jing Lv <sup>2</sup> , and Marta Molinas <sup>1</sup> ; <sup>1</sup> Norwegian University of Science and Technology, <sup>2</sup> Shanghai Jiao Tong University.
04-2 (ID: 27) 11:10 am – 11:30 am	A GENERALIZED CONTROL DESIGN APPROACH FOR A REPETITIVE CONTROLLER ON CURRENT HARMONICS Philipp Schülting, Christoph H. van der Broeck, Stefan Engel, and Rik W. De Doncker; RWTH Aachen University.
04-3 (ID: 115) 11:30 am – 11:50 pm	ACTIVE AND REACTIVE POWER FLOW ANALYSIS OF A STATCOM WITH VIRTUAL SYNCHRONOUS MACHINE CONTROL Chi Li, Rolando Burgos, Igor Cvetkovic, and Dushan Boroyevich; CPES - Virginia Tech.
04-4 (ID: 83) 11:50 pm – 12:10 pm	APPLICATION OF THREE-PHASE UNFOLDER IN ELECTRIC VEHICLE DRIVETRAIN W. Warren Chen and Regan Zane; Utah State University.

O4-5 (ID: 151) 12:10 pm – 12:30 pm	PERFORMANCE VERIFICATION OF PARAMETRIC AVERAGE-VALUE MODEL OF THYRISTOR-CONTROLLED RECTIFIERS UNDER UNBALANCED CONDITIONS Seyyedmilad Ebrahimi, Navid Amiri, Hamid Atighechi, Liwei Wang, and Juri Jatskevich; The University of British Columbia.
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**Lunch Break: 12:30 pm – 2:00 pm**

## Oral Session 5: Control of Distributed Generation and Microgrids

Chairs: Ali Davoudi and Martin Ordonez

O5-1 (ID: 59) 2:00 pm – 2:20 pm	REAL-TIME PHOTOVOLTAIC PLANT MAXIMUM POWER POINT ESTIMATION FOR USE IN GRID FREQUENCY STABILIZATION Anderson Hoke <sup>1</sup> , Eduard Muljadi <sup>1</sup> , and Dragan Maksimovic <sup>2</sup> ; <sup>1</sup> NREL – CU Boulder, <sup>2</sup> CU Boulder.
O5-2 (ID: 106) 2:20 pm – 2:40 pm	NONLINEAR SUPERSETS TO DROOP CONTROL Mohit Sinha <sup>1</sup> , Brian Johnson <sup>2</sup> , Nathan Ainsworth <sup>2</sup> , Florian Dorfler <sup>3</sup> , and Sairaj Dhople <sup>1</sup> ; <sup>1</sup> University of Minnesota, <sup>2</sup> National Renewable Energy Laboratory, <sup>3</sup> ETH-Zurich.
O5-3 (ID: 113) 2:40 pm – 3:00 pm	UNIFYING DISTRIBUTED SYNCHRONY AND OPTIMALITY IN DC MICROGRIDS Seyedali Moayedi and Ali Davoudi; University of Texas at Arlington.
O5-4 (ID: 126) 3:00 pm – 3:20 pm	MODELING AND CONTROL OF GRID-CONNECTED VOLTAGE-SOURCE CONVERTERS EMULATING ISOTROPIC AND ANISOTROPIC SYNCHRONOUS MACHINES Igor Cvetkovic <sup>1</sup> ; Dushan Boroyevich <sup>1</sup> , Rolando Burgos <sup>1</sup> , Chi Li <sup>1</sup> , and Paolo Mattavelli <sup>2</sup> ; <sup>1</sup> CPES, <sup>2</sup> Adjunct CPES.
O5-5 (ID: 135) 3:20 pm – 3:40 pm	CONTROL OF FLYWHEEL ENERGY STORAGE SYSTEMS AS VIRTUAL SYNCHRONOUS MACHINES FOR MICROGRIDS Rafael Peña-Alzola, David Campos-Gaona, and Martin Ordonez; The University of British Columbia.

**Coffee Break: 3:40 pm – 4:00 pm**

**Poster Session: 4:00 pm – 6:00 pm**

**Social Dinner (UBC Botanical Garden): 6:30 pm – 8:30 pm**

**Wednesday, July 15, 2015**

## Oral Session 6: DC-DC Converters

Chairs: Dragan Maksimovic and Luca Corradini

O6-1 (ID: 20) 8:30 am – 8:50 am	CONTROL AND MODELING OF SINGLE-INPUT AND MULTIPLE-OUTPUT MODULAR CONVERTER SYSTEMS Ye Li and Yehui Han; University of Wisconsin-Madison.
O6-2 (ID: 24) 8:50 am – 9:10 am	SMALL-SIGNAL MODELING OF COMBINED PHASE SHIFT AND PULSE WIDTH UNIFORMLY SAMPLED MODULATORS Luca Scandola <sup>1,2</sup> , Luca Corradini <sup>1</sup> , and Giorgio Spiazzi <sup>1</sup> ; <sup>1</sup> University of Padova, Italy, <sup>2</sup> Infineon Technologies Italia S.r.l.
O6-3 (ID: 49) 9:10 am – 9:30 am	FLYBACK-CONVERTER-BASED SOURCE IDENTIFICATION FOR INVESTIGATION OF DYNAMIC STABILITY WITH CONSTANT POWER LOADS Oleksandr Pizniur, Zhenyu Shan, and Juri Jatskevich; The University of British Columbia.

<a href="#">06-4 (ID: 53)</a> 9:30 am – 9:50 am	OUTPHASING CONTROL OF GALLIUM NITRIDE BASED VERY HIGH FREQUENCY RESONANT CONVERTERS Mickey P. Madsen <sup>1</sup> , David J. Perreault <sup>2</sup> , Arnold Knott <sup>1</sup> , and Michael A.E. Andersen <sup>1</sup> ; <sup>1</sup> Technical University of Denmark, <sup>2</sup> Massachusetts Institute of Technology.
<a href="#">06-5 (ID: 74)</a> 9:50 am – 10:10 am	CONTROL OF A SERIES-INPUT, PARALLEL-OUTPUT CELL BALANCING SYSTEM FOR ELECTRIC VEHICLE BATTERY PACKS Muhammad Muneeb Ur Rehman <sup>1</sup> , Fan Zhang <sup>2</sup> , Michael Evzelman <sup>1</sup> , Regan Zane <sup>1</sup> , and Dragan Maksimovic <sup>2</sup> ; <sup>1</sup> Utah State University, USA, <sup>2</sup> University of Colorado Boulder, USA.
<a href="#">06-6 (ID: 104)</a> 10:10 am – 10:30 am	ARCHITECTURE AND CONTROL OF A HIGH ENERGY DENSITY BUFFER FOR POWER PULSATION DECOUPLING IN GRID-INTERFACED APPLICATIONS Shibin Qin, Yutian Lei, Christopher Barth, and Robert Pilawa-Podgurski; University of Illinois at Urbana-Champaign.

**Coffee Break: 10:30 am – 10:45 am**

## Oral Session 7: Resonant Converters

Chairs: Juan Rivas and Robert Pilawa-Podgurski

<a href="#">07-1 (ID: 31)</a> 10:45 am – 11:05 am	MULTI-HARMONIC SMALL-SIGNAL MODELING OF DIGITALLY CONTROLLED DC-DC SERIES RESONANT CONVERTERS Luca Scandola <sup>1,2</sup> , Luca Corradini <sup>1</sup> , and Giorgio Spiazzi <sup>1</sup> ; <sup>1</sup> University of Padova, Italy, <sup>2</sup> Infineon Technologies Italia S.r.l.
<a href="#">07-2 (ID: 38)</a> 11:05 am – 11:25 am	IMPLEMENTING ADAPTIVE DIGITAL CONTROL ON AN EXISTING ANALOG CONTROLLED LLC RESONANT DC-DC CONVERTER Kevin Lei <sup>1</sup> , William G. Dunford <sup>1</sup> , Marian Craciun <sup>2</sup> , and Deepak Gautam <sup>2</sup> ; <sup>1</sup> The University of British Columbia, <sup>2</sup> Delta-Q Technologies.
<a href="#">07-3 (ID: 81)</a> 11:25 am – 11:45 am	RESONANT AND MULTI-MODE OPERATION OF FLYING CAPACITOR MULTI-LEVEL DC-DC CONVERTERS Kapil Kesarwani and Jason T. Stauth; Dartmouth College.
<a href="#">07-4 (ID: 112)</a> 11:45 am – 12:05 pm	13.56 MHZ HIGH VOLTAGE MULTI-LEVEL RESONANT DC-DC CONVERTER Luke C. Raymond, Wei Liang, Lei Gu, and Juan Rivas-Davila; Stanford University.
<a href="#">07-5 (ID: 101)</a> 12:05 pm – 12:25 pm	LOSSLESS VOLTAGE REGULATION AND CONTROL OF THE RESONANT SWITCHED-CAPACITOR DC-DC CONVERTER Yongjun Li, Mervin John, Jason Poon, Jikang Chen, and Seth R. Sanders; Department of EECS, University of California, Berkeley.
<a href="#">07-6 (ID: 123)</a> 12:25 pm – 12:45 pm	ENHANCED-ACCURACY AUGMENTED STATE-SPACE APPROACH TO STEADY-STATE MODELING OF RESONANT CONVERTERS Ashish Kumar, Jie Lu, and Khurram K. Afridi; University of Colorado Boulder.

**Lunch Break: 12:45 pm – 2:00 pm**

## Oral Session 8: New Power Conversion Architectures for PV and Storage

Chairs: Khurram Afridi and William Dunford

<a href="#">08-1 (ID: 144)</a> 2:00 pm – 2:20 pm	EFFECT OF ACTIVE DAMPING ON THE OUTPUT IMPEDANCE OF PV INVERTER Aapo Aapro, Tuomas Messo, and Teuvo Suntio; Tampere University of Technology.
<a href="#">08-2 (ID: 99)</a> 2:20 pm – 2:40 pm	STATE-OF-CHARGE ESTIMATION BASED ON MICROCONTROLLER-IMPLEMENTED SIGMA-POINT KALMAN FILTER IN A MODULAR CELL BALANCING SYSTEM FOR LITHIUM-ION BATTERY PACKS Fan Zhang <sup>1</sup> , Muhammad Muneeb Ur Rehman <sup>2</sup> , Hongjie Wang <sup>2</sup> , Yoash Levron <sup>3</sup> , Regan Zane <sup>2</sup> , Gregory L. Plett <sup>4</sup> , and Dragan Maksimovic <sup>1</sup> ; <sup>1</sup> University of Colorado Boulder, <sup>2</sup> Utah

	State University, <sup>3</sup> Technion – Israel Institute of Technology, <sup>4</sup> University of Colorado at Colorado Springs.
<i>08-3 (ID: 103)</i> 2:40 pm – 3:00 pm	AUTONOMOUS CONTROL OF SERIES-CONNECTED LOW VOLTAGE PHOTOVOLTAIC MICROINVERTERS <i>Fenglong Lu, Beomseok Choi, and Dragan Maksimovic</i> ; University of Colorado Boulder.
<i>08-4 (ID: 110)</i> 3:00 pm – 3:20 pm	A DISTRIBUTED BI-DIRECTIONAL HYSTERESIS CONTROL ALGORITHM FOR SERVER-TO-VIRTUAL BUS DIFFERENTIAL POWER PROCESSING <i>Enver Candan<sup>1</sup>, Pradeep S. Shenoy<sup>2</sup>, and Robert C.N. Pilawa-Podgurski<sup>1</sup></i> ; <sup>1</sup> University of Illinois at Urbana-Champaign, <sup>2</sup> Texas Instruments.
<i>08-5 (ID: 111)</i> 3:20 pm – 3:40 pm	VOLTAGE REGULATION OF A SERIES STACKED SYSTEM OF PROCESSORS BY DIFFERENTIAL POWER PROCESSING <i>Dipanjan Das and Philip T. Krein</i> ; University of Illinois at Urbana-Champaign.

**Coffee Break: 3:40 pm – 4:00 pm**

## Oral Session 9: New Modeling and Simulation Techniques

Chairs: Marta Molinas and Liwei Wang

<i>09-1 (ID: 54)</i> 4:00 pm – 4:20 pm	MODELING AND SIMULATION OF DC POWER ELECTRONICS SYSTEMS USING HARMONIC STATE SPACE (HSS) METHOD <i>JunBum Kwon, Xiongfei Wang, Frede Blaabjerg, and Claus Leth Bak</i> ; Aalborg University.
<i>09-2 (ID: 15)</i> 4:20 pm – 4:40 pm	HARDWARE-IN-THE-LOOP SIMULATION OF PV SYSTEMS IN MICRO-GRIDS USING SYSML MODELS <i>A. Gutierrez<sup>1,3</sup>, H.R. Chamorro<sup>2</sup>, J.F. Jimenez<sup>1</sup>, L.F.L. Villa<sup>3,4</sup>, and C. Alonso<sup>3,4</sup></i> ; <sup>1</sup> Universidad de los Andes, <sup>2</sup> KTH Royal Institute of Technology, <sup>3</sup> Univ. de Toulouse, <sup>4</sup> CNRS.
<i>09-3 (ID: 61)</i> 4:40 pm – 5:00 pm	REAL-TIME STUDIES ON AN IMPROVED MODULAR STACKED DC TRANSMISSION AND DISTRIBUTION SYSTEM <i>K. S. Amitkumar and T. Ilamparithi</i> ; Opal-RT Technologies India (P) Ltd.
<i>09-4 (ID: 89)</i> 5:00 pm – 5:20 pm	ONLINE SPECTROSCOPIC DIAGNOSTICS IMPLEMENTED IN AN EFFICIENT BATTERY MANAGEMENT SYSTEM <i>Eric Din, Christopher Schaefer, and Jason Stauth</i> ; Dartmouth College.
<i>09-5 (ID: 90)</i> 5:20 pm – 5:40 pm	SIMULINK BASED HARDWARE-IN-THE-LOOP RAPID PROTOTYPING OF AN ELECTRIC VEHICLE BATTERY BALANCING CONTROLLER <i>Hongjie Wang, M. Muneeb Ur Rehman, Michael Evzelman, and Regan Zane</i> ; Utah State University.

**Awards Banquet (Sage Bistro): 6:30 pm – 9:30 pm**

# Poster Session

Tuesday, July 14, 2015, 4:00 pm – 6:00 pm

## Power Electronics Education

Chair: Liwei Wang

<i>P-1 (ID: 42)</i>	USING THE ARDUINO UNO TO TEACH DIGITAL CONTROL OF POWER ELECTRONICS Lukas Muller <sup>1</sup> , Masihuddin Mohammed <sup>2</sup> , and Jonathan W. Kimball <sup>2</sup> ; <sup>1</sup> PULS GmbH, <sup>2</sup> Missouri University of Science and Technology.
<i>P-2 (ID: 108)</i>	PEGO POWER PACK: A MODULAR POWER ELECTRONICS LEARNING PLATFORM Ye Li, Parikshith Channegowda, Justin Krossschell, and Giri Venkataramanan; University of Wisconsin-Madison.

## Modeling and Control of Power Electronic Systems

Chairs: Sairaj Dhople and Teuvo Suntio

<i>P-3 (ID: 23)</i>	POWER-FLOW SENSITIVITIES IN DC DISTRIBUTION SYSTEMS Victor Purba <sup>1</sup> , Yu Christine Chen <sup>2</sup> , and Sairaj Dhople <sup>1</sup> ; <sup>1</sup> University of Minnesota, <sup>2</sup> University of British Columbia.
<i>P-4 (ID: 149)</i>	SKIP-DUTY CONTROL METHOD FOR MINIMIZING SWITCHING TRANSIENT STRESS IN LOW-POWER MULTI-LEVEL DC-DC CONVERTERS Nenad Vukadinovic <sup>1</sup> , Aleksandar Prodic <sup>1</sup> , Brett A. Miwa <sup>2</sup> , Cory Arnold <sup>2</sup> , and Michael Baker <sup>2</sup> ; <sup>1</sup> University of Toronto, <sup>2</sup> Maxim Integrated.
<i>P-5 (ID: 48)</i>	PARAMETRIC AVERAGE VALUE MODELING OF HIGH POWER AC/AC CYCLO CONVERTERS Seyyedmilad Ebrahimi, Navid Amiri, Hamid Atighechi, Liwei Wang, and Juri Jatskevich; University of British Columbia.
<i>P-6 (ID: 120)</i>	ANALYSIS OF CAPACITOR VOLTAGE RIPPLE MINIMIZATION IN MODULAR MULTILEVEL CONVERTER BASED ON AVERAGE MODEL Alinaghi Marzoughi <sup>1</sup> , Rolando Burgos <sup>1</sup> , Dushan Boroyevich <sup>1</sup> , and Yaosuo Xue <sup>2</sup> ; <sup>1</sup> Virginia Tech, <sup>2</sup> Siemens Corporate Research.
<i>P-7 (ID: 58)</i>	MODEL REFERENCE CONTROLLER DESIGN FOR STABILIZING CONSTANT POWER LOADS IN AN OFFSHORE MEDIUM VOLTAGE DC MICROGRID Brandon Grainger, Gregory Reed, and Zhi-Hong Mao; University of Pittsburgh.
<i>P-8 (ID: 97)</i>	STRATEGY FOR MODELING A 3-PHASE GRID-TIE VSC WITH LCL FILTER AND CONTROLLING THE DC-LINK VOLTAGE AND OUTPUT CURRENT CONSIDERING THE FILTER DYNAMICS Paulo Sergio Nascimento Filho, Tarcio Andre dos Santos Barros, Marcelo Gradella Villalva, and Ernesto Ruppert Filho; UNICAMP.
<i>P-9 (ID: 34)</i>	NONLINEAR CURRENT OBSERVER FOR BACKSTEPPING CONTROL OF BUCK TYPE CONVERTERS Michael L. McIntyre, Mohammad Mohebbi, and Joseph Latham; University of Louisville.
<i>P-10 (ID: 25)</i>	MINIMUM-TIME WITHIN A DEVIATION-CONSTRAINED HYBRID CONTROLLER FOR BOOST CONVERTERS Or Kirshenboim and Mor Mordechai Peretz; Ben-Gurion University of the Negev.
<i>P-11 (ID: 87)</i>	SOFT-STARTING PROCEDURE FOR DUAL ACTIVE BRIDGE CONVERTER Francesco Giuliani <sup>1</sup> , Alessandro Costabeber <sup>2</sup> , Nicola Delmonte <sup>1</sup> , Paolo Cova <sup>1</sup> , and Alberto Castellazzi <sup>2</sup> ; <sup>1</sup> University of Parma, <sup>2</sup> University of Nottingham.



<i>P-12 (ID: 91)</i>	LOW POWER ALL DIGITAL ACOUSTIC NOISE SUPPRESSION TECHNIQUE FOR SWITCHING VOLTAGE REGULATORS George E Matthew, Harish Krishnamurthy, Sheldon Weng, Krishnan Ravichandran, Wayne Proefrock, Pavan Kumar, Jessica Gullbrand, Karthik Sankaranarayanan, and Willem Marco Beltman; Intel Corporation.
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## Modeling and Control of Inverters and Rectifiers

Chairs: Martin Ordonez and William Dunford

<i>P-13 (ID: 139)</i>	DC FAULT CONTROL OF MODULAR MULTILEVEL CONVERTER WITH FULL-BRIDGE CELLS Jianghui Yu, Rolando Burgos, Vahid Najmi, and Dushan Boroyevich; Center for Power Electronics Systems, the Bradley Department of Electrical and Computer Engineering, Virginia Polytechnic Institute and State University.
<i>P-14 (ID: 32)</i>	ENERGY EFFICIENT DC TO AC POWER CONVERSION USING ADVANCED CONTROLLERS AND NOVEL VOLTAGE TRAJECTORIES Mohammad Mohebbi, Michael L. McIntyre, and Joseph Latham; University of Louisville.
<i>P-15 (ID: 80)</i>	A CONTROL TECHNOLOGY TO ACHIEVE A LOW COST FLICKER-FREE SINGLE STAGE LED DRIVER WITH POWER FACTOR CORRECTION Brian White <sup>1</sup> , Yan-Fei Liu <sup>1</sup> , and Xiaodong Liu <sup>2</sup> ; <sup>1</sup> Queen's University, <sup>2</sup> Anhui University of Technology.
<i>P-16 (ID: 16)</i>	A SINGLE-SOURCED TRANSFORMER-LESS ASYMMETRIC MULTI-LEVEL INVERTER Joung-Hu Park and Ashraf Ahmed; Soongsil Univ.

## DC-DC Converters

Chairs: Luca Corradini and Peter W. Lehn

<i>P-17 (ID: 43)</i>	CONCEPT OF SYNTHESIZING MODULAR POWER SUPPLY FOR INTERFACING DIVERSE ENERGY SOURCES AND LOADS Yajian Tong <sup>1</sup> , Zhenyu Shan <sup>1</sup> , Ngai Man Ho <sup>2</sup> , and Juri Jatskevich <sup>1</sup> ; <sup>1</sup> The University of British Columbia, <sup>2</sup> University of Manitoba.
<i>P-18 (ID: 64)</i>	MODELING AND CONTROL OF A STEP-DOWN COMPOSITE DC-DC CONVERTER Friedrich Schultheiß <sup>1,2</sup> and Dragan Maksimović <sup>2</sup> ; <sup>1</sup> Friedrich-Alexander University Erlangen-Nuremberg, <sup>2</sup> University of Colorado Boulder.
<i>P-19 (ID: 66)</i>	ESTIMATING SWITCHING LOSS AND CORE LOSS IN DUAL ACTIVE BRIDGE DC-DC CONVERTER Kai Zhang, Zhenyu Shan, and Juri Jatskevich; The University of British Columbia.
<i>P-20 (ID: 30)</i>	SYNTHESIS OF SWITCHED-CAPACITOR POWER CONVERTERS: AN ITERATIVE ALGORITHM Ravi Karadi; NXP Semiconductors, The Netherlands.
<i>P-21 (ID: 137)</i>	A BIDIRECTIONAL MULTI-PORT DC-DC CONVERTER WITH REDUCED FILTER REQUIREMENTS Yuanzheng Han, Mike Ranjram, and Peter W. Lehn; University of Toronto.
<i>P-22 (ID: 143)</i>	SWITCHED LINEAR STATE SPACE MODELING OF SOFT FAULTS IN DC/DC CONVERTERS USING AN OBSERVER John Tsinetakes; Drexel University.

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## Electric Machine Drives and Vehicular Applications

Chairs: Shaahin Filizadeh and Philip T. Krein

<i>P-23 (ID: 33)</i>	VEHICLE TO GRID UTILIZING A BACKSTEPPING CONTROLLER FOR BI-DIRECTIONAL FULL BRIDGE CONVERTER AND FIVE LEVEL ACTIVE NEUTRAL POINT INVERTER Mohammad Mohebbi, Michael L. McIntyre, and Joseph Latham; University of Louisville.
<i>P-24 (ID: 40)</i>	A CL-LC FILTER FOR HIGH-POWER PWM CURRENT-SOURCE DRIVE SYSTEMS Ye Zhang and Yunwei Li; University of Alberta.
<i>P-25 (ID: 98)</i>	FAULT MODELING AND SIMULATION FOR MORE-ELECTRIC AIRCRAFT SYSTEMS Christopher Mak, Srikanthan Sridharan, and Philip T. Krein; University of Illinois, Urbana-Champaign.
<i>P-26 (ID: 136)</i>	SIMULATION-BASED OPTIMAL DESIGN AND SENSITIVITY ASSESSMENT OF VECTOR-CONTROLLED INDUCTION MOTOR DRIVE USING A MULTI-MODAL OPTIMIZATION ALGORITHM Ali Yazdanpanah Goharrizi <sup>1</sup> , Aniruddha M. Gole <sup>1</sup> , Shaahin Filizadeh <sup>1</sup> , and Rajendra Singh <sup>2</sup> ; <sup>1</sup> University of Manitoba, <sup>2</sup> Manitoba HVDC Research Centre.

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## Power Electronics Components Technologies

Chairs: Charles Sullivan and Jason T. Stauth

<i>P-27 (ID: 68)</i>	POWER LOSS ANALYSIS WITH HIGH PRIMARY CURRENT IN MAGNETIC ENERGY HARVESTERS Jinyeong Moon and Steven B. Leeb; MIT.
<i>P-28 (ID: 65)</i>	FUNDAMENTAL EXAMINATION OF POTENTIAL PASSIVE COMPONENT TECHNOLOGIES FOR FUTURE POWER ELECTRONICS Phyo Aung Kyaw and Charles R. Sullivan; Thayer School of Engineering at Dartmouth.
<i>P-29 (ID: 77)</i>	EXPLOITING CLOUD COMPUTING IN THE MULTI-PHYSICS DESIGN AND OPTIMISATION OF ELECTROMAGNETIC DEVICES Nick Simpson and Phil. H. Mellor; University of Bristol.
<i>P-30 (ID: 145)</i>	DESIGN OF RESONANCE DAMPING VIA CONTROL SYNTHESIS Richard Zhang, Al-Thaddeus Avestruz, Jacob White, and Steve Leeb; MIT.

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## Resonance and High Frequency Converters

Chairs: Juan Rivas and Rolando Burgos

<i>P-31 (ID: 36)</i>	DYNAMIC MODELING OF SELF-OSCILLATING RESONANT CONVERTERS Carlos Olalla, Ricardo Bonache, and Luis Martinez-Salamero; Rovira i Virgili University.
<i>P-32 (ID: 52)</i>	A HIGH EFFICIENCY MULTIPLE OUTPUT CHARGER BASED ON THE NOVEL TIME DIVISION MULTIPLE CONTROL TECHNIQUE Tran Van Long and Woojin Choi; Soongsil University.
<i>P-33 (ID: 79)</i>	DESIGN ASPECTS OF MULTI-PHASE INTERLEAVED RESONANT SWITCHED CAPACITOR CONVERTERS WITH MM-SCALE AIR-CORE INDUCTORS Christopher Schaefer, Bradley Reese, Charles R. Sullivan, and Jason T. Stauth; Dartmouth College.
<i>P-34 (ID: 116)</i>	A STEP-SUPERPOSITION BASED ANALYSIS APPROACH TO MODELING RESONANT CONVERTERS Jie Lu, Ashish Kumar, and Khurram K. Afridi; University of Colorado Boulder.
<i>P-35 (ID: 50)</i>	100 MHZ ISOLATED DC-DC RESONANT CONVERTER USING SPIRAL PLANAR PCB TRANSFORMER Alihossein Sepahvand, Yuanzhe Zhang, and Dragan Maksimovic; University of Colorado Boulder.



<i>P-36 (ID: 51)</i>	HIGH POWER TRANSFER DENSITY AND HIGH EFFICIENCY 100 MHZ CAPACITIVE WIRELESS POWER TRANSFER SYSTEM Alihossein Sepahvand, Ashish Kumar, Khurram K. Afridi, and Dragan Maksimovic; University of Colorado Boulder.
<i>P-37 (ID: 76)</i>	HIGH-FREQUENCY RESONANT GATE DRIVER FOR GAN HEMTS Yue Yan, Alberto Castellazzi, and Martinez-perez Antonio; University of Nottingham.
<i>P-38 (ID: 105)</i>	27.12MHZ GAN BI-DIRECTIONAL RESONANT POWER CONVERTER Lei Gu, Wei Liang, Luke C. Raymond, and Juan Rivas-Davila; Stanford University.

## Energy Harvesting and Power Management

Chairs: Yu Christine Chen and Hongwei Gao

<i>P-39 (ID: 63)</i>	INTERLEAVED FLYBACK BASED MICRO-INVERTER FOR RESIDENTIAL PHOTOVOLTAIC APPLICATION IN REMOTE AREAS Janviere Umuhoza and H. Alan Mantooh; University of Arkansas.
<i>P-40 (ID: 67)</i>	PERTURBATION OPTIMIZATION OF MAXIMUM POWER POINT TRACKING OF PHOTOVOLTAIC POWER SYSTEMS BASED ON PRACTICAL SOLAR IRRADIANCE DATA Yang Du <sup>1</sup> , Xingshuo Li <sup>1</sup> , Huiqing Wen <sup>1</sup> , and Weidong Xiao <sup>2</sup> ; <sup>1</sup> Xi'an Jiaotong-Liverpool University, <sup>2</sup> Masdar Institute of Science and Technology.
<i>P-41 (ID: 92)</i>	CONTROL AND DESIGN OF FULL-BRIDGE THREE-LEVEL CONVERTER FOR RENEWABLE ENERGY SOURCES Zhilei Yao <sup>1</sup> , Jing Xu <sup>1</sup> , and Josep M. Guerrero <sup>2</sup> ; <sup>1</sup> Yancheng Institute of Technology, <sup>2</sup> Aalborg University.
<i>P-42 (ID: 72)</i>	COMPARISON OF PHOTOVOLTAIC CONVERTER CONFIGURATIONS FOR WEARABLE APPLICATIONS Hyunji Lee and Katherine A. Kim; Ulsan National Institute of Science and Technology.
<i>P-43 (ID: 85)</i>	EVALUATION OF ACTIVE FREQUENCY DRIFT ANTI-ISLANDING METHODS WITH A SINGLE-PHASE GRID-TIE PHOTOVOLTAIC INVERTER Marcos V. G. Reis, Marcelo G. Villalva, Tarcio A. S. Barros, Adson B. Moreira, Paulo S. Nascimento F., and Ernesto Ruppert F.; LEPO/FEEC/UNICAMP - Campinas-SP.
<i>P-44 (ID: 94)</i>	POWER MANAGEMENT SYSTEM FOR MICROBIAL FUEL CELL POWERED WATER QUALITY MONITORING SYSTEM Hongwei Gao, Qi Chen, and Qing Yang; Montana State University.
<i>P-45 (ID: 109)</i>	SIMULATION OF SMART FUNCTIONALITIES OF PHOTOVOLTAIC INVERTERS BY INTERFACING BOTH OPENDSS AND MATLAB Meghasai, S. Monger, H. Krishnaswami, and R. Vega; The University of Texas at San Antonio.
<i>P-46 (ID: 127)</i>	ASSESSMENT OF MEDIUM VOLTAGE DISTRIBUTION FEEDERS UNDER HIGH PENETRATION OF PHOTOVOLTAIC GENERATION Ye Tang, Rolando Burgos, Chi Li, and Dushan Boroyevich; CPES, Virginia Tech.
<i>P-47 (ID: 142)</i>	IMPACT OF DIFFERENTIAL POWER PROCESSING ON INTER-ROW SHADING IN SOLAR ARRAYS Jason Galtieri and Philip T. Krein; University of Illinois Urbana-Champaign.
<i>P-48 (ID: 102)</i>	ANALYTICAL CALCULATION OF SEMICONDUCTOR CURRENT STRESSES AND CONTROL OF STEP-UP MATRIX CONVERTER FOR THE INTEGRATION OF WIND ENERGY RESOURCES TO MICROGRIDS Onai Kuseso, Tsegazeab Shishaye, Wu Xiaohua, and James Kweku Nkrumah Nyarko; Northwestern Polytechnical University.