

Oral Sessions & Keynote Speeches

Tuesday, June 28, 2016

9:00 am – 9:20 am OPENING AND WELCOME WORDS, AND TECHNICAL COMMITTEE REPORT

Keynote Speech 1

9:20 am-10:00 am	SIX BASIC CHARACTERISTICS OF A MODERN GRID Dong Tan; Northrop Grumman Corporation (NGAS).
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Coffee Break: 10:00 am – 10:20 am

Keynote Speech 2

10:20 am-11:00 am	EFFICIENCY, CONTROL AND STABILITY OF POWER ELECTRONIC BASED SYSTEMS Mohamed Belkhayat; Huntington Ingalls Industries.
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Oral Session 1: Stability of AC Power Electronic Systems

Chairs: Jian Sun – Antonino Riccobono.

O1-1 (ID:135) 11:00 am – 11:20 am	IMPEDANCE-BASED STABILITY ANALYSIS OF MULTIPLE STATCOMs IN PROXIMITY Chi Li, Rolando Burgos, Ye Tang and Dushan Boroyevich; CPES – Virginia Tech.
O1-2 (ID: 93) 11:20 am – 11:40 am	MODELING AND ANALYSIS OF GRID-CONNECTED LARGE-SCALE PHOTOVOLTAIC PLANTS CONSIDERING THE DELAY EFFECTS Liu Jinhong and Zhou Lin; Chongqing University.
O1-3(ID: 54) 11:40 am – 12:00 pm	ACTIVE POWER FLOW DIRECTION EFFECT ON STABILITY IN MULTI-TERMINAL VSC-HVDC TRANSMISSION SYSTEM IN INTEGRATING WIND FARM Mohammad Amin, Atle Rygg and Marta Molinas; Norwegian University of Science and Technology.
O1-4(ID: 165) 12:00 pm – 12:20 pm	COMPARISON OF LTI AND LTP MODEL FOR THE STABILITY ANALYSIS OF POWER CONVERTER Junbum Kwon, Xiongfei Wang, Frede Blaabjerg and Claus Leth Bak; Aalborg University.
O1-5 (ID: 68) 12:20 pm – 12:40 pm	STABILITY ANALYSIS OF SINGLE-PHASE GRID-FEEDING INVERTERS WITH PLL USING HARMONIC LINEARISATION AND LINEAR TIME PERIODIC (LTP) THEORY Valerio Salis, Pericle Zanchetta, Alessandro Costabeber and Stephen Cox; University of Nottingham.
O1-6(ID: 164) 12:40 pm – 1:00 pm	A BLACKBOX LARGE SIGNAL LYAPUNOV-BASED STABILITY ANALYSIS METHOD FOR POWER CONVERTER-BASED SYSTEMS Airan Frances, Rafael Asensi, Oscar Garcia and Javier Uceda; Universidad Politecnica de Madrid.

Lunch: 1:00 pm – 2:00 pm

Poster Session: 2:00 pm -4:00 pm

Oral Session 2: Modeling of Modular Multilevel Converters

Chairs: Xavier Guillaud – Rolando Burgos

O2-1 (ID: 180) 4:00 pm – 4:20 pm	IMPEDANCE MODELING AND ANALYSIS OF MODULAR MULTILEVEL CONVERTERS Hanchao Liu and Jian Sun; Rensselaer Polytechnic Institute.
O2-4 (ID: 67) 4:20 pm – 4:40 pm	SMALL-SIGNAL STATE-SPACE MODELING OF AN HVDC LINK WITH MODULAR MULTILEVEL CONVERTERS Julian Freytes ¹ , Samy Akkari ² , Pierre Rault ³ , Jing Dai ² , Francois Gruson ⁴ and Xavier Guillaud ¹ ; ¹ Ecole Centrale de Lille L2EP, ² Centrale Supélec – GeePs, ³ RTE, ⁴ ENSAM - L2EP.
O2-5 (ID: 69) 4:40 pm – 5:00 pm	SPACE-STATE MODELLING OF MODULAR MULTILEVEL CONVERTERS FOR CONSTANT VARIABLES IN STEADY-STATE Gilbert Bergna ¹ , Salvatore D'Arco ¹ and Jon Are Suul ^{1,2} ; ¹ SINTEF Energy, ² Norwegian University of Science and Technology.
O2-4 (ID: 84) 5:00 pm – 5:20 pm	MODELLING OF SEMICONDUCTOR LOSSES OF THE MODULAR MULTILEVEL CONVERTER IN EMTP Keijo Jacobs ¹ , Hani Saad ² and Sébastien Dennetière ² ; ¹ KTH University, ² RTE- France.

Industrial Tutorial, 5:40 pm – 6:40 pm

**High Performance Real Time Simulation of Power Electronics on FPGA.
Presented by OPAL-RT.**

Poster Session, 2:00 pm – 4:00 pm

Modular Multilevel Converters

Chairs: Hamed Nademi.

P-1 (ID: 8)	THYRISTOR BASED MODULAR MULTILEVEL CONVERTER WITH ACTIVE FULL-BRIDGE CHAIN-LINK FOR FORCED COMMUTATION Peng Li, Stephen Finney and Derrick Holliday; University of Strathclyde.
P-2 (ID: 9)	MODULAR PARALLEL INTERLEAVED CONVERTER FOR HIGH CURRENT APPLICATION Gopal Mondal, Matthias Neumeister, Alexander Hensler and Sebastian Nielebock; Siemens AG.
P-3 (ID: 39)	FAULT-TOLERANT CONTROL FOR A MODULAR CASCADED NPC INVERTER CONFIGURATION Thilo Janssen and Hariharan Krishnaswami; The University of Texas at San Antonio.
P-4 (ID: 166)	DESIGN AND CONTROL OF A GAN-BASED, 13-LEVEL, FLYING CAPACITOR MULTILEVEL INVERTER Christopher Barth, Thomas Foulkes and Robert Pilawa Podgurski; University of Illinois at Urbana-Champaign.

P-5 (ID: 42)	CONTROL DESIGN FOR GRID AND ENERGY/BALANCING CONTROLLERS OF MODULAR MULTILEVEL CONVERTER BASED VSC HVDC SYSTEMS Christoph Hahn, Matthias Burkhardt and Matthias Luther; University of Erlangen-Nuremberg, Institute of Electrical Energy Systems.
P-6 (ID: 70)	ANALYSIS OF THERMAL CYCLING FOR SEMICONDUCTOR DEVICES IN MODULAR MULTILEVEL CONVERTERS Gilbert Bergna ¹ , Salvatore D'Arco ¹ , Jon Are Suul ^{1,2} and Magnar Hernes ¹ ; ¹ SINTEF Energy Research, ² Norwegian University of Science and Technology.
P-7 (ID: 101)	ON MODELLING OF MMC IN EMT-TYPE PROGRAM Hani Saad ¹ , Sebastien Denetiere ¹ and Jean Mahseredjian ² ; ¹ Rte-France, ² École Polytechnique de Montréal.
P-8 (ID: 103)	IMPEDANCE MODELING OF MODULAR MULTILEVEL CONVERTERS BY HARMONIC LINEARIZATION Jing Lyu, Qiang Chen and Xu Cai; Shanghai Jiao Tong University.
P-9 (ID: 106)	IMPEDANCE MODELING OF MODULAR MULTILEVEL CONVERTER BASED ON HARMONIC STATE SPACE Qiang Chen, Jing Lyu, Rui Li and Xu Cai; Shanghai Jiao Tong University.
P-10 (ID: 157)	CONTROL OF MMC CONVERTER INTEGRATED IN HVDC LINK BASED ON QUADRATIC OPTIMIZATION APPROACH Mohamed Moez Belhaouane ¹ , Frédéric Colas ² , François Gruson ² , Naceur Benhadj Braiek ³ and Xavier Guillaud ¹ ; ¹ L2EP, Ecole Centrale de Lille, ² L2EP, ENSAM Arts et Métiers, ³ LSA, Ecole Polytechnique de Tunisie.
P-11 (ID: 159)	MODELLING OF DC-DC CONVERTERS BASED ON FRONT-TO-FRONT CONNECTED MMC FOR SMALL SIGNAL STUDIES Abel A. Taffese ¹ , Elisabetta Tedeschi ¹ and Erik C. W. de Jong ² ; ¹ Norwegian University of Science and Technology, ² Eindhoven University of Technology.
P-12 (ID: 147)	ACTIVE POWER LOSSES DISTRIBUTION METHODS FOR THE MODULAR MULTILEVEL CONVERTER Michael Merlin and Paul Mitcheson; Imperial College London.
P-13 (ID: 153)	AN ANALYTICAL METHOD FOR EVALUATING THE POWER DENSITY OF MULTILEVEL CONVERTERS Tomas Modeer, Christopher Barth, Yutian Lei and Robert Pilawa-Podgurski; University of Illinois at Urbana-Champaign.

Offshore Power Systems and HVDC Networks

Chair: Mohammad Amin

P-14 (ID: 121)	DISCRIMINATION IN OFFSHORE AND MARINE DC DISTRIBUTION SYSTEMS Espen Haugan, Hanne Rygg, Asle Einar Skjellnes and Lars Barstad; Siemens AS.
P-15 (ID: 102)	SUBSEA POWER TRANSMISSION CABLE MODELLING: REACTIVE POWER COMPENSATION AND TRANSIENT RESPONSE STUDIES Prasanth Thummala ¹ , Sandeep Kolluri ¹ , Rajesh Sapkota ¹ , Sanjib Kumar Panda ¹ and Dudi Rendusara ² ; ¹ National University of Singapore, ² Schlumberger Oilfield (S) PTE LTD.
P-16 (ID: 160)	SMALL SIGNAL MODELLING OF AN MMC-BASED HVDC LINK INTERFACING AC GRIDS Atsede Gualu Endegnanew ¹ , Gilbert Bergna-Diaz ² , Jef Beerten ³ and Kjetil Uhlen ¹ ; ¹ Norwegian University of Science and Technology, ² SINTEF Energy Research, ³ KU Leuven.

P-17 (ID: 172)	DC POWER INTERCONNECTION USING SERIES CAPACITORS AND THYRISTOR-BASED PHASE CONTROLLERS Toshiki Kamimura and Shinichi Nomura; Meiji University.
P-18 (ID: 40)	IMPACT OF PRESENT AND FUTURE HVDC LINKS ON THE NORDIC POWER GRID Even Strand Aas ¹ , Til Kristian Vrana ² , Tor Inge Reigstad ² and Olve Mo ² ; ¹ Norwegian University of Science and Technology, ² SINTEF Energy Research.
P-19 (ID: 112)	COORDINATED CONTROL FOR MULTI TERMINAL DC GRIDS CONNECTED TO OFFSHORE WIND FARMS Pierre Rault ¹ , Julian Freytes ² , Xavier Guillaud ¹ , Frederic Colas ³ , Hani Saad ¹ , Olivier Despouys ¹ and Samuel Nguéfeu ¹ ; ¹ Réseau de Transport d'Electricité - RTE France, ² Ecole Centrale de Lille L2EP, ³ ENSAM L2EP.
P-20 (ID: 75)	ANALYSIS OF ACCURACY VERSUS MODEL ORDER FOR FREQUENCY-DEPENDENT PI-MODEL OF HVDC CABLES Salvatore d'Arco ¹ , Jon Are Suul ^{1,2} and Jef Beerten ³ ; ¹ SINTEF Energy, ² Norwegian University of Science and Technology, ³ KU Leuven.

DC and AC Microgrids and Energy Storage Systems

Chair: Juri Jatskevich

P-21 (ID: 16)	ASYMMETRIC MULTILEVEL TOPOLOGY FOR PHOTOVOLTAIC ENERGY INJECTION TO MICROGRIDS Javier Muñoz, Patricio Gaisse, Carlos Baier and Marco Rivera; Universidad de Talca.
P-22 (ID: 44)	ACTIVE DAMPING CONTROL STRATEGY TO AVOID RESONANCE ISSUES IN DIESEL-ELECTRIC VESSELS WITH DC DISTRIBUTION SYSTEMS Argiñe Alacano ¹ , Gonzalo Abad ¹ and Juan José Valera ² ; ¹ Mondragon University, ² Ingeteam Power Technology S.A.
P-23 (ID: 79)	ANALYSIS OF STABILITY AND POWER FLOW IN AD HOC DC MICROGRIDS FOR RURAL ELECTRIFICATION Wardah Inam, Julia Belk, Konstantin Turitsyn and David Perreault; Massachusetts Institute of Technology.
P-24 (ID: 49)	STABILITY INFLUENCE OF RENEWABLE ENERGY SYSTEMS: CONNECTION TO DC NANOGGRIDS Santiago Sanchez, Amir Hayati Soloot and Marta Molinas; Norwegian University of Science and Technology.
P-25 (ID: 51)	ANALYSIS AND DESIGN METHODOLOGY FOR SYSTEM COST REDUCTION IN DISTRIBUTED POWER SYSTEMS Wardah Inam, Thipok Rak-Amnonykit ¹ , Khurram Afridi ² and David Perreault ¹ ; ¹ Massachusetts Institute of Technology, ² UC Boulder.
P-26 (ID: 72)	IMPEDANCE-BASED ADAPTIVE DROOP METHOD IN ISLANDED MICROGRIDS WITH THREE-PHASE AND SINGLE-PHASE CONVERTERS FOR LINE LOSS REDUCTION Konstantinos Oureilidis, Spyros Gkavanoudis and Charis Demoulias Aristotle University of Thessaloniki.
P-27 (ID: 73)	AN ADAPTIVE DROOP CONTROL METHOD FOR BALANCING THE SOC OF DISTRIBUTED BATTERIES IN AC MICROGRIDS Spyros Gkavanoudis, Konstantinos Oureilidis and Charis Demoulias Aristotle University of Thessaloniki.
P-28 (ID: 86)	CERTIFYING MICROGRID STABILITY UNDER LARGE-SIGNAL INTERMITTENCY Richard Y. Zhang, Jorge Elizondo, James L. Kirtley and Jacob K. White Massachusetts Institute of Technology.

P-29 (ID: 90)	IMPACT OF PV INVERTER PENETRATION ON VOLTAGE PROFILE AND POWER LOSS IN MEDIUM VOLTAGE DISTRIBUTION SYSTEMS Ye Tang, Rolando Burgos, Chi Li and Dushan Boroyevich Center for Power Electronics Systems (CPES), Virginia Tech.
P-30 (ID: 107)	INERTIAL AND FREQUENCY RESPONSE FROM MICROGRIDS WITH INDUCTION MOTORS Jorge Elizondo, Richard Y. Zhang, Po-Hsu Huang, Jacob K. White and James L. Kirtley; Massachusetts Institute of Technology.
P-31 (ID: 111)	6MW SOLAR PLANT INTEGRATION FEASIBILITY STUDY: BONARIE ISLAND CASE STUDY Yin Sun, Erik De Jong and Vladimir Cuk; TU Eindhoven.
P-32 (ID: 114)	CONTROL OF SERIES CONNECTED RESONANT CONVERTER MODULES IN CONSTANT CURRENT DC DISTRIBUTION POWER SYSTEMS Hongjie Wang, Regan Zane and Tarak Saha; Utah State University.
P-33 (ID: 57)	STATE-OF-CHARGE AND STATE-OF-HEALTH ESTIMATING METHOD FOR LITHIUM-ION BATTERIES Tsung-Hsi Wu ¹ , Jhih-Kai Wang ¹ , Chin-Sien Moo ¹ and Atsuo Kawamura ² ; ¹ National Sun Yat-sen University, ² Yokohama National University.
P-34 (ID: 177)	ASSESSMENT OF BATTERY AGEING AND IMPLEMENTATION OF AN AGEING AWARE CONTROL STRATEGY FOR A LOAD LEVELING APPLICATION OF A LITHIUM TITANATE BATTERY ENERGY STORAGE SYSTEM Emil Namor, Dimitri Torregrossa, Fabrizio Sossan, Rachid Cherkaoui and Mario Paolone; École Polytechnique Fédérale de Lausanne.
P-35 (ID: 81)	A MULTI-LEVEL APPROACH TO POWER SYSTEM MODELICA MODELS Markus Mirz, Linus Netze and Antonello Monti; ACS RWTH Aachen University.

Wednesday, June 29, 2016

Keynote Speech 3

8:30 am – 9:10 am	WIDE-BAND FREQUENCY DEPENDENT MODELLING OF COMPONENTS IN POWER ELECTRONICS SYSTEMS Bjørn Gustavsen; SINTEF Energy Research.
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Oral Session 3: High Frequency Converters

Chairs: Juan Rivas Davila – Khurram Afridi

O3-1 (ID: 128) 9:10 am – 9:30 am	EQUIVALENT RESISTANCE APPROACH TO OPTIMIZATION, ANALYSIS AND COMPARISON OF RESONANT SWITCHED-CAPACITOR CONVERTERS Sarah Pasternak, Christopher Schaefer and Jason Stauth; Dartmouth College.
O3-2 (ID: 52) 9:30 am – 9:50 am	A NEW ARCHITECTURE FOR HIGH-FREQUENCY VARIABLE-LOAD INVERTERS David Perreault; Massachusetts Institute of Technology.
O3-3 (ID: 146) 9:50 am – 10:10 am	POWER DENSITY AND EFFICIENCY ENHANCEMENT IN IMPEDANCE CONTROL NETWORK RESONANT DC-DC CONVERTERS USING TOPOLOGY MORPHING CONTROL Ashish Kumar, Jie Lu and Khurram Afridi; University of Colorado Boulder.

O3-4 (ID: 139) 10:10 am – 10:30 am	LOW MASS RF POWER INVERTER FOR CUBESAT PLASMA THRUSTER USING 3D PRINTED INDUCTORS Wei Liang, Luke Raymond, Max Praglin, David Biggs, Mark Cappelli, Brian Holman and Juan Rivas Davila; Stanford University.
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Coffee Break: 10:30 am – 11:00 am

Oral Session 4: Model Identification and Hardware-in-the-Loop Techniques

Chairs: Erik de Jong - Salvatore D'Arco

O4-1(ID: 31) 11:00 am – 11:20 am	ONLINE WIDEBAND IDENTIFICATION OF THREE-PHASE AC POWER GRID IMPEDANCES USING AN EXISTING GRID-TIED POWER ELECTRONIC INVERTER Antonino Riccobono ¹ , Syed Khurram Abbas Naqvi ¹ , Antonello Monti ¹ , Siyu Chai ² , Francesco Castelli Dezza ² , Jonathan Siegers ³ and Enrico Santi ³ ; ¹ RWTH Aachen University, ² Politecnico di Milano, ³ University of South Carolina.
O4-2(ID: 19) 11:20 am – 11:40 am	APPARENT IMPEDANCE ANALYSIS- A NEW METHOD FOR POWER SYSTEM STABILITY ANALYSIS Atle Rygg ¹ , Mohammad Amin ¹ , Maria Marta Molinas ¹ and Bjørn Gustavsen ² ; ¹ Norwegian University of Science and Technology, ² SINTEF Energy Research.
O4-3 (ID: 56) 11:40 am – 12:00 pm	GENERAL-PURPOSE COMPUTATION METHOD OF A POWER CONVERTER FOR FREQUENCY CHARACTERISTICS - APPLICATION TO STABILITY ANALYSIS OF A GRID INVERTER Toshiji Kato, Kaoru Inoue and Yuki Takami, Doshisha University.
O4-4 (ID: 53) 12:00 pm – 12:20 pm	MODEL IDENTIFICATION OF DYNAMIC MICROGRIDS AND CONTROLLER OPTIMIZATION WITH HIGH FIDELITY HARDWARE-IN-THE-LOOP PLATFORM Edwin Fonkwe Fongang ¹ , Murilo Almeida ² , James Kirtley ¹ and Danilo Medjo ² ; ¹ Massachusetts Institute of Technology, ² Typhoon HIL.
O4-5 (ID: 27) 12:20 pm – 12:40 pm	STABILITY AND ACCURACY ANALYSIS OF POWER HARDWARE IN THE LOOP SYSTEM WITH DIFFERENT INTERFACE ALGORITHMS Tomoyuki Hatakeyama ¹ , Antonino Riccobono ² and Antonello Monti ² ; ¹ European R&D Centre, Hitachi Europe GmbH, ² RWTH Aachen University.
O4-6 (ID: 25) 12:40 pm – 1:00 pm	HARDWARE-IN-THE-LOOP USING PARAMETRIZABLE FIXED POINT NOTATION Alberto Sanchez, Irene Villar, Angel de Castro, Fernando López-Colino and Javier Garrido; HCTLab, Univ. Autonoma de Madrid.

Lunch Break: 1:00 pm – 2:00 pm

Poster Session: 2:00 pm – 4:00 pm

Oral Session 5: Stability of DC Power Electronic Systems

Chairs: David Perreault - Cristina Fernandez

O5-1 (ID: 15) 4:00 pm – 4:20 pm	STABILIZING EFFECTS OF LOAD SUBSYSTEM IN MULTI-STAGE DC-TO-DC POWER CONVERSION SYSTEMS Syam Kumar Pidaparthi, Byungcho Choi, Hangsang Kim and Yeonjung Kim; Kyungpook National University.
O5-2 (ID: 66) 4:20 pm – 4:40 pm	SIMPLE INPUT IMPEDANCE CONVERTER MODEL TO DESIGN REGULATORS FOR DC-DISTRIBUTED SYSTEM Marina Sanz, Manuel Bermejo, Antonio Lazaro, David Lopez-Del-Moral, Pablo Zumel, Cristina Fernandez and Andres Barrado; Universidad Carlos III de Madrid.
O5-3 (ID: 155) 4:40 pm – 5:00 pm	OUTPUT IMPEDANCE COMPARISON OF DIFFERENT DROOP CONTROL REALIZATIONS IN DC SYSTEMS Fang Chen, Rolando Burgos and Dushan Boroyevich; Virginia Tech.
O5-4 (ID: 43) 5:00 pm – 5:20 pm	A MULTIVARIABLE MODELING APPROACH FOR THE DESIGN OF POWER ELECTRONICS BASED DC DISTRIBUTION SYSTEMS IN DIESEL-ELECTRIC VESSELS Argiñe Alacano ¹ , Juan José Valera ² and Gonzalo Abad ¹ ; ¹ Mondragon University, ² Ingeteam Power Technology S.A.

Industry Seminar and Laboratory Tour, 5:30 pm – 7:30 pm

Presentation of the EGSTON grid emulator at NTNU.

Laboratory tour at the Norwegian Smart Grid National Laboratory.

Drink reception

Poster Session, 2:00 pm – 4:00 pm

Design Modeling and Control of Power Electronic Converters

Chair: Luca Corradini

P-36 (ID: 17)	A MODELLING AND DESIGN APPROACH FOR PUSH/PULL SWITCHED CAPACITOR DC-DC CONVERTERS Athanasios Sarafianos and Michiel Steyaert; KU Leuven
P-37 (ID: 29)	INTEGRAL-PROPORTIONAL SLIDING MODE CONTROL METHOD FOR A SEPIC-BASED RECTIFIER WITH AC MOTOR DRIVE Hsin-Jang Shieh, Ying-Zuo Chen and Yu-Wen Chiou; National Dong Hwa University
P-38 (ID: 33)	GEOMETRICAL INSIGHTS INTO PROPORTIONAL DERIVATIVE CONTROL OF SYNCHRONOUS BUCK CONVERTERS WITH CONSTANT POWER LOADS Stephen Whaite and Alexis Kwasinski; University of Pittsburgh.
P-39 (ID: 64)	STEP-UP DC-DC CONVERTERS COMBINING BASIC TOPOLOGIES WITH CHARGE PUMP Giorgio Spiazzi, Stefano Marconi and Andrea Bevilacqua; University of Padova - Dept. of Information Engineering (DEI).
P-40 (ID: 76)	FEEDBACK INJECTION-BASED TECHNIQUE FOR DYNAMIC LOAD/LINE TESTS OF DC POWER SUPPLIES - PART I: THEORY Nicola Femia; University of Salerno.

P-41 (ID: 77)	FEEDBACK INJECTION-BASED TECHNIQUE FOR DYNAMIC LOAD/LINE TESTS OF DC POWER SUPPLIES - PART II: APPLICATIONS Nicola Femia; University of Salerno.
P-42 (ID: 123)	MULTISTAGE BOOST CONVERTER WITH THE ABILITY OF PARALLEL INDUCTOR CHARGING Muhammad Bilal Saif, Dominic Korner and Klaus Hofmann; Technische Universität Darmstadt.
P-43 (ID: 138)	A METHOD TO EXTRACT LOW-VOLTAGE AUXILIARY POWER FROM A FLYING CAPACITOR MULTI-LEVEL CONVERTER Andrew Stillwell, Yutian Lei and Robert Pilawa-Podgurski; University of Illinois at Urbana-Champaign
P-44 (ID: 154)	FLYBACK MICRO-INVERTER WITH REACTIVE POWER SUPPORT CAPABILITY Edwin Fonkwe Fongang, James Kirtley and Jorge Elizondo; Massachusetts Institute of Technology.
P-45 (ID: 125)	ZERO-VOLTAGE SWITCHING FOR BIDIRECTIONAL BUCK/BOOST CONVERTER USING HYBRID DISCONTINUOUS CURRENT MODE Hoai Nam Le, Koji Orikawa and Jun-Ichi Itoh; Nagaoka University of Technology.
P-46 (ID: 126)	DESIGN CONSIDERATIONS FOR DIGITALLY CONTROLLED BUCK CONVERTERS WITH LARGE INPUT TRANSIENTS Sarah Pasternak and Jason Stauth; Dartmouth College.
P-47 (ID: 130)	SOC IMPLEMENTATION OF AN AUTONOMOUS IDENTIFICATION AND CONTROL SYSTEM FOR DC/DC POWER CONVERTERS Cristina Fernandez, Pablo Zumel, Marlon Granda, Marina Sanz, Antonio Lazaro and Andres Barrado; Universidad Carlos III de Madrid.
P-48 (ID: 151)	GENERALIZED HYBRID FEEDFORWARD CONTROL OF PULSE WIDTH MODULATED SWITCHING CONVERTERS Usama Anwar, Dragan Maksimovic and Khurram Afridi; University of Colorado Boulder.
P-49 (ID: 96)	FAST AND ACCURATE SIMULATION OF BIFURCATIONS IN NATURALLY SAMPLED PWM CONTROL LOOPS Hendrik Du Toit Mouton ¹ and Stephen Cox ² ; ¹ University of Stellenbosch, ² Nottingham University.
P-50 (ID: 118)	AN IMPROVED CONVERTER CONTROL DESIGN FOR TIME-VARYING VOLTAGE REFERENCE TRACKING Subhransu Satpathy and N. Lakshminarasamma; Indian Institute of Technology, Madras.
P-51 (ID: 11)	A TWO-CHIP QUASI-RESONANT BUCK CONVERTER WITH A 700V POWER-STAGE AND MIXED-SIGNAL CURRENT-MODE CONTROL Masafumi Otsuka and Olivier Trescases; University of Toronto.
P-52 (ID: 143)	A DESIGN METHODOLOGY FOR CLASS-D RESONANT RECTIFIER WITH PARALLEL LC TANK Sanghyeon Park and Juan Rivas-Davila; Stanford Univ./Electrical Eng.
P-53 (ID: 152)	RESONANT BI-POLAR DC PULSE POWER SUPPLY FOR ELECTROPORATION APPLICATION Luke Raymond, Wei Liang, Kawin Surakitbovorn and Juan Rivas-Davila; Stanford University.
P-54 (ID: 116)	POWER MAGNETICS VOLUME AND WEIGHT REDUCTION IN AEROSPACE POWER SUPPLY UNITS Giulia Di Capua, Nicola Femia and Kateryna Stoyka; University of Salerno – DIEM.

Stability, Grid Integration and Power Grid Improvements

Chair: Vladimir Blasko

P-55 (ID: 14)	REAL-TIME STABILITY ANALYSIS OF POWER ELECTRONIC SYSTEMS Atle Rygg and Marta Molinas; Norwegian University of Science and Technology.
P-56 (ID: 87)	INSTANTANEOUS FREQUENCY TRACKING OF HARMONIC DISTORTIONS FOR GRID IMPEDANCE IDENTIFICATION BASED ON KALMAN FILTERING Anders Broen, Mohammed Amin, Espen Skjong and Marta Molinas; Norwegian University of Science and Technology.
P-57 (ID: 55)	AN ADMITTANCE SHAPING STRATEGY TO ENHANCE THE ROBUSTNESS OF THE GRID-TIED INVERTER TO GRID IMPEDANCE Chen Zheng, Lin Zhou, Xirui Yu, Bin Li and Jinhong Liu; Chongqing University.
P-58 (ID: 95)	SMALL-SIGNAL MODEL OF A DECOUPLED DOUBLE SYNCHRONOUS REFERENCE FRAME CURRENT CONTROLLER Mohammad Kazem Bakhshizadeh ¹ , Xiongfei Wang ¹ , Frede Blaabjerg ¹ , Claus Leth Bak ¹ , Jesper Hjerrild ² , Lukasz Kocewiak ² and Bo Hesselbaek ² ; ¹ Aalborg University, ² DONG Energy Wind Power.
P-59 (ID: 2)	TRANSIENT ANALYSIS OF INTERLINE DYNAMIC VOLTAGE RESTORER USING DYNAMIC PHASOR REPRESENTATION Khaled Abojlala and Derrick Holliday; Strathclyde university.
P-60 (ID: 61)	SERIES ACTIVE COMPENSATOR BASED ON SINGLE-PHASE CURRENT-SOURCE CONVERTERS WITH MINIMUM DC LINK CURRENT OPERATION Pedro Melin ¹ , Jose Espinoza ² , Franco Hernandez ¹ , Jaime Rothen ¹ and Eduardo Espinoza ³ ; ¹ Universidad del Bio-Bio, ² Universidad de Concepcion, ³ Universidad Catolica de la Santisima Concepcion.
P-61 (ID: 170)	CONTROL OF DC-CAPACITOR PEAK VOLTAGE IN REDUCED CAPACITANCE SINGLE-PHASE STATCOM Takanori Isobe ¹ , Long Zhang ¹ , Hiroshi Tadano ¹ , Jon Are Suul ^{2,3} and Marta Molinas ² ; ¹ University of Tsukuba, ¹ Norwegian University of Science and Technology, ³ SINTEF Energy AS.
P-62 (ID: 5)	PERFORMANCE ANALYSIS OF 1 ϕ T/4 PLLS WITH SECONDARY CONTROL PATH IN BRIDGELESS CURRENT SENSORLESS PFCs Paula Lamo, Felipe López, Alberto Pigazo and Francisco Azcondo; University of Cantabria.
P-63 (ID: 148)	A LVRT METHOD FOR GRID-CONNECTED INVERTER TO COMPENSATE NEGATIVE-SEQUENCE REACTIVE POWER Tzung-Lin Lee, Da-Chun Teng and Fang-Ta Liu; National Sun Yat-sen University.
P-64 (ID: 168)	OPTIMAL CONTROL OF THREE-PHASE EMBEDDED POWER GRIDS Andrea Formentini, David Dewar and Pericle Zanchetta; University of Nottingham.
P-65 (ID: 169)	EXPERIMENTAL VERIFICATION OF A VIRTUAL SYNCHRONOUS GENERATOR CONTROL CONCEPT Igor Cvetkovic ¹ , Dushan Boroyevich ¹ , Rolando Burgos ¹ , Paolo Mattavelli ² , Yi-Hsun Hsieh ¹ , Fred C. Lee ¹ and Chi Li ¹ ; ¹ CPES - Virginia Tech, ² University of Padova.
P-66 (ID: 62)	STABILIZATION EFFECT OF VIRTUAL SYNCHRONOUS GENERATOR CONTROL IN MICROGRIDS WITH HIGHLY PENETRATED RENEWABLE ENERGIES Yuko Hirase, Eiji Yoshimura, Kazushige Sugimoto and Kenichi Sakimoto; Kawasaki Technology Co., Ltd.

Modeling and Control of Advanced Power Converter Topologies

Chair: Toshiji Kato

P-67 (ID: 92)	OPTIMIZATION OF THE GEOMETRICAL SOLUTION SPACE FOR EXTENDED HORIZON MPC TO A NPC MULTI-LEVEL INVERTER Johan Raath ¹ , Toit Mouton ² and Tobias Geyer ³ ; ¹ Central University of Technology, ² University of Stellenbosch, ³ ABB Corporate Research, Power Electronic Systems.
P-68 (ID: 175)	PARAMETRIC AVERAGE-VALUE MODELING OF AC/AC MATRIX CONVERTERS Seyyedmilad Ebrahimi, Navid Amiri, Hamid Atighechi, Liwei Wang and Juri Jatskevich; The University of British Columbia (UBC).
P-69 (ID: 12)	IMPROVED PARALLEL OPERATION CONTROL OF 12-PULSE PARALLEL CONNECTED THYRISTOR DUAL CONVERTER FOR URBAN RAILWAY POWER SUBSTATIONS Sung-An Kim ¹ , Sang-In Byun ¹ , Sung-Wo Han ² and Yun-Hyun Cho ¹ ; ¹ Dong-A university, ² Busan Transportation Corporation.
P-70 (ID: 80)	CONTROL OF PARALLEL CONNECTED POWER ELECTRONIC CONVERTERS IN MULTIFREQUENCY POWER SYSTEMS Mladen Gagic, Tsegay Hailu and Bram Ferreira; Delft University of Technology.

Thursday, June 30, 2016

Keynote Speech 4

8:30 am – 9:10 am	MIXED-SIGNAL CONTROL OF EMERGING HYBRID CONVERTER TOPOLOGIES Aleksander Prodic; University of Toronto.
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Oral Session 6: DC-DC Converters

Chairs: Dragan Maksimovic – Regan Zane

O6-1 (ID: 23) 9:10 am – 9:30 am	TWO-DIMENSIONAL ONLINE EFFICIENCY OPTIMIZATION TECHNIQUE FOR DUAL ACTIVE BRIDGE CONVERTERS Francesco Bez ¹ , Luca Scandola ² , Luca Corradini ¹ , Stefano Saggini ³ and Giorgio Spiazzi ¹ ; ¹ University of Padova, ² Infineon Technologies, ³ University of Udine.
O6-2 (ID: 136) 9:30 am – 9:50 am	SIMPLE METHOD OF DIRECT DIGITAL DESIGN OF COMPENSATOR FOR DC/DC CONVERTERS Pablo Zumel, Cristina Fernandez, Marlon Granda, Antonio Lazaro, Marina Sanz and Andres Barrado; Universidad Carlos III de Madrid.
O6-3 (ID: 117) 9:50 am – 10:10 am	DESIGN AND CONTROL OF AN INTEGRATED BMS-DC/DC SYSTEM FOR ELECTRIC VEHICLES Muhammad Muneeb Ur Rehman ¹ , Fan Zhang ² , Regan Zane ¹ and Dragan Maksimovic ² ; ¹ Utah State University, ² University of Colorado Boulder.
O6-4 (ID: 38) 10:10 am – 10:30 am	REDUCED REDUNDANT POWER PROCESSING CONCEPT: A REEXAMINATION Giorgio Spiazzi; University of Padova.

Coffee Break: 10:30 am – 11:00 am

Poster Session: 11:00 am – 1:00 pm

Lunch Break: 1:00 pm – 2:00 pm

Oral Session 7: Advanced Control Techniques

Chairs: Gonzalo Abad – Hendrik Du Toit Mouton

07-1 (ID: 142) 2:00 pm – 2:20 pm	ADVANCED LITHIUM-ION BATTERY MANAGEMENT USING PHYSICS-BASED MODEL PREDICTIVE CONTROL AND DC-DC CONVERTERS Michael Trimboli ¹ , Gregory Plett ¹ , Dragan Maksimovic ² , Regan Zane ³ , Marcelo Xavier ¹ and Gustavo Florentino ¹ , ¹ University of Colorado, Colorado Springs, ² University of Colorado, Boulder, ³ Utah State University.
07-2 (ID: 124) 2:20 pm – 2:40 pm	CURRENT CONTROL OF A GRID-TIED INVERTER WITH LCL-FILTER THROUGH MODEL PREDICTIVE CONTROL Joanie Geldenhuys ¹ , Hendrik Du Toit Mouton ¹ , Arnold Rix ¹ and Tobias Geyer ² ; ¹ Stellenbosch University; ² ABB Corporate Research.
07-3 (ID: 179) 2:40 pm – 3:00 pm	UNIVERSAL OPTIMAL MODEL PREDICTIVE CONTROL OF MULTI-PHASE AC CONVERTERS Valdimir Blasko, United Technologies Research Center.
07-4 (ID: 88) 3:00 am – 3:20 pm	LOW FREQUENCY OPERATION OF MODULAR MULTILEVEL MATRIX CONVERTER USING OPTIMIZATION-ORIENTED PREDICTIVE CONTROL SCHEME Hamed Nademi ¹ , Lars Norum ² and Tore Undeland ² ; ¹ ABB, ² Norwegian University of Science and Technology (NTNU).

Break: 3:20 pm – 3:40 pm

Oral Session 8: Optimization Techniques

Chairs: Hamed Nademi – Aleksandar Prodic

08-1 (ID: 163) 3:40 pm – 4:00 pm	η P-PARETO OPTIMIZATION AND COMPARATIVE EVALUATION OF INVERTER CONCEPTS CONSIDERED FOR THE GOOGLE LITTLE BOX CHALLENGE Dominik Bortis, Dominik Neumayr and Johann Walter Kolar; ETH Zurich.
08-2 (ID: 141) 4:00 pm – 4:20 pm	MULTI-OBJECTIVE DESIGN AND OPTIMIZATION OF INDUCTORS: A GENERALIZED SOFTWARE-DRIVEN APPROACH Xiaorui Wang, Hulong Zeng, Deepak Gunasekaran and Fang Peng; Michigan State University.
08-3 (ID: 171) 4:20 pm – 4:40 pm	OPTIMAL DESIGN OF AIR-CORE INDUCTOR FOR MEDIUM/HIGH POWER DC-DC CONVERTERS Rene Barrera-Cardenas ¹ , Takanori Isobe ¹ and Marta Molinas ² ; ¹ University of Tsukuba, ² Norwegian University of Science and Technology (NTNU).
08-4 (ID: 132) 4:40 pm – 5:00 pm	MULTI-OBJECTIVE OPTIMIZATION OF LARGE WIND POWER PLANT PARAMETERS FOR HARMONIC INSTABILITY AND RESONANCE CONDITIONS Esmaeil Ebrahimzadeh, Frede Blaabjerg, Xiongfei Wang and Claus Leth Bak; Aalborg University.

Gala Dinner: 7:00 pm – 10:00 pm

Poster Session, 11:00 am – 1:00 pm

Wide Band Gap Devices and High Frequency Converters

Chair: Giorgio Spiazzi

P-71 (ID: 59)	DESIGN OF LOW INDUCTIVE BUSBAR FOR FAST SWITCHING SiC MODULES VERIFIED BY 3D FEM CALCULATIONS AND LABORATORY MEASUREMENTS Subhadra Tiwari, Ole-Morten Midtgård and Tore Undeland; Norwegian University of Science and Technology.
P-72 (ID: 122)	GaN-HEMT DYNAMIC ON-STATE RESISTANCE CHARACTERIZATION AND MODELLING Ke Li, Paul Evans and Mark Johnson; PEMC group, University of Nottingham.
P-73 (ID: 144)	PREDICTING THE BEHAVIOR OF A HIGH SWITCHING FREQUENCY SiC-BASED MODULAR POWER CONVERTER BASED ON LOW-POWER VALIDATION EXPERIMENTS Niloofer Rashidi Mehrabadi, Rolando Burgos, Christopher Roy and Dushan Boroyevich; CPES - Virginia Tech.
P-74 (ID: 162)	ANALYSIS AND MODELING OF GaN-BASED SCHOTTKY POWER DIODES Beatrix Weiss, Richard Reiner, Patrick Waltereit, Rüdiger Quay and Oliver Ambacher; Fraunhofer IAF.
P-75 (ID: 78)	MODELING THE SWITCHING BEHAVIOUR OF SUPERJUNCTION MOSFETS IN CASCODE WITH A LOW VOLTAGE SILICON MOSFET Juan Rodriguez Mendez ¹ , Jaume Roig Guitart ² , Alberto Rodriguez Alonso ¹ , Diego Gonzalez Lamar ¹ and Filip Bauwens ² ; ¹ University of Oviedo, ² ON Semiconductor.
P-76 (ID: 140)	THERMAL TRANSIENT MODELING FOR FAILURE PREDICTION IN MULTI-CHIP POWER MODULES Quang Le, Shilpi Mukherjee, Tom Vrotsos and Alan Mantooth; University of Arkansas.
P-77 (ID: 137)	EVALUATION OF 900 V SiC MOSFET IN 13.56 MHz 2 kW RESONANT INVERTERS FOR WIRELESS POWER TRANSFER Jungwon Choi ¹ , Daisuke Tsukiyama ² and Juan Rivas ¹ ; ¹ Stanford University, ¹ DAIHEN Advanced Component, Inc.
P-78 (ID: 150)	DESIGN OF EFFICIENT MATCHING NETWORKS FOR CAPACITIVE WIRELESS POWER TRANSFER SYSTEMS Sreyam Sinha, Ashish Kumar, Saad Pervaiz, Brandon Regensburger and Khurram Afridi; University of Colorado Boulder.
P-79 (ID: 173)	MODEL FOR LOSS CALCULATION OF WIRELESS IN-WHEEL MOTOR CONCEPT BASED ON MAGNETIC RESONANT COUPLING Motoki Sato ^{1,2} , Giuseppe Guidi ³ , Takehiro Imura ¹ and Fujimoto Hiroshi ¹ ; ¹ The University of Tokyo, ² ToyodenkiSeizo K.K., ³ SINTEF Energy AS.

Passive Components for Power Electronics

Chair: Jun-Ichi Itoh

P-80 (ID: 32)	PREDICTION OF THE NON-LINEAR BEHAVIOR OF A STEPPED AIR GAP INDUCTOR Erika Stenglein, Daniel Kübrich and Manfred Albach; Lehrstuhl für Elektromagnetische Felder (Chair of Electromagnetic Fields), FAU Erlangen-Nürnberg.
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P-81 (ID: 35)	ANALYTICAL CALCULATION OF THE FLYBACK CONVERTER UTILIZING A TRANSFORMER WITH SATURABLE MAGNETIZING INDUCTANCE Panagiotis Mantzanas, Markus Barwig and Thomas Dürbaum; Lehrstuhl für Elektromagnetische Felder (Chair of Electromagnetic Fields), FAU Erlangen-Nürnberg.
P-82 (ID: 10)	POSYNOMIAL MODELS OF INDUCTORS FOR OPTIMIZATION OF POWER ELECTRONIC SYSTEMS BY GEOMETRIC PROGRAMMING Andrija Stupar, Josh A. Taylor and Aleksandar Prodic; University of Toronto.
P-83 (ID: 110)	ANALYSIS AND DESIGN OF A MULTI-TAPPED HIGH-FREQUENCY AUTO-TRANSFORMER BASED INVERTER SYSTEM Mattia Guacci ¹ , Dominik Neumayr ¹ , Dominik Bortis ¹ , Johann W. Kolar ¹ and Gerald Deboy ² ; ¹ ETH Swiss Federal Institute of Technology, ² Infineon Technologies Austria AG.
P-84 (ID: 131)	COMPARISON OF ANALYTICAL METHODS FOR CALCULATING THE AC RESISTANCE AND LEAKAGE INDUCTANCE OF MEDIUM-FREQUENCY TRANSFORMERS Murat Kaymak and Zhan Shen, Rik W. De Doncker; Institute for Power Generation and Storage Systems EON Energy Research Center, RWTH Aachen University.
P-85 (ID: 133)	A NEW WINDING DESIGN METHOD FOR INDUCTORS AND TRANSFORMERS Murat Kaymak and Zhan Shen, Rik W. De Doncker; Institute for Power Generation and Storage Systems EON Energy Research Center, RWTH Aachen University.
P-86 (ID: 156)	COMPREHENSIVE LARGE-SIGNAL PERFORMANCE ANALYSIS OF CERAMIC CAPACITORS FOR POWER PULSATION BUFFERS Dominik Neumayr, Dominik Bortis and Johann Walter Kolar; ETH Zurich / Power Electronic Systems Laboratory.
P-87 (ID: 22)	ENERGY EFFICIENT HEAT SINK DESIGN: NATURAL VS. FORCED CONVECTION COOLING Daniel Christen, Milos Stojadinovic and Jürgen Biela; ETH Zurich.

Photovoltaic Systems

Chair: Santiago Sanchez

P-88 (ID: 30)	AN ELECTRIC CIRCUIT MODEL OF PHOTOVOLTAIC PANEL WITH POWER ELECTRONIC CONVERTER Tsung-Hsi Wu ¹ , Wei-Chen Liu ² , Chin-Sien Moo ¹ and Hung-Liang Cheng ³ ; ¹ National Sun Yat-sen University, ² Chroma ATE Inc., ³ I-SHOU UNIVERSITY.
P-89 (ID: 74)	VOLTAGE AND CURRENT CONTROL OF A MULTI-PORT NPC INVERTER CONFIGURATION FOR A GRID-CONNECTED PHOTOVOLTAIC SYSTEM Thilo Janssen and Hariharan Krishnaswami; The University of Texas at San Antonio.
P-90 (ID: 98)	EXPERIMENTAL REALIZATION OF A SINGLE-PHASE FIVE LEVEL INVERTER FOR PV APPLICATIONS Abdelhamid Loukriz ¹ , Sandra Dudley ² , Terence Quinlan ³ and Stuart Walker ³ ; ¹ Ecole Nationale Polytechnique, ² London South Bank University, ³ University of Essex.
P-91 (ID: 99)	A FAULT DIAGNOSIS AND CONTROL PLATFORM FOR SOLAR PV CONVERSION SYSTEMS Palak Jain ¹ , Jason Poon ² , Seth R. Sanders ² and Sanjib Kumar Panda ¹ ; ¹ National University of Singapore, ² UC Berkeley.
P-92 (ID: 105)	DYNAMIC PHOTOVOLTAIC ARRAYS (DPVA) POWER HUB FOR AUTONOMOUS MARINE PLATFORMS

	Peter Wilson, Jonathan Storey and Benjamin Metcalfe; University of Bath.
P-93 (ID: 134)	COMPARATIVE ANALYSIS OF DIFFERENT MPPT SCHEMES FOR PHOTOVOLTAIC INTEGRATION OF MODULAR MULTILEVEL CONVERTER Hamed Nademi ¹ , Atousa Elahidoost ² and Lars Norum ² ; ¹ ABB, ² Norwegian University of Science and Technology (NTNU).
P-94 (ID: 145)	PASSIVITY BASED CONTROLLER FOR PHOTOVOLTAIC MODULES USING ZETA CONVERTER Daniel Merced and Eduardo Ortiz; University of Puerto Rico.

Damping Methods and Harmonics

Chair: Atle Rygg

P-95 (ID: 129)	INVESTIGATION ON DAMPING METHODS FOR MULTIMEGAWATT GRID CONNECTED VOLTAGE SOURCE INVERTERS WITH LCL-FILTER Emre Kantar ¹ and Ahmet M. Hava; ¹ Norwegian University of Science and Technology (NTNU), ² Middle East Technical University (METU).
P-96 (ID: 108)	A NOVEL DESIGN METHOD FOR HALF-BRIDGE CONVERTERS WITH HIGH-ORDER ACTIVELY-DAMPED FILTERS Korawich Niyomsatian ^{1,2} , Piet Vanassche ¹ , Bruno Hendrickx ¹ , Jeroen Van den Keybus ¹ and Johan Gyselinck ² ; ¹ Triphase NV, ² Université libre de Bruxelles.
P-97 (ID: 174)	USING LED LIGHTING SYSTEMS FOR HARMONIC CURRENT CANCELLATION IN POWER DISTRIBUTION SYSTEMS Zhenyu Shan, Yingwei Huang and Juri Jatskevich; The University of British Columbia.