

# The 21<sup>st</sup> IEEE Workshop on Control and Modeling for Power Electronics

**Nov 9 – 12 2020, Aalborg University**

## Program at a Glance

Time (DK time)	Nov. 9 Monday	Nov. 10 Tuesday	Nov. 11 Wednesday	Nov. 12 Thursday
12:00-13:00		T1 - Stability and Modeling of Grid-Tied Converter	T6 - Component-level Condition Monitoring and Reliability Testing	T11 - Design, Optimization and Simulation Tools
13:00-14:00	Tutorial 1 - Passive components for advancement of Power Electronics (T. Shimizu)	P1 - Modeling and Stability of Power Electronics Converter 1	T7 - Novel Topologies of Power Electronics Converter	T12 - Emerging Applications of Power Electronics
14:00-15:00		P2 - Novel Topologies, Advanced Control and Simulation 1	T8 - Performance Analysis of Power Component	T13 - Topics in Grid-Forming Power Converter
15:00-15:30	Break	Welcome + Keynote 1 - Evolution of the European Power System towards a full controllable hybrid AC/DC system (W. Winter)	Keynote 2 - Last Advances of Predictive Control in Power Electronics (J. Rodriguez)	Keynote 3 - Challenges to Small-Signal Modeling: From Single Power Converter to Distributed Power System (J. Liu)
15:30-16:00	Tutorial 2 - Transmission Level Harmonics and Converter Stability in Modern Power Systems (C. F. Flytkjaer, L. H. Kocewiak)			
16:00-16:30			T2 - Reliability Assessment in Power Electronics	T9 - Model Predictive Control of Inverter
16:30-17:30		T3 - Wireless Power Transfer	T10 - High Performance of Power Converter	P6 - Component-level and System-level Simulation
17:30-18:00	Break			
18:00-18:30	Tutorial 3- Modeling and Analysis of Magnetic Components (D. J. Perreault, A. J. Hanson, C. R. Sullivan)	T4 - Dynamic Modeling and Control of Power Converter	P3 - Modeling and Stability of Power Electronics Converter 2	T14 - Control and Real-time Simulation
18:30-19:30		T5 - Advanced Control of Power Converter	P4 - Novel Topologies, Advanced Control and Simulation 2	T15 - Optimized Design of Passive and Active Components
19:30-20:00				
20:00-20:30				

## **Presentation Format**

- Tutorial - Duration: 2 hours, Presentation: pre-recorded, Q&A: live
- Keynote - Duration: 1 hours, Presentation: pre-recorded/live, Q&A: live
- Sponsor demo - Duration: 30 minutes, Presentation: pre-recorded/live, Q&A: live
- Oral presentation - Duration: 20 minutes, 15 minutes presentation: pre-recorded (on-demand), 5 minutes Q&A: live
- Poster presentation – Duration: 1 hour, 5 minutes presentation: pre-recorded (on-demand), 1 hour free discussion Q&A: live

**Tuesday Nov. 10<sup>th</sup>, 2020**

**Technical session T1 Stability and Modeling of Grid-Tied Converter  
12:00-13:00**

N°	Paper ID	AUTHORS	TITLE	Time
T1.1	078	Huoming Yang, Hendrik Just, Malte Eggers and Sibylle Dieckerhoff	Modeling and Stability Analysis of Grid-Following Voltage-Source Converters Utilizing Individual Channel Design Method	12:00
T1.2	252	Fangzhou Zhao, Xiongfei Wang, Zichao Zhou, Lennart Harnefors, Jan R. Svensson, Lukasz Kocewiak and Mikkel Peter Sidoroff Gryning	A General Integration Method for Stability Analysis of Grid-Forming Converter Connecting to Power System	12:15
T1.3	265	Dongsheng Yang and Yin Sun	Analytical Small-Signal Modelling of Diode-Rectifier based HVDC Link Based on Physical Switching Actions of Diodes	12:30
Live Q&A via Zoom link				12:45

**Technical session T2 Reliability Assessment in Power Electronics  
16:30-17:30**

N°	Paper ID	AUTHORS	TITLE	Time
T2.1	113	Marium Rasheed, Mohamed Kamel, Hongjie Wang, Regan Zane and Kandler Smith	Investigation of Active Life Balancing to Recondition Li-ion Battery Packs for 2nd Life	16:30
T2.2	237	Mateja Novak, Ariya Sangwongwanich and Frede Blaabjerg	Monte Carlo Based Reliability Estimation Methods in Power Electronics	16:45
T2.3	126	Alvaro Cardoza and Alexis Kwasinski	Active Power Nodes for Increased Energy Resources Availability in Distribution Networks	17:00
Live Q&A via Zoom link				17:15

**Technical session T3 Wireless Power Transfer  
17:30-18:30**

N°	Paper ID	AUTHORS	TITLE	Time
T3.1	043	Usama Anwar, Zhaoyi Liu and Dejan Markovic	A Burst-Mode Controlled Inductive Wireless Power Transfer System	17:30
T3.2	287	Sounak Maji, Sreyam Sinha, Brandon Regensburger, Francesco Monticone and Khurram Afridi	Reduced-Fringing-Field Multi-MHz Capacitive Wireless Power Transfer System Utilizing a Metasurface-based Coupler	17:45
T3.3	266	Lei Gu, Grayson Zulauf, Aaron Stein, Phyo Aung	Design and Optimization of 6.78 MHz Wireless Power Transfer with Self-Resonant Coils	18:00

		Kyaw, Tuofei Chen and Juan M. Rivas-Davila	
Live Q&A via Zoom link			18:15

**Technical session T4 Dynamic Modeling and Control of Power Converter  
18:30-19:30**

N°	Paper ID	AUTHORS	TITLE	Time
T4.1	096	Daniel Zhou, Youssef Elasser, Jaeil Baek, Charles R. Sullivan and Minjie Chen	Inductance Dual Model and Control of Multiphase Coupled Inductor Buck Converter	18:30
T4.2	128	Jared Baxter and Daniel Costinett	Steady-State Convergence of Discrete Time State-Space Modeling with State-Dependent Switching	18:45
T4.3	276	Usama Anwar and Dejan Markovic	Dynamic Modeling of Hybrid Feedforward Controlled Pulse Width Modulated Switching Converters	19:00
Live Q&A via Zoom link			19:15	

**Technical session T5 Advanced Control of Power Converter  
19:30-20:30**

N°	Paper ID	AUTHORS	TITLE	Time
T5.1	226	Venkata Yaramasu, Apparao Dekka, Tomislav Dragicevic, Changming Zheng and Jose Rodriguez	Modulated Model Predictive Control of an LC-Filtered Neutral-Point Clamped Converter	19:30
T5.2	206	Soham Dutta, Minghui Lu, Rahul Mallik, Branko Majmunovic, Satyaki Mukherjee, Gab-Su Seo, Dragan Maksimovic and Brian Johnson	Decentralized Control of Cascaded H-bridge Inverters for Medium Voltage Grid Integration	19:45
T5.3	127	Lalit Kishore Marepalli, Kaushik Gajula and Luis Herrera	Fast Distributed Model Predictive Control for DC Microgrids	20:00
Live Q&A via Zoom link			20:15	

**Poster session P1 Modeling and Stability of Power Electronics Converter 1  
13:00-14:00 (Live Q&A via Zoom)**

N°	Paper ID	AUTHORS	TITLE
P1.1	053	Yuan Li, Guohua Zhou, Minrui Leng and Qingxin Tian	Stabilizing Effect of Load Converter Operating in DCM on Cascaded System

P1.2	163	Takashi Funaki, Toshiji Kato and Kaoru Inoue	Passivity-Based Stabilization Method for a DC Power Supply System with a Constant Power Load and an LC Filter
P1.3	207	Satoshi Nagai and Jun-Ichi Itoh	Unbalanced Voltage Sag Ride-through Capability for Three-phase Grid-tied Inverter with Low Inductance
P1.4	292	Wenjie Chen, Kang Tai, Michael Lau, Ahmed Abdelhakim, Ricky R. Chan, Alf Kåre Ådnanes and Tegoeh Tjahjowidodo	On the Modelling of Fuel Cell-Fed Power System in Electrified Vessels
P1.5	301	Santanu Kapat, Gopi Reddy Chilukuri and Souvik Jash	Small-Signal Modeling of SIMO DC-DC Converters and Comparative Continuous/Discrete-Time Results
P1.6	032	Shiyuan Fan, Heya Yang, Xin Xiang, Wuhua Li, Huan Yang, Rongxiang Zhao and Xiangning He	Arm Phase-shift Modulation and Pre-charge Strategy for an Enhanced Alternate Arm Converter
P1.7	049	Takaya Sekiguchi and Toshihisa Shimizu	Analysis of a Single-Phase PV Inverter with Generation Control and Power Decoupling Features
P1.8	071	Shuo Yan	An Improved Deadbeat Predictive Direct Power Control Using Geometrical Modulation
P1.9	089	Ye Yan, Yuxiang Wang, Chushan Li, Wuhua Li and Xiangning He	Resonant Control with Differentiated Phase Correction for High Power Converters with Negative Sequence Elimination Featuring Double-sided Frequency Asymmetry
P1.10	135	Yong Long Syu, Zitao Liao, Pourya Assem, Derek Chou and Robert Pilawa-Podgurski	Phase-Shifted PWM with Dynamic Phase Shift Control and Zero Sequence Injection to Minimize Inductor Current Ripple in Three-Phase Flying Capacitor Multilevel Converters
P1.11	165	Ko Oue, Shunya Sano, Toshiji Kato and Kaoru Inoue	Discrete-Time Voltage Controller for Grid-Forming Inverters based on Complex Vector Theory
P1.12	217	Wesam Rohouma, Morcos Metry, Robert S. Balog, Aaqib Ahmad Peerzada and Miroslav M. Begovic	Adaptive MPC-based Cost Function for Capacitorless VAR Compensator in Distribution Networks
P1.13	218	Morcos Metry, Minjeong Kim, Wesam Rohouma and Robert S. Balog	Model Predictive Control based Controller for Grid-Connected Ripple-Port Inverters
P1.14	013	Mads Graungaard Taul, Xiongfei Wang, Pooya Davari and Frede Blaabjerg	Frequency-Freezing FLL for Enhanced Synchronization Stability of Grid-Following Converters during Grid Faults
P1.15	018	Panagiotis Mantzanas, Daniel Kuebrich and Thomas Duerbaum	A Fast and Accurate Calculation Method for Predicting the Battery Current Ripple in Battery-fed PWM Inverter Systems
P1.16	026	Peter Renz, Niklas Deneke and Bernhard Wicht	Dynamic Modeling and Control of a Resonant Switched Capacitor Converter with Switch Conductance Regulation
P1.17	042	Chuantong Hao and Michael Merlin	Automatic Derivation of State-Space Model from Linear Electrical Circuits with Dependent Variables using Modified Nodal Analysis
P1.18	075	Roosa-Maria Sallinen, Tomi Roinila and Hessamaldin Abdollahi	Stability Analysis and Adaptive Resonance Damping of Multi-Converter System Applying Bidirectional Converter

P1.19	080	Peter Jonke, Markus Makoschitz, Sumanta Biswas, Johannes Stöckl and Hans Ertl	Analysis and Verification of a Cascaded Advanced AC-Simulator with Non-Linear Loads
P1.20	090	Alberto Bolzoni	Generalized Nyquist MIMO Stability of Frequency Regulation Services in Power Networks
P1.21	097	Vincenzo Castiglia, Rosario Miceli, Yongheng Yang and Frede Blaabjerg	Small-Signal Modeling and Experimental Validation of the Three-phase Quasi-Z-Source Inverter
P1.22	103	Marina Sanz, Carlos Olalla, Diego Ochoa, Francisco Huerta, Angel Cid and Antonio Lazaro	Stability Analysis using Reduced-order Behavioral VSI Input Impedance Converter Model applied to enhance Power-Hardware-In-the-Loop
P1.23	143	Shih-Feng Chou, Xiongfei Wang and Frede Blaabjerg	An Aggregated Model for Power Electronic System Based on Multi-Port Network Reduction Method
P1.24	148	Meng Chen, Dao Zhou and Frede Blaabjerg	Impact of Synchronous Generator Replacement with VSG on Power System Stability
P1.25	160	Joseba Erdocia, Andoni Urtasun and Luis Marroyo	Modeling the Inherent Damping of High-Power Inverters

**Poster session P2 Novel Topologies, Advanced Control and Simulation 1**  
**14:00-15:00 (Live Q&A via Zoom)**

N°	Paper ID	AUTHORS	TITLE
P2.1	099	Tianhua Zhu, Fang Zhuo, Fangzhou Zhao, Ruijie Song, Feng Wang and Hao Yi	Analysis of Multiple Phase-shift Control for Full-bridge CLLC Resonant Converter Based on Improved Fundamental Harmonic Approximation Method
P2.2	174	Zahra Saadatizadeh, Pedram Chavoshpour Heris, Yongheng Yang and Frede Blaabjerg	High Step-Up/Down Switched-Capacitor Based Bidirectional DC-DC Converter
P2.3	235	Hossein Khounjahan, Roghayeh Pourebrahimi, Sadjad Tohidi, Saeed Peyghami, Amin M. Shotorbani and Frede Blaabjerg	Two-Stage Single-Source Full-Bridge Based Three-Phase Inverter for Medium Voltage Applications
P2.4	236	Reyhaneh Eskandari, Hossein Khounjahan, Amin M. Shotorbani, Mehdi Abapour, Saeed Peyghami and Frede Blaabjerg	Asymmetric Cascaded Multilevel Inverter with Capacitor-based Half-Bridge Cells and Reduced Number of Components
P2.5	254	Houkai Zhang, Guochun Xiao, Zhaolin Lu, Yuechen Rui, Xianghao Cao and Fangzhou Zhao	A Novel 7-Leg Topology for 3-Phase 4-Wire Unified Power Quality Conditioner
P2.6	255	Zhaolin Lu, Guochun Xiao, Houkai Zhang, Yuechen Rui, Xianghao Cao and Fangzhou Zhao	Compensation Range Analysis of 3-Phase 4-Leg Topology DVR Based on Multi-leg Modulation Strategy
P2.7	298	C Dhanamjayulu, Sanjeevikumar Padmanaban, K	A Novel Nine and Seventeen Level Multilevel Inverters with Condensed Switch Count

		Palanisamy, Frede Blaabjerg and Pandav Kiran Maroti	
P2.8	028	Junichiro Nagao, Jun Furuta and Kazutoshi Kobayashi	Capacitor-Based Three-Level Gate Driver for GaN HEMT Only with a Single Voltage Supply
P2.9	068	Jinshui Zhang, Yan Zhang and Jinjun Liu	Downsizing Design of Powdered Iron Core Inductors Based on Variable-Frequency Modulation Targeted at Harmonics Suppression
P2.10	132	Yuan Li, Yuan Fu Zhao, Alex Q. Huang and Liqi Zhang	Degradation Assessment of SiC MOSFETs under the Repetitive Short-Circuit Ageing with Different Gate-Source Voltage Bias
P2.11	261	Pavel Strajnikov, Mor Peretz and Alon Kuperman	Low-Frequency-Ripple Free Finite Valued Electronic Capacitor
P2.12	033	Mini Namboothiripad, Mandar J Datar, Mukul C Chandorkar and Sachin B Patkar	Accelerator for Real-Time Emulation of Modular-Multilevel-Converter Using FPGA
P2.13	067	Chang Liu, Yueshi Guan, Yijie Wang, Wei Wang and Dianguo Xu	Design of Matching Network in High Frequency Converter Considering Flexible Aircore Inductor Effect
P2.14	267	Nachiketa Deshmukh and Sandeep Anand	A Cascaded Interleaved Bootstrapped Gate Driver Power Supply for Multilevel Photovoltaic Inverters
P2.15	288	Minjeong Kim and Robert Balog	Commutation Method for a Three-Phase Current Sourced High-Frequency ac-link Inverter
P2.16	299	Rakesh Kumar, Sanjeevikumar Padmanaban, Partha Sarathi Subudhi, Frede Blaabjerg and Dhanamjayulu C	A Fibonacci Series based Nearest Level Modulation Scheme for MultiLevel Inverters
P2.17	058	Mohammad Hedayati, Harry Dymond, Dawei Liu and Bernard Stark	Fast temperature sensing for GaN power devices using E-field probes
P2.18	140	Mateja Novak and Frede Blaabjerg	Model predictive active thermal control strategy for lifetime extension of a 3L-NPC converter for UPS applications
P2.19	159	Jing Yuan, Yenan Chen, Yongheng Yang, Frede Blaabjerg and Minjie Chen	High Frequency Multicell Cascaded Quasi-Square-Wave Boost Converter
P2.20	281	Jiahui Wu, Dong Liu, Yanbo Wang and Zhe Chen	A Hybrid-bridge based Dual Active Bridge DC/DC Converter with Compact Structure
P2.21	289	Ahmed Abdelhakim and Frede Blaabjerg	Current-fed Modular Multilevel Converter (CMMC) for Fuel Cell and Photovoltaic Integration
P2.22	004	Benedikt Kohlhepp, Stefan Peller, Daniel Kübrich and Thomas Dürbaum	Test Setup for Loss Measurements of Inductive Components by using GaN-HEMTs
P2.23	077	Yunni Li, Jannik Schäfer, Dominik Bortis, Johann Kolar and Gerald Deboy	Optimal Synergetic Control of a Three-Phase Two-Stage Ultra-Wide Output Voltage Range EV Battery Charger Employing a Novel Hybrid Quantum Series Resonant DC/DC Converter
P2.24	232	Saeed Peyghami, Seyed Fariborz Zarei, Mohammad Amin Ghasemi, Peter Palensky and Frede Blaabjerg	A Decentralized Frequency Regulation Scheme in AC Microgrids
P2.25			



**Wednesday Nov. 11<sup>th</sup>, 2020**

**Technical session T6 Component-level Condition Monitoring and Reliability Testing  
12:00-13:00**

N°	Paper ID	AUTHORS	TITLE	Time
T6.1	139	Zhaoyang Zhao, Weiguo Lu, Pooya Davari and Frede Blaabjerg	An Online Monitoring Method for Output Capacitors of DC/DC Boost Converters	12:00
T6.2	243	Hongbo Zhao, Dipen Narendra Dalal, Jannick Kjær Jørgensen, Asger Bjørn Jørgensen, Xiongfei Wang, Bjørn Rannestad and Stig Munk-Nielsen	Identification of the Terminal-to-Core Couplings in Filter Inductors by Using Double-Pulse-Test Setup	12:15
T6.3	264	Javad Naghibi, Kamyar Mehran and Martin Foster	An Online Failure Assessment Approach for SiC-based MOSFET Power Modules Using Iterative Condition Monitoring Technique	12:30
Live Q&A via Zoom link				12:45

**Technical session T7 Novel Topologies of Power Electronics Converter  
13:00-14:00**

N°	Paper ID	AUTHORS	TITLE	Time
T7.1	064	Cheng Li, Diego Serrano and José A. Cobos	Analysis of a 48V-12V Hybrid Switched Capacitor Converter with DC Winding Current Autotransformer	13:00
T7.2	157	David Lumbreras, Ernesto Barrios, Julian Balda, Roberto Gonzalez and Pablo Sanchis	Novel three-phase topology for cascaded multilevel medium-voltage conversion systems in large-scale PV plants	13:15
T7.3	166	Hamed Mashinchi Maheri, Andrii Chub and Dmitri Vinnikov	Light-Load Efficiency Improvement for Galvanically Isolated Quasi-Z-Source DC-DC Converter for Photovoltaic Applications	13:30
Live Q&A via Zoom link				13:45

**Technical session T8 Performance Analysis of Power Component  
14:00-15:00**

N°	Paper ID	AUTHORS	TITLE	Time
T8.1	017	Erika Stenglein and Thomas Dürbaum	Empirical Core Loss Model for Arbitrary Core Excitations Including DC-bias	14:00
T8.2	038	Armin Jafari, Michaël Heijnemans, Reza Soleimanzadeh, Remco Van Erp, Mohammad Samizadeh	Calibration-Free Calorimeter for Sensitive Loss Measurements: Case of High-Frequency Inductors	14:15

		Nikoo, Enea Figini, Furkan Karakaya, Nirmana Perera and Elison Matioli		
T8.3	110	Martijn Deckers, Simon Ravyts, Mauricio Dalla Vecchia, Urmimala Chatterjee, Xiangdong Li, Stefaan Decoutere and Johan Driesen	Influence of Driver Integration on GaN Enhancement Mode Transistor Performance	14:30
Live Q&A via Zoom link				14:45

**Technical session T9 Model Predictive Control of Inverter  
16:30-17:30**

N°	Paper ID	AUTHORS	TITLE	Time
T9.1	006	Mohamed Abdelrahem, Christoph Hackl, Jose Rodriguez and Ralph Kennel	Predictive Torque Control without Weighting Factors for Doubly-Fed Induction Generators in Wind Turbine Applications	16:30
T9.2	101	Ludovico Ortombina, Petros Karamanakos and Mauro Zigliotto	Robustness Analysis of Long-Horizon Direct Model Predictive Control: Permanent Magnet Synchronous Motor Drives	16:45
T9.3	179	Johan Raath, Toit Mouton and Tobias Geyer	Alternative Sphere Decoding Algorithm for Long-horizon Model Predictive Control of Multi-level Inverters	17:00
Live Q&A via Zoom link				17:15

**Technical session T10 High Performance of Power Converter  
17:30-18:30**

N°	Paper ID	AUTHORS	TITLE	Time
T10.1	190	Danish Shahzad, Nauman Zaffar and Khurram Afridi	Power Factor Enhancement of a Soft-Switched Common-Neutral Single-DC-Bus Power Converter	17:30
T10.2	133	Zichao Ye, Rose Abramson, Yong-Long Syu and Robert Pilawa-Podgurski	MLB-PoL: A High Performance Hybrid Converter for Direct 48 V to Point-of-Load Applications	17:45
T10.3	072	Jianglin Zhu and Dragan Maksimovic	48 V-to-1 V Transformerless Stacked Active Bridge Converters with Merged Regulation Stage	18:00
Live Q&A via Zoom link				18:15

**Poster session P3 Modeling and Stability of Power Electronics Converter 2  
18:30-19:30 (Live Q&A via Zoom)**

N°	Paper ID	AUTHORS	TITLE
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P3.1	134	Ping Wang, Robert Pilawa-Podgurski, Philip Krein and Minjie Chen	Performance Limits of Differential Power Processing
P3.2	272	Anup Thapa and Madhu Sudhan Chinthavali	Dynamic Model of Active Front-End Converters with 2DOF Type PI Controller for DC Bus Voltage Control
P3.3	129	Sounak Maji, Sreyam Sinha and Khurram Afridi	Theoretical Limits of Power Transfer in Capacitive Wireless Charging Systems
P3.4	056	Nathan Pallo, Mads Taul, Andrew Stillwell and Robert Pilawa-Podgurski	Fault Ride-Through of Flying-Capacitor Multilevel Converters through Rapid Fault Detection and Idle-mode Operation
P3.5	063	Netan Yakop, Philippe A. Gray and Peter W. Lehn	Control of a Universal Input Voltage Modular Multilevel DC/DC Converter
P3.6	066	Pallavi Bharadwaj and Bradley Lehman	Maximising Energy Yield Using Global Maximum Power Point Tracking of Reconfigurable Photovoltaic Panel Array
P3.7	079	Hanqing Lin, Seyyedmilad Ebrahimi, Mohammad Mahdavyfakhr and Juri Jatskevich	Analysis of Sliding-Mode-Controlled Boost Converters with Mixed Loads
P3.8	040	Spencer Cochran and Daniel Costinett	Dual-Loop Frequency Synchronization and Load Regulation using a Discrete Time Model for a 7-Level Switched Capacitor WPT Rectifier
P3.9	141	Leandro Benhur Klinger Fisch and Marcelo Lobo Heldwein	10-MW Direct-Drive PMSG-Based Wind Energy Conversion System Model
P3.10	203	Sebastián Neira, Pablo Poblete, Javier Pereda and Felipe Nuñez	Consensus-Based Distributed Control of a Multilevel Battery Energy Storage System
P3.11	215	Janko Celikovic, Pier Cavallini, Siamak Abedinpour and Dragan Maksimovic	Minimum-Deviation Transient Response in Non-Inverting Buck-Boost DC-DC Converters
P3.12	238	Jose Robles, Freedy Sotelo and Javier Chavez	Robust Nonsingular Terminal Sliding Mode Control with Constant Frequency for DC/DC Boost Converters
P3.13	224	Venkata Yaramasu, Apparao Dekka and Jose Rodriguez	Modulated Model Predictive Torque and Current Control of Squirrel Cage Induction Generator-Based Wind Power Generation System
P3.14	247	Adam Emes, Thibaut Harzig and Brandon Grainger	Design of a Grid-Forming, Multi-Loop Control Scheme for Parallel Connected Three-Phase Quasi-Z-Source Inverters
P3.15	258	Manuel Martinez Gomez, Claudio Burgos Mellado and Roberto Cardenas Dobson	Distributed Control for a Cost-based Droop-free Microgrid
P3.16	171	Leyre Rosado, Javier Samanes, Eugenio Gubía and Jesús López	Capacitor Current Feedback Active Damping with Lagged Compensator for DFIG Wind Turbines with LCL Filter
P3.17	187	Huoming Yang, Hendrik Just, Malte Eggers and Sibylle Dieckerhoff	Wirtinger Calculus Based Modeling and Analysis of VSG-Dominated Grids
P3.18	248	Hadi El Khatib, Daniel Gaona, Dieter Gerling and Michael Saur	SRC as a Reliable Methodology to Evaluate Flux Observer Estimation Accuracy
P3.19	200	Tommi Reinikka, Tomi Roinila and Jian Sun	Measurement Device for Inverter Output Impedance Considering the Coupling Over Frequency

P3.20	250	Bahram Pournazarian, Meysam Saeedian, Bahman Eskandari, Matti Lehtonen and Edris Pouresmaeil	Feasible Range of Microgrid Parameters Based on Small-signal Stability Analysis
P3.21	260	Javier Samanes, Leyre Rosado, Eugenio Gubia and Jesus Lopez	Sub-synchronous Resonance Damper Based on the Stator Voltage Feedback for DFIG Wind Turbines
P3.22	269	Amir Sepehr, Mobina Pouresmaeil, Mojgan Hojabri, Frede Blaabjerg and Edris Pouresmaeil	Improving Transient Stability of Power Synchronization Control for Weak Grid Applications
P3.23	137	Wenjie Liu, Yongheng Yang, Elizaveta Liivik, Tamas Kerekes and Frede Blaabjerg	Impedance Network Impact on the Controller Design of the QZSI for PV Applications
P3.24	008	Zhiqing Yang, Chirag Shah, Jakob Teichrib, Shenghui Cui and Rik W. De Doncker	Passivity-Based Virtual Damping Control of Three-Phase Grid-Tied PV Inverters
P3.25			

**Poster session P4 Novel Topologies, Advanced Control and Simulation 2**  
**19:30-20:30 (Live Q&A via Zoom)**

N°	Paper ID	AUTHORS	TITLE
P4.1	003	Wen-Chuen Liu and Robert Pilawa-Podgurski	Bi-lateral Energy Resonant Converter (BERC) with Merged Two-Stage Inductor for 48-to-12V Applications
P4.2	070	Tuofei Chen, William Dally and John Fox	Multiple Input Multiple Output (MIMO) Control of a Novel Three Phase Multilevel Inverter
P4.3	123	Jessica Boles, Elaine Ng, Jeffrey Lang and David Perreault	High-Efficiency Operating Modes for Isolated Piezoelectric-Transformer-Based DC-DC Converters
P4.4	273	Matheus Soares and Edson H. Watanabe	MMC Applied to Pumped Hydro Storage using a Differentiable Approximation of a Square Wave as Common-Mode Voltage during Low-Frequency Operation
P4.5	278	Haoquan Zhang, Anas Al Bastami, Alexander S. Jurkov, Aaron Radomski and David J. Perreault	Multi-Inverter Discrete Backoff: A High-Efficiency, Wide-Range RF Power Generation Architecture
P4.6	194	Prescott H. McLaughlin, Yue Wu, Charles R. Sullivan and Jason T. Stauth	Modeling and Design of Planar-Spiral Merged-LC Resonators in a Standard CMOS Process
P4.7	209	Jianghui Yu and Rolando Burgos	Impact of Parasitic Capacitors on Cell Capacitor Voltage Balance in Power Converters Having Integrated Capacitor Blocked Transistor Cells
P4.8	285	Le Wang and Rolando Burgos	Analysis of Impacts of Compensation Networks on Characteristics of Piezoelectric Transformers
P4.9	286	Anas Al Bastami, Haoquan Zhang, Alexander Jurkov, Aaron Radomski and David Perreault	Comparison of Radio-Frequency Power Architectures for Plasma Generation

P4.10	108	Peyman Amiri, Deepak Gautam, Chris Botting, Wilson Eberle and Liwei Wang	Real-Time Hardware-in-the-Loop Simulation and Control of Totem Pole PFC Converter
P4.11	162	Haoran Li, Seungjae Lee, Min Luo, Charles Sullivan, Yuxin Chen and Minjie Chen	MagNet: A Machine Learning Framework for Magnetic Core Loss Modeling
P4.12	221	Pranav Chandran, Blake Rose and Brian Johnson	Equivalent Circuit Models for Closed-loop Multiphysics Drive Systems
P4.13	122	Levi Bieber, Liwei Wang, Juri Jatskevich and Wei Li	A Quantitative Analysis on the Energy Storage Requirements for Hybrid Cascaded Multilevel
P4.14	161	Thaibao Phan, Grayson Zulauf, Jonathan Fan and Juan Rivas-Davila	1 kW, Multi-MHz Wireless Charging for Electric Transportation
P4.15	175	Yenan Chen, David Giuliano and Minjie Chen	Two-Stage 48V-1V Hybrid Switched-Capacitor Point-of-Load Converter with 24V Intermediate Bus
P4.16	191	Mike Ranjram and David Perreault	Leveraging Multi-Phase and Fractional-Turn Integrated Planar Transformers for Miniaturization in Data Center Applications
P4.17	201	Minki Kim and Jungwon Choi	Design of High-frequency Resonant Inverter for Capacitive Wireless Power Transfer
P4.18	202	Tarak Saha, Anindya Chitta Bagchi and Regan Zane	Time-Domain Analysis and ZVS Assistance Design for a DAB LCL-T Resonant Converter in Underwater DC Current Distribution Network
P4.19	256	Manikanta Pallantla, Jeyaram Durga Manian Deivanayagam, Sreekanth T. and Ned Mohan	A Line Commutated - Thyristor Bridge Emulated Rotating Power Electronic Converter for Brushless Exciter Applications
P4.20	283	Andrew Foote, Daniel Costinett, Ruediger Kusch, Jason Pries, Mostak Mohammad and Burak Ozpineci	Fourier Analysis Method for Wireless Power Transfer Coil Design
P4.21	118	Mustapha Touhami, Ghislain Despesse and François Costa	A New Topology of DC-DC Converter Based On Piezoelectric Resonator
P4.22	147	Stefano Cabizza, Luca Corradini, Giorgio Spiazzi and Cristian Garbossa	Comparative Study of 48V-based Low-Power Automotive Architectures
P4.23	152	Ruediger Schwendemann, Fabian Sommer and Marc Hiller	A resonant supplied cascaded H-Bridge Cell for a Series Hybrid Cascaded H-Bridge Converter used as a Power Hardware in the Loop Emulator
P4.24	153	Vegard Steinsland, Lars Michael Kristensen, Reza Arghandeh and Shujun Zhang	Design of Modular Multilevel Converters for the Shipnet in Medium Voltage DC All-Electric Ships
P4.25			

**Thursday Nov. 12<sup>th</sup>, 2020**

**Technical session T11 Design, Optimization and Simulation Tools  
12:00-13:00**

N°	Paper ID	AUTHORS	TITLE	Time
T11.1	011	Christian Winter, Jan Riedel and Stefan Butzmann	Determination of Power Loop Inductance for High-Current PCB-Based Half-Bridge Circuits	12:00
T11.2	051	Georgios Kampitsis, Max Chevron, Remco van Erp, Nirmana Perera, Stavros Papathanassiou and Elison Matioli	Mixed Simulation-Experimental Optimization of a Modular Multilevel Switched Capacitors Converter Cell	12:15
T11.3	222	Ahmed Ibrahim Soliman, Mohammad Vedadi, Billel Kahia, Mohamed Abdelrahem and Ralph Kennel	Flexible Test bench arrangement and particular implementation of 3 Level IGBT based VSI for self-sensing Model predictive Control of induction motor	12:30
Live Q&A via Zoom link				12:45

**Technical session T12 Emerging Applications of Power Electronics  
13:00-14:00**

N°	Paper ID	AUTHORS	TITLE	Time
T12.1	055	Shuxin Chen, Yiming Zhang, Xin Li, Hongchang Li, Yang Chen and Yi Tang	Controlling the Phase Angle in LCC-S IPT for Information Feedback	13:00
T12.2	104	Mahdi Shahparasti, Rasool Heydari, Mehdi Savaghebi, Jose Rodriguez and Frede Blaabjerg	Hybrid Four-wire Three-Level Inverter Equipped with Model Predictive Control for UPS Applications	13:15
T12.3	186	Daniel G. Aller, Diego G. Lamar, Manuel Arias, Pablo F. Miaja and Javier Sebastián	Design of a high performance VLC-LED driver for Visible Light Communication based on the split of the power	13:30
Live Q&A via Zoom link				13:45

**Technical session T13 Topics in Grid-Forming Power Converter  
14:00-15:00**

N°	Paper ID	AUTHORS	TITLE	Time
T13.1	087	Gregory N. Baltas, Ngoc Bao Lai, Leonardo Marin, Andres Tarasso and Pedro Rodriguez	Grid-forming Power Converter controller with Artificial Intelligence to Attenuate Inter-Area Modes	14:00

T13.2	121	Xianxian Zhao and Damian Flynn	Freezing Grid-Forming Converter Virtual Angular Speed to Enhance Transient Stability Under Current Reference Limiting	14:15
T13.3	241	Andres Tarrasó, Ngoc Bao Lai, Gregory N. Baltas and Pedro Rodriguez	Voltage Sensorless Grid-Forming Power Converters	14:30
Live Q&A via Zoom link				14:45

**Technical session T14 Control and Real-time Simulation**  
**18:30-19:30**

N°	Paper ID	AUTHORS	TITLE	Time
T14.1	046	Janesh Rupasinghe, Shaahin Filizadeh and Dharshana Muthumuni	A Co-Simulation Platform for Modeling and Testing Modular Multilevel Converters and Their Controls in Large Networks	18:30
T14.2	105	Rafael B. P. Chagas, André Furlan and Marcelo L. Heldwein	Finite Element Method Analysis of a Three-Media Submarine Cable Ground Return Impedance at Varying Depth	18:45
T14.3	213	Firehiwot Gurara, Maida Farooq, Mausamjeet Khatua, Danish Shahzad, Saad Pervaiz and Khurram Afridi	Control Strategy and Energy Density Enhancement Methodology for Merged Energy Buffer AC-DC Converters	19:00
Live Q&A via Zoom link				19:15

**Technical session T15 Optimized Design of Passive and Active Components**  
**19:30-20:30**

N°	Paper ID	AUTHORS	TITLE	Time
T15.1	214	Zitao Liao and Robert Pilawa-Podgursk	Power Harmonic Elimination Technique for Using Non-linear Ceramic Capacitors under Large Voltage Swings for Single-Phase Active Power Decoupling	19:30
T15.2	244	Jessica Boles, Pedro Acosta, Yogesh Ramadass, Jeffrey Lang and David Perreault	Evaluating Piezoelectric Materials for Power Conversion	19:45
T15.3	223	Zhongyi Quan, Li Ding, Juncheng Lu and Yunwei Li	Design Considerations of the GaN Power Stage for a GaN/Si Internal Parallel Multilevel Converter based 1500V PV String Inverter	20:00
Live Q&A via Zoom link				20:15

**Poster session P5 Advanced Control and Modulation**  
**16:30-17:30 (Live Q&A via Zoom)**

N°	Paper ID	AUTHORS	TITLE
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P5.1	012	Milad Gholami, Alessandro Pisano and Elio Usai	Robust Distributed Optimal Secondary Voltage Control in Islanded Microgrids with Time-Varying Multiple Delays
P5.2	019	Claudio Burgos-Mellado, Joseph Gutierrez, Cristian Pineda, Felipe Donoso, Alan Watson, Mark Sumner, Roberto Cardenas and Andres Mora	Distributed Control Strategy Based on a Consensus Algorithm for the Inter-cell and Inter-cluster Voltage Balancing of a Cascaded H-Bridge Based STATCOM
P5.3	034	Cristian Pineda, Javier Pereda, Claudio Burgos, Alan Watson and Felix Rojas	Zero-Current Switching (ZCS) for a High Step Ratio Modular Multilevel dc-dc Converter with wide voltage range operation
P5.4	059	Nagendra Badiger, Florian Hagel, Patrick Winzer, Alexander Schmitt and Horst Hammerer	Novel Master/Slave Configured Closed Loop Regulated Modular 320kW Isolated Symmetric CLLC Resonant DC/DC Converter
P5.5	086	Ngoc Bao Lai, Gregory N. Baltas, Leonardo Marin, Andres Tarraso and Pedro Rodriguez	Voltage Sensorless Control for Grid-connected Power Converters based on State Feedback and State Observer
P5.6	195	Hendrik Just, Huoming Yang, Malte Eggers, Marius Kaufmann-Buehler and Sibylle Dieckerhoff	Assessing Power Factor Distortion and Transient Current Response of Grid Converters During Fault Ride-Through with Extended PLL Models
P5.7	093	Ivan Petric, Paolo Mattavelli and Simone Buso	Noise Attenuation Properties of Multisampled Control in Power Electronics
P5.8	094	Zahra Rafiee, Mansour Rafiee, Mohammad Reza Aghamohammadi, Rasool Heydari and Jose Rodriguez	Adaptive Model Predictive Control of DFIG-based Wind Farm: A Model-Free Control Approach
P5.9	098	Asimena Korompili and Antonello Monti	Active Disturbance Rejection Control for DC/DC Converters in MTDC Systems
P5.10	100	Ludovico Ortombina, Petros Karamanakos and Mauro Zigliotto	Robustness Analysis of Long-Horizon Direct Model Predictive Control: Induction Motor Drives
P5.11	111	Stefan Ganzel, Magdalena Gierschner and Uwe Ritschel	Synthetic inertia control in the generator-side converter control of a grid-connected PMSG wind turbine
P5.12	115	Jiahui Wu, Dong Liu, Yanbo Wang and Zhe Chen	Three-level LLC Resonant Converter with Structure-reconfigurable Control
P5.13	119	Leonardo Marin, Ngoc Bao Lai, Gregory N. Baltas, Andres Tarraso and Pedro Rodriguez	Small-signal Model and Analysis of a Grid-forming Power Converter based on the Synchronous Power Controller
P5.14	149	Mohammad Jafari Matehkolaei, Saeed Peyghami, Hossein Mokhtari and Frede Blaabjerg	An Adaptive Droop Curve for the Superimposed Frequency Method in DC Microgrids
P5.15	158	David Lumbreras, Ernesto Barrios, Manuel Navarrete, Julian Balda, Roberto Gonzalez and Pablo Sanchis	Active control for medium-frequency transformers flux-balancing in a novel three-phase topology for cascaded converters
P5.16	164	Giuseppe Schettino, Rosario Miceli, Fabio Viola, Frede Blaabjerg, Yongheng Yang and Vincenzo Castiglia	A Novel Symmetrical Boost Modulation Method for qZS-based CHB Inverters



P5.17	173	Paula Lamo, Gustavo A. Ruiz, Francisco J. Azcondo and Alberto Pigazo	Implementation Oriented Two-Sample Phase Locked Loop for Single-Phase PFCs
P5.18	181	Sjur Føyen, Chen Zhang, Marta Molinas, Olav B Fosso and Takanori Isobe	Single-phase synchronisation with Hilbert transformers: a linear and frequency independent orthogonal system generator
P5.19	196	Jiayu Zhou, Giuseppe Guidi and Jon Are Suul	Impact on Efficiency of Inductive Battery Charging System by Sub-Resonant Frequency Control during Large Variations in Coupling Conditions
P5.20	199	Tobias Merz, Christian Korte, Eduard Specht and Marc Hiller	Optimizing Utilization of an MMSPC with Model Predictive Control
P5.21	145	Andoni Urtasun, Pablo Sanchis and Luis Marroyo	Effect of the Inner Current Loop on the Voltage Regulation for Three-Phase Photovoltaic Inverters
P5.22	242	Andres Tarrasó, Leonardo Marín, Ngoc Bao Lai and Pedro Rodriguez	Enhanced Proportional-Resonant (PR) controller with negative decoupling for weak grids
P5.23	257	Saad Hamayoon, Morten Hovd, Jon Are Suul and Mohsen Vatani	Modified Reduced Indirect Finite Control Set Model Predictive Control of Modular Multilevel Converters
P5.24	270	Burkhard Ulrich	A Unified PWM Switch Model for Current- and Voltage-Mode Control with Automatic Transition between DCM and CCM
P5.25	284	Hong Gong and Xiongfei Wang	Impacts of Digital Filters on Admittance Dissipativity of Sequence Current Control for Grid-Connected Converters

**Poster session P6 Component-level and System-level Simulation  
17:30-18:30 (Live Q&A via Zoom)**

N°	Paper ID	AUTHORS	TITLE
P6.1	291	Naser Nourani Esfetanaj, Yingzhou Peng, Huai wang, Frede Blaabjerg and Pooya Davari	Analytical Modeling of 9-150 kHz EMI in Three-Phase Active Rectifiers
P6.2	282	Jiahui Wu, Dong Liu, Yanbo Wang and Zhe Chen	Hybrid-bridge Based Dual Active Bridge DC/DC Converter with Wide Voltage Conversion Gain
P6.3	188	Beeond M. Saleh, Alessandro Costabeber, Alan J. Watson and Jon C. Clare	A Series Chain-Link Modular Multilevel DC-DC Converter For High Voltage and High Power Applications
P6.4	155	Lukas Stefanski, Rüdiger Schwendemann, Daniel Bernet, Martin Widenmeyer, Andreas Liske and Marc Hiller	Cascaded H-Bridge based Parallel Hybrid Converter – A new Voltage Source for Power-Hardware-in-the-Loop Emulation Systems
P6.5	095	Youssef Kandeel and Maeve Duffy	Design of 4th Order Resonance Filter for 5.4 W 20 MHz Buck Converter with PCB Integrated Inductor
P6.6	107	Hendrik Just, Huoming Yang, Malte Eggers, Peter Teske and Sibylle Dieckerhoff	Multi-Fidelity Model-based PLL Design for Enhanced Dynamics and Transient Stability during Fault Ride-Through
P6.7	239	Kamran Ali Khan Niazi, Yongheng Yang and Dezso Sera	Intrinsic-Capacitance-based Differential Power Processing for Photovoltaic Modules

P6.8	197	Bawar Jalal, Steve Greedy and Paul Evans	Real-Time Thermal Imaging Using Augmented Reality and Accelerated 3D Models
P6.9	192	Alex Buus Nielsen, Pooya Davari, Frede Blaabjerg and Bo Vork Nielsen	Power Density and Loss Optimization Design Methodology of a 10 kW 2-Level 3-Phase SiC Inverter
P6.10	102	Roland Unruh, Frank Schafmeister and Joachim Böcker	11kW, 70kHz LLC Converter Design with Adaptive Input Voltage for 98% Efficiency in an MMC
P6.11	062	Ravi Karadi	Methodology and Algorithm for Synthesis of Multi-Phase Switched-Capacitor Power Converter Topologies
P6.12	035	Sisi Zhao, Niklaus Felderer and Jost Allmeling	Real-Time Simulation of Three-Phase Current Source Inverter using Sub-Cycle Averaging Method
P6.13	295	Christian Østergaard, Claus Skærsholm Kjeldsen and Morten Nymand	Calculation of Planar Transformer Capacitance Based on the Applied Terminal Voltages
P6.14	249	Thomas Langbauer, Alexander Connaughton, Franz Vollmaier and Klaus Krischan	Pre-Charging of a DC-Link Capacitor from a High Voltage Battery
P6.15	245	Jeremias Kaiser and Thomas Dürbaum	Calculation of Saturation in Magnetic Cores using the Boundary Element Method
P6.16	204	Andreas Apelsmeier, Cornelius Rettner and Martin März	Model for Conducted Emission of SiC Power Modules for automotive traction Inverter - Comparison to behaviour-based Model
P6.17	183	Zhijian Yin, Yongheng Yang and Huai Wang	Thermal Modeling of an Electrolytic Capacitor Bank
P6.18	154	Nirmana Perera, Armin Jafari, Luca Nela, Georgios Kampitsis, Mohammad Samizadeh Nikoo and Elison Matioli	Output-Capacitance Hysteresis Losses of Field-Effect Transistors
P6.19	106	Josip Bacmaga, Hrvoje Stimac and Adrijan Baric	Methodology for Characterization and Modelling of DC-Biased Surface-Mount Ferrite Power Inductors
P6.20	084	David Elizondo, Ernesto L. Barrios, Pablo Sanchis and Alfredo Ursua	Analytical Modeling of High-Frequency Winding Loss in Round-Wire Toroidal Inductors
P6.21	060	Armin Jafari, Mohammad Samizadeh Nikoo, Nirmana Perera, Furkan Karakaya, Reza Soleimanzadeh and Elison Matioli	Small-Signal Approach for Precise Evaluation of Gate Losses in Soft-Switched Wide-Band-Gap Transistors
P6.22	054	Marlee Basurto, Paul Judge, Michael Merlin and Stephen Finney	Investigation of Output Filter Topologies for a Parallel Hybrid Converter based on Si-IGBTs and Partially-Rated SiC-MOSFETs
P6.23	041	Ross Mathieson, Paul Judge and Stephen Finney	Si/SiC Hybrid Switch for Improved Switching and Part-Load Performance
P6.24			
P6.25			