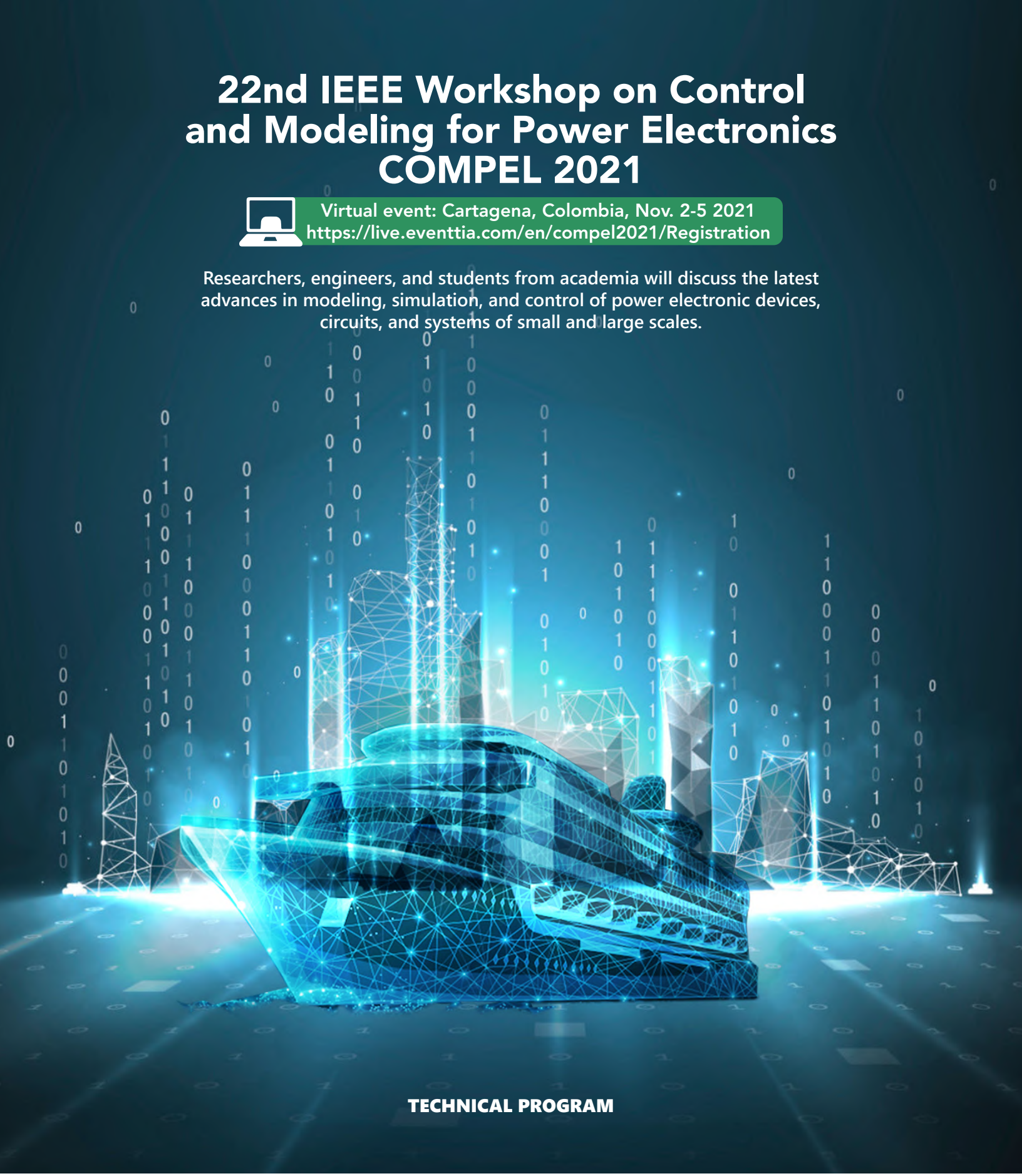
22nd IEEE Workshop on Control and Modeling for Power Electronics COMPEL 2021

Virtual event: Cartagena, Colombia, Nov. 2-5 2021
https://live.eventtia.com/en/compel2021/Registration

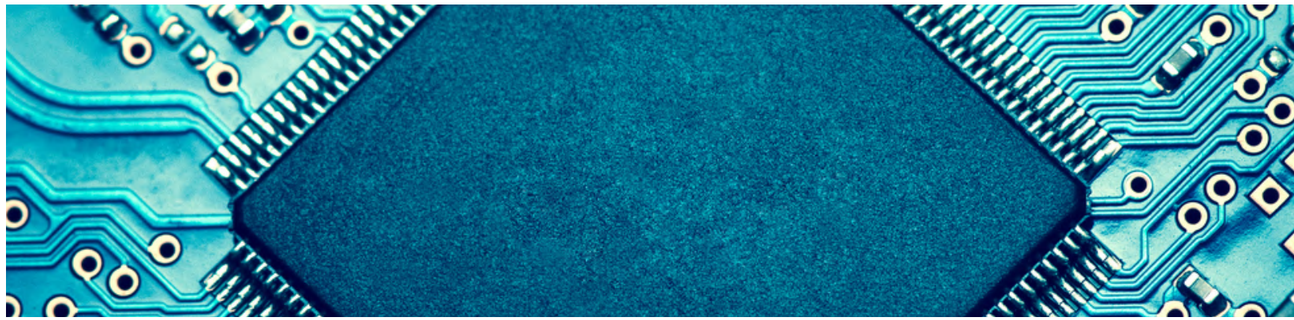
Researchers, engineers, and students from academia will discuss the latest advances in modeling, simulation, and control of power electronic devices, circuits, and systems of small and large scales.



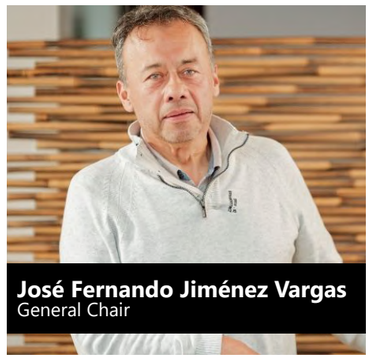
TECHNICAL PROGRAM

Universidad de los Andes Colombia
Typhoon HIL
ARMADA DE COLOMBIA
pels IEEE POWER ELECTRONICS SOCIETY Powering a Sustainable Future
IEEE

CONTENTS



WELCOME MESSAGE



José Fernando Jiménez Vargas
General Chair

Miguel Garnica
General co-chair

On behalf of the IEEE Power Electronics Society, we, Universidad de Los Andes, and the Colombian Navy will welcome you to the Twenty-Second IEEE Workshop on Control and Modeling for Power Electronics (COMPEL) 2021, to be held on 2-5 November in Cartagena, Colombia.

We have been so excited to welcome you to Colombia and the beautiful city of Cartagena de Indias, unhappily we must decide to run a COMPEL 2021 virtual despite the desire of gathering together. Nevertheless, we think today that we took the best decision in these not normal circumstances.

The port, the fortresses, and the group of monuments of Cartagena de Indias located in a bay over the Caribbean Sea were selected in 1984 by the United Nations Educational, Scientific and Cultural Organization (UNESCO) to be a Word Heritage Site. It´s the grandest remaining fortification in South America and has the fifth busiest port of the same region.

This exceptional landscape takes us to focus this COMPEL on marine and maritime applications. That's why the attendees will find exciting tutorials and keynotes in these subjects: the power electronics formed microgrids going to the sea.

We will also attend the latest results of more than 80 research groups coming everywhere over the world. It will permit us to discuss together the education and the innovation on power electronics for Latin America. We have a round table on this subject. It is important to remark that this is the first COMPEL in our region: Latin America.

We especially thank the Technical Committee 1 in the IEEE Power Electronics Society for supporting this COMPEL 2021. To the local organization and to the technical program committee thank you for their great job.

Also, we will like to thank our sponsor for its continuous support – it is very important for us and we will encourage all attendees to visit the Typhoon booth and take a chat about their products.

Thank you very much for coming, attendees and speakers, we expect that virtual meetings through networking will stimulate and motivate your creativity and innovation in modeling and control in power electronics for the next bright future.

THANK YOU TO OUR SPONSORS

Typhoon HIL

evento.uniandes.edu.co/en/compel2021

2021 IEEE COMPEL Cartagena, Colombia, Nov. 2-5

ARMADA DE COLOMBIA

THANK YOU TO OUR SPONSORS

2021 IEEE COMPEL

PROGRAM AT A GLANCE

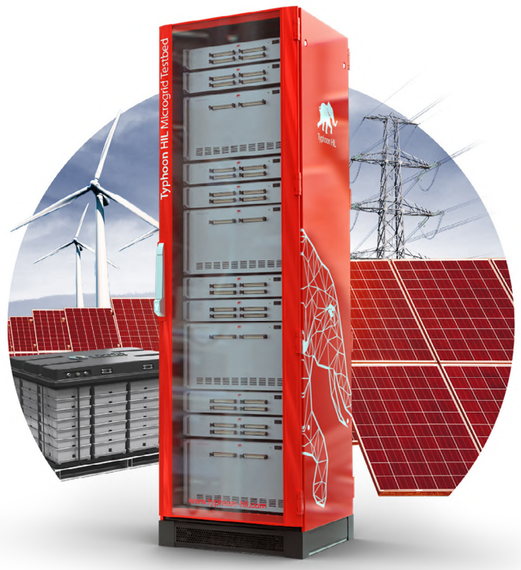
Time (GMT-5)	TUESDAY 2ND NOVEMBER	NOVEMBER 3RD 2021	THURSDAY 4TH NOVEMBER	FRIDAY 5TH NOVEMBER
8:00 - 8:30	Tutorial I - Industrial Perspective on Megawatt Marine Electrical Power Systems /Stephane Ouchouche	PANEL SESSION- Advanced Control of Power Converters	PANEL SESSION- Modeling and Stability of Grid Tied Power Converters II	PANEL SESSION: Modeling and Stability of power Converters IV
8:30 - 9:00		DIALOGUE SESSION Modeling and Stability of Power Converters	DIALOGUE SESSION Topics on Der and Microgrids	DIALOGUE SESSION Design, optimization and Realiability
9:00 - 9:30		DIALOGUE SESSION Modelling and Stability of Grid Tied Power Converters	DIALOGUE SESSION Modeling and Stability of Power Converters	DIALOGUE SESSION Advanced Control and Component Level Design and Simulation
9:30 -10:00		WELCOME + KEY NOTE 1: Microgrid Technologies: From the Land, to the Sea and Out in Space/ Josep M. Guerrero	KEY NOTE 2: Stability and Control of Inverter-Based Resources/ Xiongfei Wang	KEY NOTE 3: Impedance-Based Stability Criteria for Converter-Based Power Systems / Jian Sun
10:00 - 10:30		Break/Networking	Networking	Networking
10:30 - 11:00	Break/ Networking	PANEL SESSION- Component Level Design and Simulation	PANEL SESSION: Modeling and Stability of Power Converters II	ROUND TABLE: Innovation and education for Power Electronics Guillermo Oscar García,Mario Pacas, Ahmed Elasser
11:00 - 11:30	TUTORIAL II - Identification techniques for DC/ DC power converters / Cristina Fernández Pablo Zumel	PANEL SESSION- Design, Optimisation and Reliability	PANEL SESSION: Modeling and Stability of Power Converters II	PANEL SESSION: Education
11:30 - 12:00		PANEL SESSION- Modeling and Stability of Grid Tied Power Converters	PANEL SESSION: Real Time Aplications	PANEL SESSION: Modeling and Stability of Grid Tied Power Converters III
12:00 - 12:30		PANEL SESSION- Modeling and Stability of Power Converters	PANEL SESSION: Advanced Control II	PANEL SESSION: Microgrid der converters
12:30 - 13:00	Break/Networking	TUTORIAL - TYPHOON 2- HIL-based design and test for DER Integration PART TWO TYPHOON live TUTORIAL		PANEL SESSION: Modeling and Stability of power Converters
13:00 - 13:30				
13:30 - 14:00	TUTORIAL III - Microgrids technologies for electrical ships / Josep M. Guerrero, Juan C. Vasquez, Tomasz Tarasiuk, Daniele Bosich			CULTURAL SPECTACLE: Tonada Bullerengue
14:00 - 14:30				
14:30 - 15:00				
15:00 - 15:30	Break/Networking			
15:30 - 16:00	TUTORIAL IV - Battery Energy Storage Systems: An Industrial Perspective / Ahmed Elasser			
16:00 - 16:30				
16:30 - 17:00				
17:00 -17:30	TUTORIAL - TYPHOON 1 - HIL-based design and test for DER Integration PART ONE TYPHOON live TUTORIAL			
17:30 -18:00				

PRESENTATION FORMAT

Tutorial - Duration: 1:30 to 2 hours, 1:15 to 1:30 hours presentation, 15 to 30 mins Q&A: live
Keynote - Duration: 1 hours, 45 mins presentation, 15 mins Q&A: live
Typhoon Tutorial - Duration: 1 hour, 45 min presentation, 15 min Q&A: live
Panel Presentation: Duration 1 hour, 15 minutes presentation per paper, 15 minutes Q&A live
Dialog presentation – Duration: 1 hour, 5 minutes presentation (on-demand), 1-hour free discussion Q&A: live

Ultra-high-fidelity, real-time hardware in the loop.

Vertically integrated and suitable for microgrid and power electronics applications.



Universal Hardware in the Loop

Typhoon HIL testbeds are integrated, turn-key solutions that engineers can start using from day one. From a 1 kW smart household inverter to a 20 MW microgrid or a 110 MW shipboard power system with hundreds of busses, major manufacturers, OEMs and research institutions rely on Typhoon HIL to run their simulation in real-time with a timestep of 1 µs.

Scalable, Versatile, and Rock-Solid

Typhoon HIL simulators are parallelable and support variable time steps, meaning that there is practically no power electronics device or system that cannot be simulated in real time. Moreover, with Virtual HIL Device engineers can also run their simulation in the offline mode without a HIL simulator. Finally, Typhoon HIL's simulators provide an unprecedented numerical stability, meaning that testing with real-time emulated power can last for hours or even days and can be fully automated in accordance with standardized or custom test procedures.

www.typhoon-hil.com

Get your free Virtual HIL device at the Typhoon HIL hands-on tutorial

Learn Controller Hardware in the Loop (C-HIL)

Reinventing design, testing, and validation of power electronics and microgrid controls

Until recently there were no Hardware in the Loop (HIL) systems available for power electronics and microgrids.

With the advent of low-latency real-time simulation technology, fueled by powerful system on chip devices that combine the flexibility of general-purpose processors with the low latency of the FPGA fabric, the way power electronics and microgrid control systems are designed tested and validated is being radically transformed. In this tutorial we will cover the fundamentals of low-latency ultra-high fidelity real time simulation technology including both computational algorithms as well as processor architecture. In addition, we will cover a range of industrial application examples: from solar inverter controller testing all the way to terrestrial and shipboard microgrid systems. We will also show how HIL empowers engineers and organizations to continuously exceed their controller software quality, performance, and time-to-market goals thus paving the way to superior power electronics and power systems products. The instructor at the tutorial will be Dr. Ivan Celanovic, the Co-founder and Director of Typhoon HIL Inc.

www.typhoon-hil.com

TUESDAY NOVEMBER 2TH, 2021

TUTORIAL I

8:00 AM A 10:30 AM (GMT-5)

Chair: Fernando Jiménez
Universidad de los Andes

Industrial Perspective on Megawatt Marine Electrical Power Systems

Stephane Ouchouche,
Senior Engineer, GE Renewable Energy

Industrial Perspective on Megawatt Marine Electrical Power Systems

Power electronics is an essential part of marine electric power systems and propulsion. It's heavily used for powering and controlling a variety of loads in ships such as propulsion motors, cranes, drilling, and a host of auxiliary loads. In this talk, we will address all aspects of a ship electric power grid from architectures, topologies, controls, design challenges, testing standards and requirements to grid features. Since a ship electric power grid is an island, it requires features such as anti-blackout, voltage dip ride through, black-start, and special protections such as advanced generator and prime mover protection units. In addition, power converters such as variable frequency drives need to strictly meet industry standards and regulations governing quality of supply (e.g. harmonics, voltage imbalances, sags, swells, etc.). From a controls point of view, accurate and robust speed and torque control algorithms are key to managing various modes of operation such as picking up an already spinning shaft, etc. Finally, a real-life case study involving the world's largest crane vessel and deep sea drillships will be presented.

2021 IEEE COMPEL Cartagena, Colombia, Nov. 2-5

Stephane Ouchouche
Senior Engineer,
GE Renewable Energy

Stéphane Ouchouche

(Received the Diplôme Ingénieur degree ireceived the Diplôme Ingénieur degree in electric power and power electronics from École Centrale de Marseille, Marseille, France, in 2001. He subsequently joined Alstom Power Conversion, in Rugby, UK as a Power Electronics Engineer. He worked on developing marine propulsion power systems computation tools (e.g. Harmonics, Power Semiconductor Devices' junction temperatures for Thyristor load commutated and Voltage source IGBT inverters). He worked with the Alstom Power Conversion's Advanced Technology Group to develop and test novel power converters such as liquid immersed multi-phase brushless AC/DC converterd, and rotating shaft-mounted exciters for high temperature superconducting generators.
In 2012, He joined GE Power Conversion's Marine & Offshore business as lead project engineer where he led the delivery of several power generation and propulsion systems for deep sea water drillships in concert with DSME, South Korea and Sembcorp, Singapore for Transocean, one of the world's largest offshore drilling contractors.
In 2016, he moved to Singapore to lead the delivery of the power generation and propulsion system for the largest offshore crane vessel in the world (Heerema Sleipnir) built by Sembcorp in Jurong, Singapore. In 2019, he joined the Solar division of GE Power Conversion and worked on several solar projects in Japan and Vietnam. In 2020, he joined the Hybrids division of GE Renewable as Technical Program Leader for the New Product Introduction of GE's latest 4MWh utility scale Battery Energy Storage System.

TUESDAY NOVEMBER 2TH, 2021

TUTORIAL II

11:00 AM 12:30 PM (GMT-5)

Chair: Fernando Jiménez, Universidad de los Andes

Identification techniques for DC/DC power converters

Cristina Fernández
Associate professor, Universidad de Madrid Carlos III
Pablo Zumel
Associate professor
Universidad de Madrid Carlos III

Identification techniques for DC/DC power converters

Digital controls have become standard in many applications of DC/DC converters. They offer multiple advantages and enable new features for a minimum cost. Frequency response identification is one of such enabled functionalities, used indifferent applications: to auto-tune the compensator, to assess the converter's state of health by measuring its components, to monitor the system stability, etc. High accuracy, flexibility to operate in open or closed loop, and minimum impact in the converter's regular operation are key issues in the frequency response identification process. The purpose of this tutorial is to provide an overview of different strategies for the identification of DC/DC switching power converters and their implementation, focusing in non-parametric techniques. The seminar will cover the following topics:

- Fundamentals of identification.
- Excitation signals.
- Non-parametric identification techniques and their implementation: frequency analysis, cross-correlation, spectral analysis.
- Examples and results of the implementation for DC/DC converters.
- Examples and results of the implementation for DC/DC converters.

Cristina Fernández
Associate professor
Universidad de Madrid Carlos III

Dr. Cristina Fernández

(Member, IEEE) received the M.S. and Ph.D. degrees in electrical engineering from the Universidad Politécnica de Madrid (UPM), Madrid, Spain, in 1998 and 2004, respectively. She researched in the field of power electronics at UPM from 1997 to 2003. In summer 2000, she was a Summer Intern with the Center of Research and Development, General Electric, Schenectady, NY, USA. Since 2003, she has been with the Carlos III University of Madrid, Spain, where she is currently an Associate Professor and works with the Group of Power Electronics Systems (GSEP). In 2016, she was a Visitant Researcher for three months with the Tyndall National Institute in Cork, Ireland. She has published over 100 scientific articles at international conferences and journals, has filed four patents, and is the co-founder of a spin-off company targeting CAD for power electronics. Her research interests are contactless transference of energy, identification techniques applied to switching power converters, design and modeling of high-frequency magnetic components, and design tools for dc/dc converters. Dr. Fernández has been serving as an Associate Editor for the IEEE Transactions on Power Electronics since 2013 and the IEEE Journal of Emerging and Selected Topics in Power Electronics since 2019.

Pablo Zumel
Associate professor
Universidad de Madrid Carlos III

Dr. Pablo Zumel

(Member, IEEE) received the B.S. degree in electrical engineering from the University of Burgos, Burgos, Spain, in 1995, the M.S. degree in electrical engineering from the Universidad Politécnica de Madrid (UPM), Madrid, Spain, in 1999, the M.S. degree in electrical engineering from the École Centrale Paris, Paris, France, in 2000, and the Ph.D. degree in electrical engineering from UPM in 2005. From 1999 to 2003, he was a Researcher with UPM. Since 2003, he has been with the Department of Electronic Technology, Carlos III University of Madrid, Spain, where he is currently an Associate Professor. He has authored/coauthored more than 100 scientific articles in main international conferences and journals, has filed four patents, and is the co-founder of a spin-off company targeting CAD for power electronics. He has participated in more than 50 research projects in the field of power electronics. His research interests include digital control in power electronics, modeling and control techniques, modular power converters, design optimization, and educational topics in power electronics.

TUTORIAL III

1:00 PM A 3:00 PM (GMT-5)

Chair: Fernando Jiménez
Universidad de los Andes

Microgrids technologies for electrical ships

Professor Josep M. Guerrero
Aalborg University, Denmark
Professor Juan C. Vasquez
Aalborg University, Denmark
Professor Tomasz Tarasiuk
Maritime University, Poland
Assistant Professor Daniele Bosich
University, Italy

Microgrids technologies for electrical ships

Nowadays, an important kind of islanded microgrids can be found in maritime power systems. For example, under normal operating conditions, the ship power system can be considered as a typical isolated microgrid and its characteristics, including variable frequency, are matched to terrestrial islanded microgrids. This tutorial provides an overview of the present and future architectures of such microgrids, associated control technologies, optimization methods, power quality issues and state of the art solutions. The significant role of power electronics in realizing maritime microgrids, challenges in meeting high power requirements and regulations in the maritime industry, state-of-the-art power electronic technologies and future trend towards the use of medium voltage power converters in maritime microgrids are also presented in this tutorial.

2021 IEEE COMPEL Cartagena, Colombia, Nov. 2-5

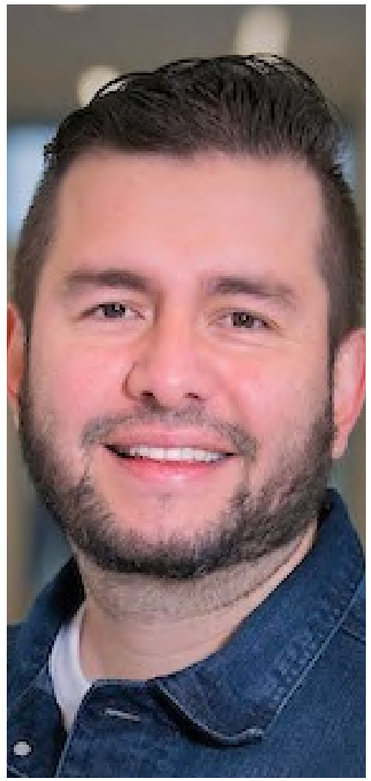
Josep M. Guerrero
Director, Center for Research on microgrids (CROM) ay Aalborg University

Maritime Electrification - Microgrids Technologies Going to the Sea

Josep M. Guerrero

(S'01-M'04-SM'08-FM'15) received the B.S. degree in telecommunications engineering, the M.S. degree in electronics engineering, and the Ph.D. degree in power electronics from the Technical University of Catalonia, Barcelona, in 1997, 2000 and 2003, respectively. Since 2011, he has been a Full Professor with the Department of Energy Technology, Aalborg University, Denmark, where he is responsible for the Microgrid Research Program. From 2019, he became a Villum Investigator by The Villum Fonden, which supports the Center for Research on Microgrids (CROM) at Aalborg University, being Prof. Guerrero the founder and Director of the same centre (www.crom.et.aau.dk). Nowadays he is working towards the M.S. Degree in Psychobiology and Cognitive Neuroscience.

His research interests is oriented to different microgrid frameworks in applications like microgrid clusters, IoT-based and digital twin, maritime microgrids for electrical ships, vessels, ferries and seaports, and space microgrids applied to nanosatellites and closed ecological systems. Prof. Guerrero is an Associate Editor for a number of IEEE TRANSACTIONS. He has published more than 700 journal papers in the fields of microgrids and renewable energy systems, which are cited more than 70,000 times. During seven consecutive years, from 2014 to 2020, he was awarded by Clarivate Analytics (former Thomson Reuters) as Highly Cited Researcher with 50 highly cited papers. He received the 2021 IEEE Bimal Bose Award for Industrial Electronics Applications in Energy Systems.



Juan C. Vasquez
Aalborg University, Denmark

Juan C. Vasquez

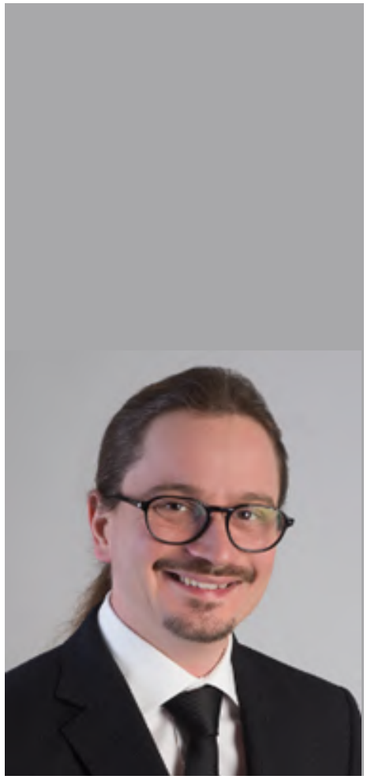
(M'12-SM'14) received the Ph.D. degree in automatic control, robotics, and computer vision from Barcelona-Tech-UPC, Spain, in 2009. Currently He is a Professor at AAU Energy, Aalborg University, Denmark and codirector of the Center for Reseearch on Microgrids (see crom.et.aau.dk). His current research interests include operation, advanced hierarchical and cooperative control, optimization and energy management applied to distributed generation in AC/DC Microgrids, maritime microgrids, advanced metering infrastructures and the integration of Internet of Things and Energy Internet into the SmartGrid. Prof. Vasquez is a Associate Editor of IET POWER ELECTRONICS the IEEE System Journal and a Guest Editor of a Special Issue in the IEEE TRANSACTIONS ON INDUSTRIAL INFORMATICS on Energy Internet. Since 2017 Prof. Vasquez was awarded as Highly Cited Researcher by Thomson Reuters and He was the recipient of the Young Investigator Award 2019. He has published more than 500 journal papers in the field of Microgrids, which in total are cited more than 26000 times. Prof. Vasquez is currently a member of the IEC System Evaluation Group SEG4 on LVDC Distribution and Safety for use in Developed and Developing Economies, the Renewable Energy Systems Technical Committee TC-RES in IEEE Industrial Electronics, PELS, IAS, and PES Societie

2021 IEEE COMPEL Cartagena, Colombia, Nov. 2-5

Tomasz Tarasiuk
Maritime University, Poland

Prof. Tomasz Tarasiuk:

Vice-Rector for Cooperation and Development of the Gdynia Maritime Universit. He is also employed at Remontowa Electrical Solutions as the head of R&D team in the project concerning modelling and simulation of maritime AC microgrids. His practical experience includes employment with shipping companies and a several voltage quality expertise for the classification society, shipyards and shipowners. His research focuses on signal processing and measurement of power quality phenomena, particularly in maritime power systems.



Daniele Bosich
University, Italy

Daniele Bosich

(M'07-SM'20) is an Assistant Professor of Microgrids for the Sustainable Energy at the University of Trieste (Italy). He received the M.Sc. degree (Hon) in electrical engineering at the University of Trieste (Italy) in 2010, and the Ph.D. degree in energy engineering at the University of Padua (Italy) in 2014. He is the author of more than 60 papers in the field of marine shipboard power systems, microgrid modeling, voltage control and nonlinear systems analysis. Dr. Bosich is an IEEE Senior Member (PES, IAS, IES and VTS societies).

TUTORIAL IV

3:30 PM A 5:00PM (GMT-5)
Chair: Fernando Jiménez
Universidad de los Andes

Battery Energy Storage Systems: An Industrial Perspective

Ahmed Elasser
Principal Systems Engineer, GE Research

Ahmed Elasser
Principal Systems Engineer, GE Research

Battery Energy Storage Systems: An Industrial Perspective

Energy Storage has been in the making for at least two hundred years, but it has recently been playing a prominent role with the advent of highly variable and intermittent renewable resources such as wind and solar. In addition to providing an overview of Energy Storage Technologies in general, Battery Energy Storage Systems (BESS) will be addressed from a cell, module, string, power conversion, and grid level point of view. Key challenges and future opportunities for innovation in the BESS space will also be discussed. A comprehensive reference list will also be provided.

Ahmed Elasser

Received his MS & PhD degrees in Electric Power & Power Electronics in 1993 & 1996 respectively from Rensselaer Polytechnic Institute. He is a Principal Systems Engineer at GE Research in the areas of Electric Power, Power Electronics, and Power Semiconductor Devices. He worked on Power Devices, Solar Energy, Power Conversion Systems, and is currently leading the Battery Energy Storage Systems Power Conversion. He published over 40 papers and has 37 issued patents. He is a Senior IEEE Member. Dr. Elasser is the recipient of numerous GE Awards for his contributions and innovations over his 26 years GE career.

TYPHOON LIVE TUTORIAL

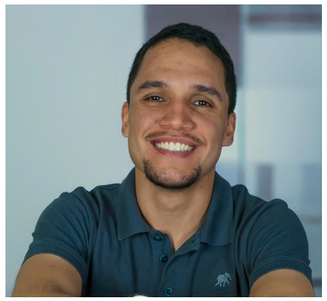
17:00 A 18:00 (GMT-5)

Chair: Fernando Jiménez
Universidad de los Andes

HIL-based design and test for DER Integration PART ONE

The paradigm shift from centralized generation to a digitalized grid based on distributed energy resources (DERs) has been enabled by the continuous advancements on power electronics technology. The new grid is becoming smarter, but also more dynamic and complex, and the biggest challenge is to ensure that the grid components work together seamlessly, in different real-life scenarios. In this context, engineers are continuously challenged to design and implement different solutions more and more efficiently.

For this reason, in this tutorial we will present hands-on how the Hardware-in-the-Loop (HIL) technology can help you to verify and validate your designs from the earliest stages, adding flexibility and security, besides reducing the time spent in the development cycle. We will also discuss challenges faced by the HIL-based design and test for DER integration and how to overcome that.



Biljana Sovilj is a Business Developer at Typhoon HIL and responsible for development and evolution of HIL Academy. Her focus is on e-learning industry and growth of relationships with HIL Academy instructors and partners. Biljana holds a bachelor's degree in Power, Electronic and Telecommunication Engineering from the Faculty of Technical Sciences in Novi Sad, Serbia

Caio Osório j is Applications Engineer at Typhoon HIL. He received the PhD., M.S., and B.S. degrees in Electrical Engineering from the Federal University of Santa Maria, Brazil. Caio did an internship at the Fraunhofer IZM, Berlin, and was a visiting researcher at the University of Oviedo, Spain, during his PhD. He has research experience in robust control applied to power electronics, stability analysis, optimization algorithms, state observers, electrical machines, and integration of renewable energy sources.

Murilo Almeida is the Head of Microgrid and Critical Power Applications Group at Typhoon HIL. Mainly, he is responsible for the microgrid applications branch and for coordinating the development team for high fidelity models and controls for elements of a microgrid, including protection relays, controlled and variable loads, energy management systems and distributed energy resources. He holds an M.Sc. degree from Northeastern University and a bachelor's degree from Federal University of Goiás, both Electrical Engineering, and an MBA from FGV.

COLOMBIAN NAVY

The **mission** of the **Colombian Navy** is focused on developing naval operations for Defense and National Security and the protection of Colombian Maritime and Riverine Interests, contributing to the sustainable development of the State.

The **vision** of the **Colombian Navy** is to become a Navy of regional projection and influence, with technology and capabilities for Defense and National Security, relevant for the protection and development of Colombian Maritime and Riverine Interests, recognized for its integrity and contribution to the progress of the country.

Roles of a Navy:

The institutional roles of the Colombian Navy are broad, persistent, and independent purposes of the national strategic reality of the moment. That is why the Colombian Navy carries out naval operations, in the entire spectrum of the conflict (peace and war), framed within the following six institutional roles: dissuasion and naval defense, tension and crisis management, comprehensive maritime and riverine security, external projection, assistance, and cooperation. Each of these roles involves a differential use of power.

Components of the Colombian Navy

Naval Fleet (surface units, submarines, and aviation), Coast Guard, and Marine Corps.

Area of responsibility:

928.660 km2 of the maritime area, equivalent to 44.85 % of the entire national territory, and 2.900 km of coastline (Pacific and Caribbean coast). Colombia also has rivers as highways, with 8.865 km of navigable rivers throughout the entire national territory.

BIOCEANIC COLOMBIA:

- 45% of Colombian territory is maritime.
- 98% of Colombian trade is done by sea.
- 10 Port zones.
- 12 Offshore Blocks
- 11.880 Port arrivals.
- 195 Million tons of cargo transported by sea.
- Colombian Maritime territory: 928.660 km2
  Caribbean sea: **66,6%**
  Pacific sea: **33,4%**

www.armada.mil.co

@ArmadaDeColombia

NOVEMBER 3RD 2021

PANEL SESSION

ADVANCED CONTROL OF POWER CONVERTERS

8:00 AM - 9:00 AM (GMT-5)

Chair: Michael Bressan
Universidad de los Andes

8:00 AM
P17- Performance Evaluation of a Current DC-Link AC-AC Converter with Novel Monolithic Bidirectional 600V GaN Switches and New Advanced Control/Modulation Scheme

Neha Nain[1], Jonas Huber[1], Johann Walter Kolar[1], Kennith Kin Leong[2] and Bhargav Pandya[2]
[1]ETH ZURICH, 2INFINEON

8:15 AM
P19- Design of a Digital Peak V2 Controller for the Synchronous Boost Converter with Negligible ESR

Ekansh Kapoor[1], Amit Singha1 and Ravada Madhu Sudhan Rao
[1]Indian Institute of Technology (IIT) Mandi

8:30 AM
P7- Modified Capacitor Voltage Control Strategy of Stacked Multicell Converter with Model Predictive Control

Zehong Liao, Paul Judge, Michael Merlin and Stephen Finney
School of Engineering, University of Edinburgh

8:45 AM
LIVE Q&A

DIALOG SESSION

MODELING AND STABILITY OF POWER CONVERTERS

9:00 AM - 10:00 AM (GMT-5)

Chair: Mor Peretz
Ben Gurion University

P109- A Multi-Mode Four-Switch Buck-Boost Derived DC-DC Converter with an Intermediate Battery Interface for Solar Thermoelectric Generation

Firehiwot Gurara, Sreyam Sinha and Khurram Afridi
Cornell University

P43-Intrinsic and Robust Voltage Balancing of FCML Converters with Coupled Inductors

Daniel Zhou, Avi Bendory, Ping Wang and Minjie Chen
Princeton University

P125- Automatic determination of the amplitude of the perturbation signal for the non-parametric identification of DC/DC switching converters

Marlon Granda, Pablo Zumel and Cristina Fernandez
Universidad Carlos III de Madrid

P116- Adaptive Virtual Synchronous Machine Applied to Four-Leg Three-Phase VSC

Ana Marin-Hurtado1, Walter Gil-González[2] and Andrés Escobar-Mejía[1]
[1]Universidad Tecnológica de Pereira, [2]Institución Universitaria Pascual Bravo

P57- Modeling and Analysis of Resonant Switched-Capacitor Converters with Finite Terminal Capacitances

Yicheng Zhu, Zichao Ye and Robert Pilawa
University of California, Berkeley

P59- Comparison of Simulation of Dual Active Bridge in Different Simulators and Using Different Simulation Methods

Shiyuan Yin[1], Suman Debnath[2], Qianxue Xia[1], Shilpa Marti[2] and Maryam Saeedifard1
[1]Georgia Institute of Technology, [2]Oak Ridge National Laboratory

2021 IEEE COMPEL Cartagena, Colombia, Nov. 2-5

P6- Improved Noise Immunity for Two-Sample PLL Applicable to Single-Phase PFCs

Paula Lamo[1], Francisco J. Azcondo[2] and Alberto Pigazo[2]
[1]Universidad Internacional de La Rioja, [2]Universidad de Cantabria

P66- Comparison of Inverter Topologies for High-Speed Motor Drive Applications

Mohammad Qasim and David Perreault
Massachusetts Institute of Technology

P72- New Third-Harmonic Injection Modulation Reducing the DC-Link Power Pulsation Buffer Requirement of Phase-Modular Isolated PFC Three-Phase AC/DC Converter Systems

Spasoje Miric[1], David Menzi[1], Jon Azurza Anderson[2], Matthias Joachim Kasper[2] and Johann Walter Kolar[1]
[1]PES ETH Zurich, Infineon[2]

P75- ZVS and Parametric Analysis for Fly-Buck Converter

Lee Gill, Matthew McDonough and Jason Neely
Sandia National Laboratories

P34- A Partial Power Processing MMC Topology for Direct AC/AC Power Conversion

Anjana Wijesekera, Yuan Li and Gregory Kish
University of Alberta

P62- An Accurate Approach to Calculate and Measure Capacitor Voltage and Inductor Current Levels in Hybrid Converters

Ratul Das and Hanh-Phuc Le
University of California San Diego

P100- A Modular Solid State Transformer for Future Hybrid Distribution Network

Jonathan Lillo[1], Felix Rojas[1], Diego Verdugo[2], Mohammed Azharuddin[3] and Javier Pereda[1]
[1]Pontificia Universidad Católica de Chile, [2]Universidad de Santiago de Chile, [3]Technische Universität München

P87- Multidimensional Extensions to Generalized Averaged Models for Multi-Frequency-Excited Dynamic Systems

Kartikeya Jayadurga Prasad Veeramraju and Jonathan Kimball
Missouri University of Science and Technology

DIALOG SESSION

MODELLING AND STABILITY OF GRID TIED POWER CONVERTERS

10:00 AM - 11:00 AM (GMT-5)

Chair: María Alejandra Mantilla Villalobos
Universidad Industrial de Santander

P4- Versatile Measurement Method for Three-Phase Impedance in a Two-Axis Domain

Kazuki Yomura, Toshiji Kato and Kaoru Inoue
Doshisha University

P70- A Simplified SISO Small-Signal Model for Analyzing Control Loops Interaction of Grid-Forming Converter with Droop Control

Liang Huang, Chao Wu, Dao Zhou and Frede Blaabjerg
Aalborg University

P127- Accurate Power-Sharing between Grid-Forming and Grid-Following Inverters

Fahmid Sadeque, Dushyant Sharma and Behrooz Mirafzal
Kansas State University

P111- Coherency Enforcement Control Scheme for Cluster of Grid-forming Inverters in Power Electronics-Dominated Grid

Muhammad F. Umar, Mohsen Hosseinzadehtaher and Mohammad B. Shadmand
University of Illinois at Chicago

P33- Averaged Dynamic Model of Three-level NPC Grid-following Inverter for Examining Neutral-point Instability

D Venkatramanan[1], Brian Johnson[2] and Sairaj Dhople[1]
[1]University of Minnesota, [2]University of Washington

P119- Modeling and Comparison of Unbalanced Load Compensation Methods in DFIG Systems Based on Mechanical Constraints

Rasool Peykarporsan1, Soroush Oshnoei[1], Subham Sahoo[2] and Frede Blaabjerg[2]
[1]Shahid Beheshti University of Iran, [2]Aalborg University

P128- A Model-Reference Adaptive Direct-Power Control Scheme for Grid-Interactive Inverters

Mehmetcan Gursoy and Fariba Fateh
Kansas State University

P95- Robust H∞ Current Control of Three-Phase Grid-Connected Voltage Source Converters Using Linear Matrix Inequalities

Hosein Gholami-Khesht, Pooya Davari, Mateja Novak and Frede Blaabjerg
Aalborg University

P42- Low-Inertia Grid-Forming Control with Large Phase Angle Jump Capability for Converters With Small Energy Storage

Malte Eggers and Sibylle Dieckerhoff
Technische Universität Berlin

P12- Control Method and Operational Impact of Decoupling AC and DC Powers During a Frequency Event in the Modular Multilevel Converter Using Internal Energy Storage

Agatha Williams-Kelly and Michaël Merlin
University of Edinburgh

P9- Fast Oscillation Source Location Method Based on Instantaneous Active Power Direction

Songda Wang and Dongsheng Yang
Eindhoven University of Technology

P31- Study of Sensorless Field-Oriented Control of PMSM using rotor flux observer and disturbance observer based discrete sliding mode observer

Aveek Podder and Darshankumar Pandit

The MathWorks Inc

WELCOME + KEY NOTE 1

11:00 A 12:00 (GMT-5)

Chairs: Fernando Jiménez
Universidad de los Andes
Captain Miguel Garnica
Armada de Colombia

Microgrid Technologies: From the Land, to the Sea and Out in Space

Josep M. Guerrero
Director Center for Research on Microgrids (CROM)
at Aalborg University

Josep M. Guerrero
Director
Center for Research on Microgrids
(CROM) at Aalborg University

This talk will begin by introducing the control of microgrids, the parallelisms with the human brain and the research for possible sources of inspiration in last frontiers of neuroscience. In this keynote, microgrid technologies will be introduced to show how land-based microgrid knowledge can be introduce in shipboard systems. The talk will include: power quality standards and issues in ship board electrical systems, DC microgrids and energy storage systems for ships and ferries, power management systems and optimization for vessels and offshore platforms, and power electronics enabling AC/DC grids in ships. Then, control in electric power systems of satellites and space platforms will be presented, showing approaches that are extended from terrestrial microgrids and explaining the differences and challenges when it comes to apply them out in the space. Further, multi-microgrid systems will be discussed for moon craters in future lunar manmade bases. Finally, the extension from the hierarchical control of microgrids to bio-astronautics in the control of closed ecological systems to support with oxygen, water, and food to the astronauts and thus creating new ecosystems for the moon and future mars bases

Josep M. Guerrero

((S'01-M'04-SM'08-FM'15) received the B.S. degree in telecommunications engineering, the M.S. degree in electronics engineering, and the Ph.D. degree in power electronics from the Technical University of Catalonia, Barcelona, in 1997, 2000 and 2003, respectively. Since 2011, he has been a Full Professor with the Department of Energy Technology, Aalborg University, Denmark, where he is responsible for the Microgrid Research Program. From 2019, he became a Villum Investigator by The Villum Fonden, which supports the Center for Research on Microgrids (CROM) at Aalborg University, being Prof. Guerrero the founder and Director of the same centre (www.crom.et.aau.dk). Nowadays he is working towards the M.S. Degree in Psychobiology and Cognitive Neuroscience.
His research interests is oriented to different microgrid frameworks in applications like microgrid clusters, IoT-based and digital twin, maritime microgrids for electrical ships, vessels, ferries and seaports, and space microgrids applied to nanosatellites and closed ecological systems. Prof. Guerrero is an Associate Editor for a number of IEEE TRANSACTIONS. He has published more than 700 journal papers in the fields of microgrids and renewable energy systems, which are cited more than 70,000 times. During seven consecutive years, from 2014 to 2020, he was awarded by Clarivate Analytics (former Thomson Reuters) as Highly Cited Researcher with 50 highly cited papers. He received the 2021 IEEE Bimal Bose Award for Industrial Electronics Applications in Energy Systems.

PANEL SESSION

COMPONENT LEVEL DESIGN AND SIMULATION

12:30 PM - 13:30 PM (GMT-5)

Chair: Gustavo Ramos
Universidad de los Andes

12:30 PM
P69 - Transfer Learning Methods for Data-Driven Magnetic Core Loss Modeling

Evan Dogariu[1], Haoran Li[1], Shukai Wang[1], Min Luo[2] and Minjie Chen[1]
[1]Princeton University, 2Plexim GmbH

12:45 PM
P22 - A High Frequency Resonant Gate Driver for SiC MOSFETs

Zhechi Ye, Zikang Tong and Juan Rivas-Davila
Stanford University

13:00 PM
P28 - Sequential-Drive Switched Capacitor Circuits for Electrostatic Loads: Modelling and Comparison

Yanqiao Li, Bahlakoana Mabetha and Jason Stauth
Dartmouth College

13:15 PM
LIVE Q&A

PANEL SESSION

DESIGN, OPTIMISATION AND RELIABILITY

13:30 PM - 14:30 PM (GMT-5)

Chair: Guillermo Jiménez
Universidad de los Andes

13:30 PM

P112– Lite-Sparse Hierarchical Partial Power Processing for Parallel Batteries in Heterogeneous Energy Storage Systems

Xiaofan Cui, Alireza Ramyar, Veronica Contreras, Gracie Judge, Jason Siegel, Anna Stefanopoulou and Al-Thaddeus Avestruz
University of Michigan Ann Arbor

13:45 PM

P77– Multi-Converter System Modelling in Cost for Reliability Studies

Monika Sandelic, Amirali Davoodi, Ariya Sangwongwanich, Saeed Peyghami and Frede Blaabjerg
Aalborg University

14:00 PM

P53– Reduce-Order Analysis and Circuit-Level Cost Function for the Numerical Optimization of Power Electronics Modules

Mark Cairnie[1], Christina DiMarino[1], Paul Evans[2] and Neo Lophitis[2]
[1]Center for Power Electronics Systems at Virginia Tech, [2]The University of Nottingham

14:15 PM

LIVE Q&A

PANEL SESSION

MODELING AND STABILITY OF GRID TIED POWER CONVERTERS

14:30 PM - 15:30 PM (GMT-5)

Chair: Juan Manuel Rey López
Universidad Industrial de Santander

14:30 PM

P36- Bifurcation-Based Transient Stability Analysis of Grid-Forming Converters with DC-Link Voltage Controller

Cheng Luo[1], Teng Liu[2], Xiongfei Wang[2] and Xikui Ma1
[1]Xi'an Jiaotong University, [2]Aalborg University

14:45 PM

P88- Synthetic Reference based Transition Optimal Control of Inverter for Surge-Current-Free Rapid Interface to Grid

Mateo Greidanus and Sudip Mazumder
University of Illinois Chicago

15:00PM

P44- From Physics to Data Oriented Cyber Attack Profile Emulation in Grid Connected PV Systems

V S Bharath Kurukuru[1], Mohammed Ali Khan[1], Subham Sahoo[2] and Frede Blaabjerg[2]
[1]Jamia Millia Islamia, [2]Aalborg University

15:15 PM

LIVE Q&A

PANEL SESSION

MODELING AND STABILITY OF POWER CONVERTERS

15:30 PM - 16:30 PM (GMT-5)

Chair: Guillermo Jiménez
Universidad de los Andes

15:30 PM

P92- Broadly-Applicable Accurate Analytical Steady-State Model for Class-E Inverters

Yuetao Hou[1], Mohammad Daryaei[2], Ali Khajehoddin[2] and Khurram Afridi1
[1]Cornell University, [2]University of Alberta

15:45 PM

P101- Capacitor Balance Control of a Modular Multilevel Converter Based on Parallel Connected Clusters for an MVAC/LVDC Solid State Transformer

Diego Verdugo[1], Felix Rojas[1], Jonathan Lillo[1], Mohammed Azharuddin[2] and Javier Pereda[1]
[1]Pontificia Universidad Católica de Chile, [2]Technische Universität München

16:00 PM

P102- Feedback Control for a Piezoelectric-Resonator-Based DC-DC Power Converter

Joshua Piel, Jessica Boles and David Perreault
Massachusetts Institute of Technology

16:15 PM

LIVE Q&A

TYPHOON LIVE TUTORIAL

16:30 PM - 17:30 PM (GMT-5)

Chair: Fernando Jiménez
Universidad de los Andes

HIL-based design and test for DER Integration PART TWO

Typhoon HIL

Universidad de los Andes
Colombia

Departamento de
Ingeniería Eléctrica y Electrónica

LOS ANDES UNIVERSITY

1 BEST UNIVERSITY OF COLOMBIA
6TH BEST UNIVERSITY IN LATIN AMERICA

1 Mejor Universidad de Colombia

6ta Mejor Universidad de Latinoamérica

QS WORLD UNIVERSITY RANKINGS

QS RATED FOR EXCELLENCE

*Según el Ranking QS 2021.

Los Andes University | Monitored Ministry of Nacional Education | Recognition as a University: Decree 1297 of May 30, 1964. Recognition of legal status: Resolution 28 of February 23, 1949 Minjusticia.

Universidad de los Andes
Colombia

Departamento de
Ingeniería Eléctrica y Electrónica

ESPECIALIZATION

Specialization in Electric Power Transmission and Distribution Systems

SNIES: 1568 | Qualified Registry: Resolution 0015842 of September 21, 2018 for 7 years. | ***Duration: 3 academic periods (1 year). | Modality Studies: Presential***

MASTERS

Master in Electrical Engineering

SNIES: 1580 | Qualified Registry: Resolution 02010 of February 13, 2018 for 7 years. |
Duration: 4 semesters. | Modality Studies: Presential

Master in Electronic and Computer Engineering

SNIES: 5182 | Qualified Registry: Resolution 08682 of May 24, 2018 for 7 years. |
Duration: 4 semesters. | Modality Studies: Presential

DOCTORAL

Doctoral

PhD in Engineering
SNIES: 16071 | Qualified Registry: Resolution 4325 of March 14, 2018 for 7 years. |
Duration: minimum: 3 years, maximum: 8 years. | Modality: Face-to-face | Number of credits: 108 | Dedication: Full time

More Information:
electricayelectronica.uniandes.edu.co

NOVEMBER 4TH 2021

PANEL SESSION

MODELING AND STABILITY OF GRID TIED POWER CONVERTERS II

8:00 AM - 9:00 AM (GMT-5)

Chair: Wilmar Martínez
KU Leuven

8:00 AM
P131 Multiple Grid-Forming Inverters in Black-Start: The Challenges

Fahmid Sadeque, Dushyant Sharma and Behrooz Mirafzal.
Kansas State University

8:15 AM
P110- "A Self-learning Scheme to Detect and Mitigate the Impact of Model Parameters Imperfection in Predictive Controlled Grid-tied Inverter " is incorrectly attributed

Matthew Baker, Hassan Althuwaini, Mohammad B. Shadmand
University of Illinois Chicago

8:30 AM
P56- Evaluation and Comparison of Different Topologies for a Grid Emulator

Ming Jia
The Institute for Power Generation and Storage Systems, RWTH Aachen University

8:45 AM
LIVE Q&A

DIALOG SESSION

TOPICS ON DER AND MICROGRIDS

9:00 AM - 10:00 AM (GMT-5)

Chair: Dr. Jose Maria Riola
Escuela Naval de Cadetes Almirante Padilla

P103- System-Level Stability of the CIGRE Low Voltage Benchmark System: Definitions and Extrapolations

Yubo Song[1], Subham Sahoo[1], Yongheng Yang[2] and Frede Blaabjerg[1]
[1]Aalborg University, [2]Zhejiang University

P98- Blockchain-Enabled Cyber-Secure Microgrid Control Using Consensus Algorithm
Rasel Mahmud and Gab-Su Seo
National Renewable Energy Laboratory

P97- An Optimal Energy Management System for Marine Hybrid Power Systems

Daeseong Park[1], Florian Perabo[1], Minjoo Choi[2], Espen Skjong[3] and Mehdi Zadeh1
[1]Norwegian University of Science and Technology, [2]Korea Maritime and Ocean University, [3]Blue Ctrl AS

P32- An autonomous fault detection and isolation algorithm for LVDC microgrid.

Chengwei Liu, Joan Marc Rodriguez-Bernuz and Adria Junyent-Ferre
Imperial College

P39- Smart Renewable Energy Communities - Existing and Future Prospects.

Harold R. Chamorro
KTH

P74- Analysis of DC Faults into Hybrid HVAC/HVDC Systems.
Jose A. Murillo and Mario A. Rios
Universidad de los Andes

P115- Modeling and Control of Multiple Microgrids: An Overview.

Miguel Felipe Arevalo-Castiblanco, Jhojan A. Rodriguez-Gil, Daniel Vargas-Medina, Eduardo Mojica-Nava, John Cortes-Romero, Camilo A. Cortes and Sergio Rivera
Universidad Nacional de Colombia

P35- Single-stage Grid-connected PV System with Artificial Neural Network Controller.

Prabhat Ranjan Bana[1], Simone Vanti[2] and Mohammad Amin[1]
[1]Norwegian University of Science and Technology, [2]University of Padua

DIALOG SESSION

MODELING AND STABILITY OF POWER CONVERTERS

10:00 AM - 11:00 AM (GMT-5)

Chair: Carlos Hernan Fajardo Toro

P20- Piezoelectric Resonator Second Harmonic Cancellation in Class Φ_2 Inverters

Eric Stolt, Weston Braun, Clarissa Daniel and Juan Rivas-Davila
Stanford University

P47- All-in-One-Magnetics for Matrix Coupled PWM Power Conversion.

Ping Wang, Daniel Zhou, Vincent Yang and Minjie Chen
Princeton University

P58- Multi-Resonant Compensation Control for Terminal Capacitance Reduction in Resonant Switched-Capacitor Converters.

Yicheng Zhu, Zichao Ye, Ting Ge and Robert Pilawa.
University of California, Berkeley

P86- Design of a Dual-Loop Controller with Two Voltage-Dependent Current Compensators for an LLC-Based Charger.

Ujjwal Pratik, Muhammad Abdelraziq, Urvi Ahluwalia, Zhansen Akhmetov, Gabriel Chenevert and Zeljko Pantic.
North Carolina State University

P14- Automated Copper Layer Design and Optimization Tool based on Progressive Point Expansion Algorithm for Switch Mode Power Supplies.

Yidong Tian, Andrew Forsyth, Zhuoru Li and Cheng Zhang
The University of Manchester

P65- Nodal impedance assessment in dc power distribution networks.

Renan Pillon Barcelos and Drazen Dujic.
EPFL - Ecole Polytechnique Federale de Lausanne.

P24- Design, Control and Simulation Study of a 3-phase PWM converter for Unity Power Factor Applications Independent of Load Variations.

Nisith Bhowmick[1], Kaushik Mukherjee[2] and Prasid Syam[2]
[1]Valeo Siemens eAutomotive, [2]Indian Institute of Engineering Science and Technology, Shibpur

P78- Compensation and Emulation of Output Impedance in Ultra-High Bandwidth Class-D Power Amplifiers

Florian Krismer and Johann W. Kolar
ETH Zürich

KEY NOTE II

11:00 AM - 12:00 PM (GMT-5)

Chair: Fernando Jiménez
Universidad de los Andes

Stability and Control of Inverter-Based Resources

Xiongfei Wang, Professor
Aalborg University, Denmark;
KTH Royal Institute of Technology, Sweden.

Xiongfei Wang
Aalborg University, Denmark

Stability and Control of Inverter-Based Resources

Power electronics has become a foundational technology for modernizing electric power grids. The massive integration of inverter-based resources is radically changing power system dynamics. The control dynamics of inverters tend to interact with each other and with the grid, leading to several stability problems. This talk will share a series of real-world stability challenges, and address the recent advances in analytical modeling and robust control techniques of inverter-based resources.

Xiongfei Wang

Received a Ph.D. degree in energy technology from Aalborg University, Aalborg, Denmark, in 2013. From 2009 he has been with the Department of Energy Technology, Aalborg University, where he became an Assistant Professor in 2014, an Associate Professor in 2016, a Professor and Leader of Electronic Power Grid (eGrid) Research Group in 2018. He is also a part-time Full Professor at KTH Royal Institute of Technology, Stockholm, Sweden, from 2020. His current research interests include modeling and control of power electronic converters and systems, stability and power quality of power-electronics-dominated power systems, high-power converters.
Dr. Wang serves as a Member-at-Large of Administrative Committee for the IEEE Power Electronics Society (PELS) in 2020-2022, a Co-Editor-in-Chief for the IEEE Transactions on Power Electronics Letters, and as an Associate Editor for the IEEE Journal of Emerging and Selected Topics in Power Electronics (JESTPE). He was selected into Aalborg University Strategic Talent Management Program in 2016. He has received six Prize Paper Awards in the IEEE Transactions and conferences, the 2018 Richard M. Bass Outstanding Young Power Electronics Engineer Award, the 2019 IEEE PELS Sustainable Energy Systems Technical Achievement Award, the 2020 IEEE Power & Energy Society Prize Paper Award, the 2020 JESTPE Star Associate Editor Award, and the Highly Cited Researcher in the Web of Science in 2019-2020.

PANEL SESSION

MODELING AND STABILITY OF POWER CONVERTERS II

12:30 PM - 13:30 PM (GMT-5)

Chair: Dr. Jose Maria Riola
Escuela Naval de Cadetes Almirante Padilla

12:30 PM
P107- Multiphase Coupled Inductor Current Balancer for Parallel Resonant GaN Devices

Tanuj Sen, Jaeil Baek and Minjie Chen
Princeton University

12:45 PM
P108 An Active Voltage Balancing Strategy for Stacked-Inverter ICN Converters

Mausamjeet Khatua and Khurram Afridi
Cornell University

13:00 PM
P3- Efficiency Modeling of the Flying Capacitor Multilevel Flyback Converter

Santino Graziani, Thomas Cook and Brandon Grainger
University of Pittsburgh

13:15 PM
LIVE Q&A

PANEL SESSION

MODELING AND STABILITY OF POWER CONVERTERS III

13:30 PM - 14-30 PM (GMT-5)

Chair: Harold Chamorro
KU Leuven

13:30 PM
P48- High-Frequency Self-driven Push-Pull Class E Rectifier using Capacitive Voltage Divider

Minki Kim and Jungwon Choi
University of Minnesota, Twin Cities

13:45 PM
P121- Resonant Converter based DC Transformer Operation with Magnetic Control

Yuqi Wei[1], Thiago Pereira[2], Marco Liserre[2] and Alan Mantooth[1]
[1]University of Arkansas, [2]Kiel University

14:00 PM
P46- 1 kW MHz Wide-band Class E Power Amplifier

Jiale Xu, Zikang Tong and Juan Rivas Davila
Stanford University

14:15 PM
LIVE Q&A

PANEL SESSION

REAL TIME APLICATIONS

14:30 PM - 15:30 PM (GMT-5)

Chair: Adam Shorek

Université de Quebeq a Trois Rivières

14:30 PM

P16- Real Time Monitoring for Model Based Design of Power Converters

Maksudjon Usmonov and Francesco Gregoretti
Politecnico di Torino

14:45 PM

P50- Real-Time Electromagnetic Visualisation using Augmented Reality and Accelerated 3D Models

Bawar Jalal, Valon Blakaj, Steve Greedy and Paul Evans
University of Nottingham

15:00 PM

P54- Real-Time Stability Boundary Identification of Prosumers PCC in a Virtual Power Plant.

Ahmad Khan and Mohammad B. Shadmand
University of Illinois at Chicago

15:15 PM

LIVE Q&A

2021 IEEE COMPEL Cartagena, Colombia, Nov. 2-5

PANEL SESSION

ADVANCED CONTROL II

15:30 PM - 16:30 PM (GMT-5)

Chair: Victor Monteiro

University of Minho

15:30 PM

P23- Bisection Algorithm based Indirect Finite Control Set Model Predictive Control for Modular Multilevel Converters.

Saad Hamayoon, Morten Hovd and Jon Are Suul
Norwegian University of Science and Technology

15:45 PM

P21- Implementation of a two-loop digital control for high voltage DC-DC buck-boost converter with coupled inductor.

Catalina Gonzalez Castaño[1], Emerson Madrid[2], Walter Naranjo[1], Carlos Restrepo[2], Javier Revelo-Fuelegan[3] and Diego Peluffo-Ordoñez[4]
[1]Universidad Manuela Beltran, [2]Universidad de Talca, [3]Universidad de Nariño, [4]Mohammed VI Polytechnic University

16:00 PM

P71- Experimental Assessment of Sliding Mode Current Control with Exponential Reaching Law for an Induction Machine Drive fed by a Matrix Converter

Christian Medina[1], Paola Maidana[1], Jorge Rodas[1], Edgar Maqueda[1], Raul Gregor[1], Maarouf Saad[2] and Pat Wheeler[3].
[1]Universidad Nacional de Asunción, [2]École de technologie supérieure, [3]University of Nottingham

16:15 PM

LIVE Q&A

HIL Specialist 2.0

Specialization program
“Support yourself so you can support others”

How the Specialization Works?

Take courses

Take the 5 HIL Specialist courses, pass the end of course quizzes, and receive your Certificate of Completion for each one. You are free to take the courses in any order you like, although we recommend that you follow the course order below

Earn a certificate

After completing each of the 5 courses, become recognized as a HIL Specialist with a HIL Specialist 2.0 Certification that you can share with your colleagues and on LinkedIn.

There are 5 Courses in this Specialization

HIL Fundamentals (Available)

HIL Fundamentals is the first course in the HIL Specialist 2.0 specialization program authored by Typhoon HIL engineers. This course series is designed to raise your skill and knowledge of the Typhoon HIL toolchain so that you can confidently and successfully execute your own hardware-in-the-loop (HIL) projects.

HIL CERTIFIED

More courses coming in December 2021

HIL for Power Electronics (Coming December 2021)

This course will teach you how to make the best use of Typhoon HIL real-time simulator features specifically dedicated to validation of your converter control design. If you are in the E-mobility sector, motor drives business, or any other activity that involves making power electronics devices, don’t miss out on this course! For the best course experience, it is highly recommended to first take the HIL Fundamentals course.

HIL for Microgrids (Coming December 2021)

Learn how to quickly build microgrid models using libraries of high-fidelity DER models. You will master different modeling approaches in order to optimize your model for the real-time computing requirements of system-level applications. You will learn how a HIL device can be used as both a testing and rapid control prototyping platform for microgrid controllers. For the best course experience, it is highly recommended to first take the HIL Fundamentals course.

Test Automation (Coming December 2021)

In this course, you learn to automate the Typhoon HIL testing workflow. Experience the “code less, achieve more” concept within the pytest framework and learn to write your first automated test. Bring that knowledge to the TyphoonTest IDE, where you can easily automate tests and user-friendly test report generation. No previous coding experience is required. It is highly recommended to take the HIL Fundamentals course first.

Communication Protocols (Coming December 2021)

Learn how to get your simulated models to talk to the real world over a variety of industrial and user-defined protocols. This course puts special emphasis on teaching you how to configure and test Modbus and CAN bus devices. Learn how to run custom protocols over Ethernet and UART. This course combines perfectly with the HIL for microgrids course, and it is recommended to anyone who needs to enable an HMI interface, solve device interoperability problems, or integrate multi-vendor systems.

www.typhoon-hil.com
e-mail: info@typhoon-hil.ch

NOVEMBER 5TH 2021

PANEL SESSION

MODELING AND STABILITY OF POWER CONVERTERS IV

8:00 AM - 9:00 AM (GMT-5)

Chair: Andrés Escobar Mejía
Universidad Tecológica de Pereira

8:00 AM

P61- Modeling and Analysis of Shutdown Dynamics in Flying Capacitor Multilevel Converters

Samantha Coday, Nathan Ellis and Robert Pilawa-Podgurski
University of California, Berkeley

8:15 AM

P81- Machine Learning based Power Flow Control for Multi-Active-Bridge Converters

Mian Liao, Haoran Li, Ping Wang, Yenan Chen and Minjie Chen
Princeton University

8:30 AM

P126- Self-Security for Grid-Interactive Smart Inverters Using Steady-State Model

Mehmetcan Gursoy and Behrooz Mirafzal
Kansas State University

8:45 AM

LIVE Q&A

2021 IEEE COMPEL Cartagena, Colombia, Nov. 2-5

DIALOG SESSION

DESIGN, OPTIMIZATION AND RELIABILITY

9:00 AM - 10:00 AM (GMT-5)

Chair: Jessica Danielle Boles
Massachusets Institute of Technology

P122- Exploiting the Converter Efficiency as Application-level Health Estimation Precursor

Martin Kjaer, Huai Wang and Frede Blaabjerg
Aalborg University

P130- Smart Inverter Digital Twin for Anomaly Detection

Tareq Hossen, Dushyant Sharma and Behrooz Mirafzal
Kansas State University

P73- Dual-Sequence Current Controller with Delayed Signal Cancellation in the Rotating Reference Frame

Daniel dos Santos Mota, Erick Fernando Alves and Elisabetta Tedeschi
Norwegian University of Science and Technology (NTNU)

P99- Multi D-Q Frame Small-Signal Stability Analysis of Three-Phase Systems with Unbalanced Single-Phase Loads Using the Generalized Nyquist Criterion (GNC)

Ye Tang, Rolando Burgos, Bo Wen and Qing Lin
Center for Power Electronics Systems, Virginia Tech

P113- A Microcontroller-Based High Efficiency Critical Conduction Mode Control for GaN-Based Totem-Pole PFC

Xingyu Chen, Gibong Son, Feng Jin and Qiang Li
Center for Power Electronics Systems, Virginia Tech

P105- Synthesized Finite Control Set-Model Predictive Control and Discrete SVPWM for quasi Z-Source Inverter

Abualkasim Bakeer and Mohammed Alhasheem
Aswan University

P55- Power Electronics Based Self-Monitoring and Diagnosing for Photovoltaics Systems

Jeet Panchal, Bo Wen and Rolando Burgos
Center for Power Electronics Systems, Virginia Tech

P114- Impact of the Transformer Magnetizing Inductance on the Performance of the Dual-Active Bridge Converter

Shiyuan Yin[1], Suman Debnath[2], Rafal Wojda[2], Phani Marthi[2], Qianxue Xia[1] and Maryam Saeedifard[1]
[1]Georgia Institute of Technology, [2]Oak Ridge National Laboratory

P90- Broadband Impedance-Measurement Methods in Dynamic Analysis of Dual Active Bridge Converters

Roosa-Maria Sallinen and Tomi Roinila

P93- Impedance Characterization of a Single-Phase PFC in DQ Frame

Qing Lin, Bo Wen, Rolando Burgos, Ye Tang and Keyue Shan
Center for Power Electronics Systems, Virginia Tech

P104- Hybrid Scheme to Minimize DC-link Capacitance Requirement for Grid-Interactive Inverters

Anas Karaki, Congbo Bao, Mohammad B. Shadmand and Sudip Mazumder
University of Illinois at Chicago

P76- Decentralized Anomaly Characterization Certificates in Cyber-Physical Power Electronics Based Power Systems

Kirti Gupta[1], Subham Sahoo[2], Rabindra Mohanty[3], Bijaya Ketan Panigrahi[1] and Frede Blaabjerg[2]
[1]Indian Institute of Technology, [2]Aalborg University, [3]Birla Institute of Technology and Science

P79- Hardware-in-the-Loop Experimental Setup of a LCL-Filtered Grid-Connected Inverter with Digital Proportional-Resonant Current Controller

Tiago Davi Curi Busarello[1], Joel Filipe Guerreiro[2], Marcelo Godoy Simões[3] and José Antenor Pomilio[2]
[1]Federal University of Santa Catarina, [2]University of Campinas, [3]University of Vaasa

DIALOG SESSION

ADVANCED CONTROL AND COMPONENTE LEVEL DESIGN AND SIMULATION

10:00 AM - 11:00 AM (GMT-5)

Chair: Daniel González

Montoya Instituto Tecnológico Metropolitano ITM

P29- Augmented Piezoelectric Resonators for Power Conversion

Joseph Bonavia, Jessica Boles, Jeffrey Lang and David Perreault
Massachusetts Institute of Technology

P38- Comparative Analysis of Different Box Inductor Designs

Edwin Peredo Maita, Diego Serrano López, Regina Ramos Hortal, Rafael Asensi Orosa and José Antonio Cobos Márquez
Universidad Politécnica de Madrid

P27- Simulations and Measurements of Failure Modes in SiC Cascode JFETs under Short Circuit Conditions

Sunday Nereus Agbo, Erfan Bashar, Ruizhu Wu, Simon Mendy, Jose Ortiz Gonzalez and Olayiwola Alatise
The University of Warwick

P40- Piezoelectric Materials for the DC-DC Converters Based on Piezoelectric Resonators

Mustapha Touhami[1], Ghislain Despesse1 and François Costa[2]
[1]CEA-LETI, [2]SATIE

P89- Analysis and mitigation of the voltage unbalance effects for the series connected rectifier diodes in high voltage generator applications

Song Zhang[1], Saijun Mao[1], Hongyao Liu[2], Yujie Ding1 and Wenyu Li[1]
[1]Fudan University, 2UNISIC

P106- A Compact High-Power Single-Turn Inductor for 6 kV SiC-based Power Electronics Building Blocks

He Song[1], Jun Wang[2], Yue Xu[1], Joshua Stewart[1], Slavko Mocevic[1], Igor Cvetkovic[1], Rolando Burgos[1] and Dushan Boroyevich[1]
[1]Virginia Tech, [2]University of Nebraska

P85- Class E Power Amplifier with Piezoelectric Resonator Output Branch

Clarissa Daniel, Eric Stolt and Juan Rivas-Davila
Stanford University

P18- Optimizations and Comparisons of Air-Core Inductors Based on a Semi-Analytical Calculation Toolkit

Yue Wu and Charles Sullivan
Dartmouth College

P68- Multi-level Active Gate Driver for SiC MOSFETs with Paralleling Operation

Yuqi Wei, Liyang Du, Xia Du and Alan Mantooth
University of Arkansas

P67- Cryogenic Static and Dynamic Characterizations of 650 V Field Stop Trench Si IGBT

Yuqi Wei, Md Maksudul Hossain and Alan Mantooth
University of Arkansas

P41- Lyapunov Function Based Weighting-Factorless Model Predictive Controller for Common-Grounded Photovoltaic Inverter

Mokhtar Aly[1], Fernanda Carnielutti[2], Margarita Norambuena[3], Samir Kouro[3], Jose Rodriguez[4] and Emad M. Ahmed[5]
[1]Universidad San Sebastián, [2]Federal University of Santa Maria, [3]Federico Santa María Technical University, [4]Universidad Andres Bello, [5]Aswan University

P80- Generalized Predictive Control Strategy applied to a Single-Phase T-Type Voltage Source Inverter in Stand-Alone Operation Mode

Diego Naunay[1], Paúl Ayala[1], Josue Andino[1], Wilmar Martinez[2], Jacqueline Llanos[1] and Diego Arcos-Aviles[1]
1Universidad de las Fuerzas Armadas ESPE, [2]KU Leuven - EnergyVille

P117- Model Predictive Control of a Z-Source Power Converter for Wireless PowerTransfer Applications

Eliana Yiceth Piedrahita Echavarria, Walter Julián Gil González and Andrés Escobar Mejía
Universidad Tecnológica de Pereira

P2- Closed-Loop Control of a Three-Port Series Resonant Converter

[1]Thomas Langbauer, [1]Alexander Connaughton, [1]Franz Vollmaier, [1]Milan Pajnic and Klaus Krischan[2]
[1]Silicon Austria Labs GmbH, [2]Graz University of Technology

P45- A Simple, Decoupled Control Concept for a Modular DC-DC Converter in ISOP, IPOP, and Back-to-Back Connection

Niklas Fritz, Isabel Austrup and Rik W. De Doncker
RWTH Aachen University – ISEA

KEY NOTE III

11:00 A 12:00 (GMT-5)

Chair: Fernando Jiménez
Universidad de los Andes

Impedance-Based Stability Criteria for Converter-Based Power Systems

Jian Sun, PhD, Professor, Department of Electrical, Computer, and Systems Engineering, Director, New York State Center for Future Energy Systems, Rensselaer Polytechnic Institute

Jian Sun, PhD
Professor, Department of Electrical, Computer, and Systems Engineering, Director, New York State Center for Future Energy Systems, Rensselaer Polytechnic Institute

An impedance-based stability criterion for grid-connected converters was published in 2011 to address emerging stability challenges associated with grid integration of renewable generation and high-voltage dc (HVDC) transmission. The method attracted broad interests when the predicted stability problems started to affect the industry from 2014-2015. Since then, impedance analysis has become a common practice in industry to support new product design and system development. New impedance-based specifications and grid codes are also being developed.

As the society moves towards decarbonized economies that rely 100% on renewables, the power grid will also evolve into a converter-based power system. Converter-related stability challenges that so far have been limited to the grid interface of individual converters are expected to become more systemic and will require more general modeling and analysis methods. This talk will review the new challenge and present generalization of the impedance-based stability criterion to such converter-based power systems, including both ac and hybrid ac-dc grids.

Jian Sun

Dr. Jian Sun joined the faculty at Rensselaer Polytechnic Institute (RPI) in 2002, where he is currently a Professor in the Department of Electrical, Computer and Systems Engineering. He is also Director of the Center for Future Energy Systems (CFES) funded by New York State government. His research interests are in the general area of power electronics and energy conversion, with an emphasis on modeling, control, and different applications including renewable energy and power systems.

Dr. Sun received his doctorate from University of Paderborn, Germany. Prior to joining the faculty at RPI, he spent five years at Rockwell Collins working on power electronics for aircraft power systems, and was a Post-Doc Fellow at Georgia Tech from 1996 to 1997. As Director of CFES, he is responsible for the strategic directions and development of the Center's research, industry collaboration, education, and outreach programs. His professional activities in the power electronics community included serving as Editor-in-Chief of IEEE Power Electronics Letters from 2008 to 2014, Treasurer of IEEE Power Electronics Society from 2013 to 2020, and Vice President for Conferences since 2021. He works closely with industry in research and has also served as consultant/advisor to more than a dozen companies in the US, Europe and Asia, including Rockwell, United Technologies, GE, Facebook, China State Grid, and TenneT.

Dr. Sun received the IEEE PELS Modeling and Control Technical Achievements Award in 2013 and the R. David Middlebrook Outstanding Achievement Award in 2017. He is a Fellow of IEEE.

ROUND TABLE

12:30 A 13:30 (GMT-5)

Chairs: Fernando Jiménez, Universidad de los Andes
Captain Miguel Garnica, Armada de Colombia

Guillermo Oscar García, professor, Electrical and Electronics Department at National University of Río Cuarto (UNRC), researcher at the National Council for Scientific and Technical Research (CONICET)
Mario Pacas, professor University of Siegen
Ahmed Elasser, Principal Systems Engineer, GE Research

Innovation and education for Power Electronics

Guillermo Oscar García
professor, Electrical and Electronics Department at National University of Río Cuarto (UNRC), researcher at the National Council for Scientific and Technical Research (CONICET)

Guillermo Oscar García

Was born in Río Cuarto, Argentina, on September 11, 1954.

He received the Electromechanical degree from the National School of Technical Education Ambrosio Olmos, Río Cuarto, Argentina (1973), the Electrical and Electronics Engineer degree from the National University of Córdoba, Argentina (1981), the MSc degree (1990) and PhD degree (1994), both in Electrical Engineering, from COPPE, Federal University of Rio de Janeiro, Brazil. In 2020 he received the "Houssay Trajectory Award", corresponding to Engineering, Architecture and Informatics, the highest award that is annually given to the most outstanding people in the Argentine scientific system.
Since 1994 he has been with the Electrical and Electronics Department at National University of Río Cuarto (UNRC), where he served as director of the Applied Electronics Group (GEA) and founding director of the Master and PhD Programs in Sciences of Engineering. Since 1998 he has also been a researcher at the National Council for Scientific and Technical Research (CONICET) of Argentina. He is currently a full Prof. at UNRC and Principal Researcher at CONICET. He is a Visiting Prof. at the "South West Jiaotong University", Chengdu, China (2018-2022) and a member of the "China-Latin American United Laboratory for Rail Transit", funded by the Ministry of Science and Technology of the People's Republic of China since 2018. He has been a visiting professor at WEMPEC, University of Wisconsin, USA (1997), with a Fulbright research grant; at the Dept. of Electrical, Electronic and Communications Engineering of the University of Zaragoza, Spain (1997); and at the Department of Electrical Engineering of the University of Arkansas, USA (2003 and 2019). In addition, he has been coordinator or member of numerous projects and international networks between different countries (Germany, Brazil, Chile, China, Colombia, Cuba, Ecuador, France, USA, Spain, Mexico, Panama, Paraguay, Peru, Portugal, Republic Dominican Republic, Uruguay and Venezuela).

He has been a member of the Institute of Electrical and Electronics Engineers (IEEE) since 1985 and "Senior Member" since 2001. He has been Treasurer (2005-2006), Vice President (2007-2008) and President (2009-2010) of the Joint Chapter # 1 of the Argentine IEEE (which includes Industrial Electronics, IES; Control Systems, CSS; Robotics and Automation, RAS; Industry Application, IAS; Power Electronics, PES; and Vehicular Technology, VTS). He has also been a member of the Argentine Association of Automatic Control (AADECA) 1994-2018 and is a member of the RPIC Standing Committee since 2005.

His topics of technical interest are power electronics, electrical machines, automatic control systems and its applications in smart electrical microgrids; integration of renewable energies; conversion, processing and storage of electrical energy; electric mobility; fault detection, diagnosis and tolerance.

2021 IEEE COMPEL Cartagena, Colombia, Nov. 2-5

Mario Pacas
Professor University of Siegen

Mario Pacas

VDE, Senior Member IEEE, studied Electrical Engineering at the University of Karlsruhe (KIT) in Germany, obtaining the Dipl.-Ing. and the Dr.-Ing. –degree in 1978 and 1985 respectively.

From 1985 to 1996 he worked for BBC/ABB in Switzerland and Germany in different R&D and management positions with a very wide experience in international projects. In the last years with ABB he was responsible for the development of servo drives and later Product Responsible Manager for these products. Dr. Pacas was strongly involved in the introduction of digital control in the area of servos and actively participated in different international R&D consortia. Since 1996, he has been a member of the Department of Electrical Engineering and Computer Sciences at the University of Siegen, Germany and has headed the Institute of Power Electronics and Electrical Drives maintaining numerous partnerships with universities in Europe, Latin America and Asia. His special fields of interest are motion control, diagnostics and reliability, system identification and optimization of motor drive systems. Dr. Pacas is now Senior Professor at the University of Siegen and an independent consultant in the area of power electronics, electrical drives, and automation.

Additionally he has been appointed as peer and advisor in many scientific government and accreditation commissions in Germany and abroad, especially in the area of higher education and research.

Dr. Pacas has served as Member at Large, as VP for conferences and currently as VP for Global Relations in PELS and as conference director of the PCIM Europe.

Ahmed Elasser

received his MS & PhD degrees in Electric Power & Power Electronics in 1993 & 1996 respectively from Rensselaer Polytechnic Institute. He is a Principal Systems Engineer at GE Research in the areas of Electric Power, Power Electronics, and Power Semiconductor Devices. He worked on Power Devices, Solar Energy, Power Conversion Systems, and is currently leading the Battery Energy Storage Systems Power Conversion. He published over 40 papers and has 37 issued patents. He is a Senior IEEE Member. Dr. Elasser is the recipient of numerous GE Awards for his contributions and innovations over his 26 years GE career.

Ahmed Elasser

PANEL SESSION

EDUCATION

13:30 PM - 14:10 PM (GMT-5)

Chair: Lieutenant Juan Pablo Gutiérrez

Colombian NavyT

13:30 PM

P52- Kiosol: Intelligent Distributed Energy Resources (DERs) living laboratory

Jorge Felipe Gaviria Fierro, Gabriel Esteban Narvaez Morales, Harold Rene Chamorro Vera, Jose Fernando Jimenez Vargas, Luis Felipe Giraldo Trujillo and Michael Bressan
Universidad de los Andes

13:45 PM

P129- The use of Renewable Energy System to Enhance the Power Electronics Curriculum

Rafael Ocasio, Guillermo Lopez, Melvin Lugo-Alvarez and Eduardo Ortiz
University of Puerto Rico, Mayaguez

14:00 PM

LIVE Q&A

PANEL SESSION

MODELING AND STABILY OF GRID TIED POWER CONVERTERS III

14:10 PM - 14:30 PM (GMT-5)

Chair: Camilo A Ordóñez M.

Universidad de Sevilla

14:10 PM:

P118– Mitigation of MMC High-frequency Resonance by Narrowband Damping

Pengxiang Huang and Jian Sun
Rensselaer Polytechnic Institute

14:25 PM
LIVE Q&A

PANEL SESSION

MICROGRID DER CONVERTERS

14:30 PM - 15:30 PM (GMT-5)

Chair: Michael Bressan

Universidad de los Andes

14:30 PM

P8- System Control and Reset Algorithm for DPP Converters in a Photovoltaic Microinverter

Chi Jui Lo and Katherine Kim
National Taiwan University

14:45 PM

P120- Control Strategy for a Brushless Synchronous Generator based Active Rectifier regulated DC Power System with minimal DC-link capacitance for More Electric Aircraft

Goutham Selvaraj[1], Kaushik Rajashekara[1] and Krishna Raj Ramachandran[2]
[1]University of Houston, [2]Indian Institute of Technology Delhi

15:00 PM

P15- Design and Control of a Grid-Connected Hybrid Wind-Solar Energy System with Adaptive Maximum Power Point Tracking

Zehong Liao, Ross Mathieson and Stephen Finney
University of Edinburgh

15:15 PM
LIVE Q&A

PANEL SESSION

MODELING AND STABILITY OF POWER CONVERTERS

15:30 PM - 16:30 PM (GMT-5)

Chair: Harold Chamorro

KU Leuven

15:30 PM

P10- Modular Multilevel Converter with Stack-Parallel Cascaded H-Bridge Energy Storage Branch

Zoe Blatsi, Sebastián Neira, Paul Judge, Michael Merlin and Stephen Finney
The University of Edinburgh

15:45 PM

P37- Exact Solution of Modulation Waveforms for MMCs Operating with Circulating Current Suppression Control (CCSC) Strategy

Ramin Parvari and Shaahin Filizadeh
University of Manitoba

16:00 PM

P49- Frequency and Duty Ratio Control of Bidirectional Class-E DC-DC Converter

Kamlesh Sawant, Brody Hultman and Jungwon Choi
University of Minnesota

16:15 PM

LIVE Q&A

CULTURAL SPECTACLE

16:30 PM - 17:30 PM (GMT-5)

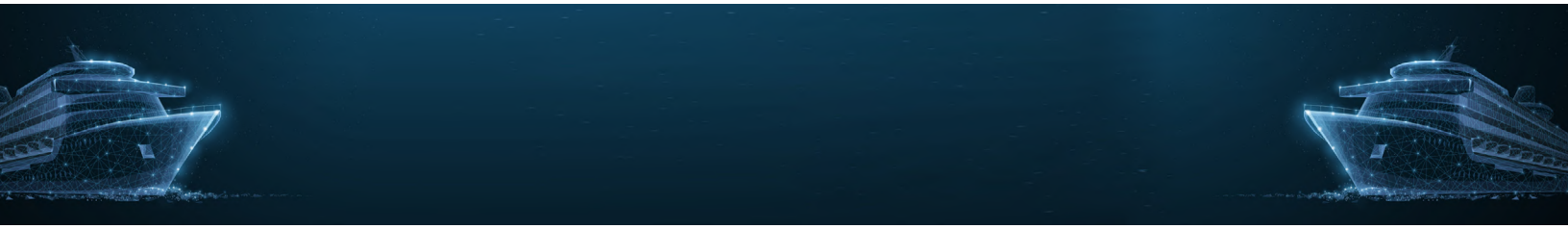
Chair: Ricardo Barón

Colombian Navy

Tonada Bullerengue
Uniandes Cultural Center

Connect with the Colombian Music Heritage Route and get ready to travel through the Colombian Caribbean with the group Tonada.

Tonada is a musical ensemble formed mostly by young lovers of traditional music whose principle is the safeguarding and preservation of the musical heritage of the Colombian Caribbean, born in 2014 in the city of Barranquilla, after the research process conducted by its members since 2011 in different municipalities of the Colombian Caribbean. Tonada develops its live show based on the concept of the Bullerengue dance, a dance of courtship and struggle between the dancer and the Tambolero for the dancer; in the same way each sung story is represented, which is inspired by the daily life of each singer.



ORGANIZING COMMITTEES FOR COMPEL 2021

COMPEL 2021 IS ORGANIZED BY THE DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING, LOS ANDES UNIVERSITY AND THE COLOMBIAN NAVY

General Chair: Fernando Jiménez, Universidad de los Andes
General Co-Chair: Miguel Garnica, Colombian Navy

Technical Program Committee (Review):

Chair: Gustavo Ramos, Universidad de los Andes
Co-Chair: Mor Peretz, Ben Gurion University of the Negev
Co-Chair: Andres Escobar-Mejía, Universidad Tecnológica de Pereira
Mario Pacas, University of Siegen
Guillermo Jimenez, Universidad de los Andes
Wilmar Martinez, KU Leuven
Harold Chamorro, KU Leuven
Camilo Andres Ordoñez Medina, Universidad de Sevilla
Ricardo Moreno, Universidad Autónoma de Occidente
Kumars Rouzbehi, Universidad de Sevilla
Francisco Gozalez-Longatt, University of South-Eastern
Vijai Sood, Ontario-Tech University
Corinne Alonso, Université Paul Sabatier
Oscar David Flórez Cediel, Universidad Distrital Francisco José de Caldas
Frede Blaabjerg, Aalborg University
Josep M. Guerrero, Aalborg University
Vítor Monteiro, University of Minho
Mahajan Sagar Bhaskar, Prince Sultan University

Publications chair (web site and proceedings):

Michael Bressan, Universidad de los Andes
Santiago Serrano, Universidad de los Andes

Virtual Platform:

Chair: Juan Pablo Gutiérrez, Colombian Navy
Co-Chair: Andrea Valderrama, Universidad de los Andes

Local Organizing Committee:

Chair: Alejandra Cancino, Universidad de los Andes
Co-Chair: Sirley Tabio, Universidad de los Andes
Co-chair: Ricardo Barón, Colombian Navy

Sponsorship and Finance:

Chair: Guillermo Jiménez, Universidad de los Andes
Co-Chair: Sandra Milena Moreno, Universidad de los Andes