

IEEE ENERGY CONVERSION CONGRESS & EXPO Portland, Oregon | Sept. 23-27



PROGRAM

SPONSORED BY THE IEEE POWER ELECTRONICS
AND INDUSTRY APPLICATIONS SOCIETIES

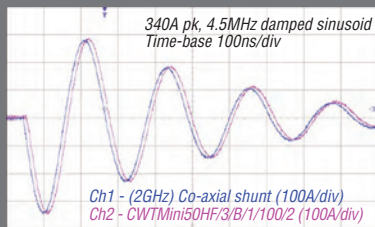


New Products in Current Sensor ICs, DC Closed-loop Current Transducers and AC Current Probes



AKM CZ-37xx Series Low Noise Current Sensors (preliminary specifications)

- » Current Ranges: $\pm 5A$ to $\pm 180A$ Peak, 60Arms
- » Accuracy: 0.5% (Typ.) @ $T_{AMBIENT} = 0 - 90^{\circ}C$
- » Bandwidth (-3dB): dc to 400kHz
- » Response Time: 1 μ sec
- » Voltage Isolation: 3kV
- » Operating Temp.: -40 to 105 $^{\circ}C$
- » Decreased dV/dt Noise and Stray Magnetic Field Influence
- » UL61800-5-1 Safety Standard Compliant



PEM CWTMini50HF Rogowski Coil AC Current Probe

- » Current Ranges: $\pm 600A$, $\pm 1200A$
- » Accuracy: < 0.5%
- » Bandwidth (-3dB): 50MHz High Frequency
- » Rise Time: 12.5ns
- » Voltage Isolation: 2kV
- » Coil Length: 100mm
- » Coil Cross-Section: 3.5mm
- » Screened coil for high dV/dt immunity



Danisense DM1200ID High Stability, High Accuracy Closed-loop Fluxgate Current Transducer

- » Current Range: $\pm 1500A$ DC Current, 1200Arms AC Current
- » Accuracy, dc to 10Hz: $\pm 7ppm$
- » Bandwidth (-3dB): dc to 300kHz
- » Response Time: < 1 μ sec
- » Aperture: 45mm
- » Supply Voltage: $\pm 15V$

TABLE OF CONTENTS

ECCE 2018 Supporters.....	2
Welcome from General Chair	3
2018 Organizing Committee	4
General Information.....	7
Rules and Regulations	7
Schedule-at-a-Glance	8
PELS Meetings.....	10
Committee Meetings.....	11
Special Events	12
Presenter Information.....	15
Plenary Session	16
Special Sessions	18
Tutorials	20
TECHNICAL PROGRAM	24
Oral Sessions	24
Poster Sessions	57
EXPOSITION	80
Convention Center Floor Plans	80
Exhibit Hall Floor Plan	81
Product and Services Sessions	82
Student Demonstrations.....	83
Exhibitor Listing.....	84
ECCE 2019 INFORMATION	86
Call for Papers	86
Call for Tutorials	87
Call for Special Session Organizers.....	89

ECCE 2018 SUPPORTERS

The ECCE 2018 Planning Committee would like to express its gratitude for the generous support received from the following:

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WELCOME FROM GENERAL CHAIR: AVOKI M. OMEKANDA



It is my pleasure to welcome you to Portland, Oregon, USA, for the 10th Annual IEEE Energy Conversion Congress & Exposition (ECCE 2018), sponsored by the IEEE Power Electronic Society (PELS) and IEEE Industry Applications Society (IAS). With a record number of digests submitted, this popular conference is already bigger and better than previous years. I invite you to join me as we celebrate this fact, as well as our 10th anniversary at the ECCE 10th Anniversary Celebration, taking place Wednesday night during the Industry Night Out Reception.

As the world's leading technical conference and exposition for energy conversion solutions, ECCE provides a unique opportunity to engineers, researchers, students, and other professionals from the broad spectrum of energy conversion for the exchange of technical knowledge, networking, and exposure to the latest technology trends. ECCE is unique in our emphasis on integrated systems, presenting the best in contemporary energy conversion research alongside innovations from more traditional component topics.

ECCE 2018 features an emphasis on the challenges in the energy conversion industry. This is highlighted in our five plenary keynote speeches featuring Dr. Stephanie Watts Butler, Dr. Victor Veliadis, Sean James, Jason Busch, and Dr. Jiaqi Liang. We are extremely fortunate to have these five distinguished leaders from industry and scientific community to share their visions and wisdom with us.

This year, the 2018 Technical Program Committee (TPC) has made efforts to expand the professional program. The technical program features 1,102 technical presentations over a 1,788 record number of digests from across the globe. Technical papers will be presented as 144 oral sessions, 54 poster sessions, and 11 special sessions. Among these oral sessions, three memorial sessions have been dedicated to our colleagues who passed away this year: **Ronald Gordon Harley** – *Fault Diagnosis*, **Md. Azizur Rahman** – *IPM Motor 1*, and **Peter Lawrenson** – *Switched Reluctance Machines*.

ECCE 2018's professional program begins Sunday, with 22 tutorial sessions that offer an in-depth discussion of important and complex technical topics combining practical application with theory. In the Exposition Hall, our partners and exhibitors will showcase their state-of-the-art technologies, products, and solutions, creating a highly interactive networking environment. Also taking place in the Exposition Hall are a series of poster sessions and student demonstrations scheduled for Monday and Tuesday.

ECCE is similar to a homecoming event, designed for you to catch up with old friends and meet new ones. This year, ECCE 2018 is once again co-locating with the 2018 Industry Applications Society (IAS) Annual Meeting (AM). ECCE 2018 and the 2018 IAS AM conferences will operate as separate events in different locations of the Portland Convention Center, with their own technical and professional programs. However, 2018 IAS AM attendees are invited to partake in our social functions, such as the Welcome Reception, Expo Opening Reception, Industry Night Out, and Awards Luncheon. For those who are new to ECCE, thank you for joining us and we hope to see you at our ECCE Newcomers session, just after the Sunday Welcome Reception.

I would like to express my utmost gratitude to the members of the ECCE 2018 Organizing Committee, the ECCE Steering Committee, and SmithBucklin, who with hard work and selfless dedication have made this event possible. I would like to thank PELS and IAS for their sponsorship and stewardship, and the generous support of all our corporate partners. I would like to thank each and every one of you, whether you are present as a presenter, attendee, exhibitor, volunteer, or any combination of the above, for your contribution and participation. Once again, I welcome you to ECCE 2018.

Sincerely,

A handwritten signature in black ink, appearing to read 'Avoki M. Omekanda'. The signature is fluid and cursive, with a long horizontal stroke at the end.

Dr. Avoki M. Omekanda
General Chair IEEE ECCE 2018

2018 ORGANIZING COMMITTEE

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Kausik Basu, *IISc Bangalore, India*

Behrooz Mirafzal, *Kansas State University, USA*

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Vice Chair: Mahesh Krishnamurthy, *Illinois Institute of Technology, USA*

Martin Ordóñez, *University of British Columbia, Canada*

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Sheldon Williamson, *University of Ontario*

Institute of Technology, Canada

Mark Scott, *Miami University, USA*

John Lam, *York University, Canada*

Jiangchao Qin, *Arizona State University, USA*

Suman Debnath, *Oak Ridge National Lab, USA*

Karthik Kandasamy, *Georgia Institute of Technology, USA*

Norma Anglani, *University of Pavia, Italy*

Mohammad Khodayar, *Southern Methodist University, USA*

Marcelo Perez, *Universidad Tecnica Federico Santa Maria, Chile*

Mohammad Shadmand, *Kansas State University, USA*

Mehdi Narimani, *McMaster University, Canada*

Fei Gao, *University of Technology of Belfort-Montbéliard, France*

Arindam Ghosh, *Curtin University, Australia*

Kumar Dinesh, *Danfoss, Denmark*

Karthik Sudharshan, *Indian Institute of Space Science and Technology, India*

Dhaval Patel, *Microchip Inc, India*

Ha Pham, *University of Technology Sydney, Australia*

Santosh Kumar Singh, *Indian Institute of Technology (BHU), Varanasi, India*

Datacenters and Telecommunication Applications

Vice Chair: John Hawkins, *Telepower Australia, Australia*

Norbert Grass, *Technische Hochschule Nuremberg, Germany*

Alexis Kwasinski, *University of Pittsburgh, USA*

Transportation Electrification Applications

Vice Chair: Mohammad Anwar, *General Motors, USA*

Mehmet Aydemir, *Gazi University, Turkey*

Rashmi Prasad, *General Motors, USA*

Mazharul Chowdhury, *Halla Mechatronics, USA*

Long Wu, *John Deere, USA*

Suresh Gopalakrishnan, *General Motors, USA*

Phillip Kollmeyer, *McMaster University, Canada*

Antonio Marques Cardoso, *Universidade da Beira Interior, Portugal*

Wen Ouyang, *ABB, USA*

Jae-Do Park, *University of Colorado, USA*

Mengqi Wang, *University of Michigan-Dearborn, USA*

Power Converter Topologies

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Vice Chair: Khurram Afridi, *University of Colorado, Boulder, USA*

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Diego Gonzalez, *University of Oviedo, Spain*

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Khai Ngo, *Virginia Tech, USA*

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Giacomo Scelba, *University of Catania, Italy*

Mohammad Shadmand, *Kansas State University, USA*

Yongsug Suh, *Chonbuk National University, South Korea*

Luca Tarisciotti, *University of Nottingham, UK*

Xibo Yuan, *University of Bristol, UK*

Zheyu Zhang, *University of Tennessee, USA*

Modelling and Optimization of Power Converters Control

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Rebecca Todd, *University of Manchester, UK*
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Xiongfei Wang, *Aalborg University, Denmark*
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Electrical Machines

Vice Chair: Akira Chiba, *Tokyo Institute of Technology, Japan*
Vice Chair: Greg Heins, *Regal Beloit, Australia*
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Renato Lyra, *Aerotech, Inc., USA*
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Maria Carmela Di Piazza, *Institute of Marine Engineering-CNR, Italy*
Richard Lukaszewski, *Rockwell Automation, USA*

GENERAL INFORMATION

Registration Hours

Pre-Function Lobby A

Saturday, September 22	5:00PM – 7:00PM
Sunday, September 23	7:30AM – 7:00PM
Monday, September 24	7:00AM – 6:00PM
Tuesday, September 25	7:30AM – 5:00PM
Wednesday, September 26	7:30AM – 7:00PM
Thursday, September 27	7:30AM – 12:00PM

Expo Hall Hours

Exhibit Hall A

Monday, September 24	4:30PM – 7:30PM
Tuesday, September 25	10:30AM – 5:00PM



Creative Digressions

Monday through Thursday

Room A103

A Creative Digression room is available to attendees requiring a break from busy conference activities. The room will be equipped with large tables, note pads, and easels in order to facilitate one-on-one discussions, idea generation sessions, business meetings, or social interactions. Coffee and tea will also be available.

Family Room

Monday through Thursday

Room A109

A family room is available for use by attendees with young children. This room will serve as a safe space for children to rest, enjoy complimentary and healthy snacks, watch videos, or create art with crayons and paper during the conference hours. All children must be supervised by a parent or family member at all times. Additionally, Nursing Suites are also available throughout the Convention Center for nursing mothers.

Wi-Fi

Attendees have full access to Wi-Fi in the meeting space, foyer, and exhibit hall.

Network: ECCE WiFi (no password required)

Stay Connected with the ECCE Mobile App

Download the ECCE 2018 mobile app to access all things related to the conference, including session information, exhibitors and locations, floor plans, timely notifications, and more! Visit the Apple Store and Google Play Store and search 'ECCE2018'.

RULES AND REGULATIONS

Consent to Use of Photographic Images

Registration and attendance at, or participation in, ECCE constitutes an agreement by the registrant to ECCE's use and distribution (both now and in the future) of the registrant or attendee's image or voice in photographs, videotapes, electronic reproductions and audiotapes of such events and activities.

Cameras and Recording Devices

The use of cameras and/or recorders is strictly prohibited during the oral and poster sessions. Limited use is allowed for Exhibitors in their own booth area. Personal photography is allowed at social functions.

Distributing Commercial Material at ECCE

Exhibitors: Exhibitors may only distribute commercial materials in their booth, at Exhibitor Product Demos they are conducting and at press conferences they are holding. ECCE reserves the right to remove without notice any materials not in compliance with this policy.

Non-Exhibitors: Distribution of commercial material in the ECCE 2018 hotel space (including directly to the hotel rooms of ECCE participants), meeting space and Exhibit Hall by people or organizations not participating in the Exposition is prohibited. ECCE reserves the right to remove without notice any materials not in compliance with this policy.

SCHEDULE-AT-A-GLANCE

SATURDAY, SEPTEMBER 22

5:00PM – 7:00PM **Registration Open**Pre-Function Lobby A

SUNDAY, SEPTEMBER 23

7:30AM – 7:00PM **Registration Open**Pre-Function Lobby A

8:00AM – 11:45AM **AM Tutorials**

11:45PM – 12:30PM **Lunch On Your Own**

12:30PM – 4:15PM **PM Tutorials**

5:00PM – 7:00PM **Registration Open**Pre-Function Lobby A

6:00PM – 8:00PM **ECCE Welcome Reception**Oregon Ballroom Lobby

8:00PM – 8:30PM **Newcomer's Orientation**Room C120

MONDAY, SEPTEMBER 24

7:00AM – 6:00PM **Registration Open**Pre-Function Lobby A

7:30AM – 8:30AM **Speaker's Breakfast** Oregon Ballroom

8:30AM – 11:00AM **Plenary Session** Oregon Ballroom 202-204

11:00AM – 12:30PM **Lunch On Your Own**

12:30PM – 2:10PM **Technical Program: Oral Sessions**

Special Session: SS1ARoom B116

2:10PM – 2:20PM **PM Break**Pre-Function Lobby B

2:20PM – 4:25PM **Technical Program: Oral Sessions**

Special Session: SS1BRoom B116

4:30PM – 7:30PM **Student Demonstrations on Emerging Technology** Student Demonstration Lounge, Exhibit Hall A

Expo Hall Opening Reception Exhibit Hall A

5:00PM – 7:30PM **Technical Program: Poster Sessions** Exhibit Hall A

7:30PM – 8:30PM **Women In Engineering Evening Event** Room A105

TUESDAY, SEPTEMBER 25

7:30AM – 5:00PM **Registration Open**Pre-Function Lobby A

7:30AM – 8:30AM **Speaker's Breakfast** Oregon Ballroom 201

8:30AM – 10:10AM **Technical Program: Oral Sessions**

10:10AM – 10:30AM **AM Break** Exhibit Hall A

10:30AM – 1:00PM **Technical Program: Poster Sessions** Exhibit Hall A

10:30AM – 5:00PM **Expo Hall Open** Exhibit Hall A

12:15PM – 2:30PM **Lunch in the Exhibit Hall** Exhibit Hall A

2:30PM – 5:00PM **Student Demonstrations on Emerging Technology** Student Demonstration Lounge, Exhibit Hall A

2:30PM – 5:00PM **Technical Program: Poster Sessions** Exhibit Hall A

3:10PM – 3:30PM **PM Break** Exhibit Hall A

5:00PM – 7:00PM **PELS Mentoring Round Tables (Registration required)** Oregon Ballroom 201

WEDNESDAY, SEPTEMBER 26

7:30AM – 7:00PM	Registration Open <i>Pre-Function Lobby A</i>
7:30AM – 8:30AM	Speaker's Breakfast <i>Oregon Ballroom</i>
8:00AM – 9:00AM	Women in PELS (WIPELS) Breakfast <i>Room C126</i>
8:30AM – 10:10AM	Technical Program: Oral Sessions
	Special Session: SS3A <i>Room B114</i>
	Special Session: SS4 <i>Room B115</i>
10:10AM – 10:30AM	AM Break <i>Pre-Function Lobby B</i>
10:30AM – 12:10PM	Technical Program: Oral Sessions
	Special Session: SS3B <i>Room B114</i>
	Special Session: SS6 <i>Room B115</i>
12:10PM – 2:00PM	Lunch On Your Own
2:00PM – 3:40PM	Technical Program: Oral Sessions
	Special Session: SS3C <i>Room B114</i>
	Special Session: SS7 <i>Room B115</i>
3:40PM – 4:00PM	PM Break <i>Pre-Function Lobby B</i>
4:00PM – 5:40PM	Technical Program: Oral Sessions
	Special Session: SS2 <i>Room C121</i>
	Special Session: SS3D <i>Room B114</i>
	Special Session: SS8 <i>Room B115</i>
7:00PM – 9:30PM	ECCE 10th Anniversary Celebration and Industry Night Out <i>Oregon Ballroom</i>

THURSDAY, SEPTEMBER 27

7:30AM – 12:00PM	Registration Open <i>Pre-Function Lobby A</i>
7:30AM – 8:30AM	Speaker's Breakfast <i>Oregon Ballroom</i>
8:30AM – 10:10AM	Technical Program: Oral Sessions
10:10AM – 10:30AM	AM Break <i>Pre-Function Lobby B</i>
10:30AM – 12:10PM	Technical Program: Oral Sessions
12:10PM – 2:00PM	IEEE Awards Luncheon <i>Oregon Ballroom</i>
2:10PM – 3:50PM	Technical Program: Oral Sessions

PELS MEETINGS

SUNDAY, SEPTEMBER 23

11:00AM	PELS AdCom Strategy Meeting (<i>Executive Team Only</i>)	Room C125
1:00PM	PELS Energy Access Committee Planning Meeting	Room C126
3:30PM	PELS Town Hall Meeting	Oregon Ballroom 201

MONDAY, SEPTEMBER 24

10:30AM	PELS Digital Media/Education Meeting	Room C126
	PELS Cyber-Physical Security Meeting	Room C125
11:30AM	Asian Power Electronics Coordination Committee	Room C124
	ECCE Asia Coordination Committee Meeting	Room C124
12:30PM	PELS TC Chair Luncheon	Room C125
	PELS Fellows Committee (<i>Members Only</i>)	Room C126
1:00PM	PELS Membership Meeting	Room C124
1:30PM	PELS Constitution and Bylaws Meeting	Room C126
2:30PM	PELS Magazine Advisory Board Meeting (<i>Members Only</i>)	Room C126
3:00PM	IEEE Journal of Emerging and Selected Topics in Power Electronics (JESTPE) Steering Committee	Room C125
3:30PM	PELS Chapter Chair Forum	Room C124
	PELS Industry Advisory Board Meeting (<i>Members Only</i>)	Room C126

TUESDAY, SEPTEMBER 25

8:00AM	PEDG Steering Committee Meeting	Room C126
	PELS TC3 Motor Drives & Actuators Meeting	Room C125
	IEEE Journal of Emerging and Selected Topics on Power Electronics (JESTPE) Awards & Editorial Board	Room C124
9:00AM	PELS TC7 - Communication Energy Systems	Room C125
	SPEC Steering Committee Meeting	Room C126
10:00AM	PELS Energy Access Committee Meeting/Empower a Billion Lives	Room C125
	International Future Energy Challenge (IFEC) Information Session	Room C124
10:30AM	PELS TC1 – Power and Control Core Technologies Meeting	Room C126
11:00AM	FEPPCON Steering Committee	Room C124
12:00PM	PELS TC2 – Power Conversion Systems and Components Meeting	Room C125
1:00PM	Empower a Billion Lives Proposal Review Meeting	Room C124
1:30PM	PELS TC4 – Vehicle and Transportation Systems Meeting	Room C126
2:30PM	eGrid Steering Committee	Room C126
	PELS TC6 – High Performance and Emerging Technologies Meeting	Room C125
4:00PM	PELS TC5 – Sustainable Energy Technical Committee	Room C126
5:00PM	PELS Mentoring Round Tables	Oregon Ballroom 201
6:30PM	IEEE IAS/PELS Young Professional Reception	Yardhouse

WEDNESDAY, SEPTEMBER 26

8:00AM	PELS Women In Engineering Breakfast	Room C126
9:00AM	PELS Products Committee Meeting	Room C125
9:30AM	PELS Global / Intersociety Relations Committee	Room C126
11:00AM	PELS Technical Operations Committee Meeting	Room C125
11:30AM	IEEE Transactions on Power Electronics Paper Awards and Editorial Board Meeting	Room C124
	PELS Nominations Committee (<i>Committee Members Only</i>)	Room C126
1:00PM	PELS Conferences Committee Meeting	Room C125
1:30PM	PELS Standards Committee Meeting	Room C126
2:00PM	PELS Administrative Committee Meeting	Room C124
2:30PM	PELS ITRW Steering Committee Meeting	Room C126
6:30PM	PELS Administrative Committee Dinner (<i>Members Only</i>)	Offsite

THURSDAY, SEPTEMBER 27

7:00AM	PELS Administrative Committee Meeting	Room C124
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IAS Committee Meetings at ECCE

SUNDAY, SEPTEMBER 23		
3:00PM – 4:00PM	IAS-IPCS D – Standards Meeting	Room A104
4:00PM – 5:00PM	IAS-IPCS D – Editorial Meeting	Room A104
7:30PM – 9:30PM	IAS-IPCS D Department Meeting	Room A104
8:00PM – 8:30PM	Newcomer’s Orientation	Room C120
TUESDAY, SEPTEMBER 25		
2:00PM – 3:00PM	IAS Renewable and Sustainable Energy Conversion Systems (RESC) Meeting	Room B113
3:00PM – 4:00PM	IAS Transportation Systems Committee (TSC) Meeting	Room B116
4:30PM – 6:00PM	IAS Electrical Machines Committee (EMC) Meeting	Room B113
5:00PM – 6:00PM	IAS Power Electronics Devices and Components Committee (PEDCC) Meeting	Room B116
6:00PM – 7:00PM	IAS Industrial Drives Committee (IDC) Meeting	Room B114
6:30PM	IEEE IAS/PELS Young Professional Reception	Yardhouse: 888 SW 5th Avenue #2004
7:00PM – 8:00PM	IAS Industrial Power Converter Committee (IPCC) Meeting	Room B116
WEDNESDAY, SEPTEMBER 26		
5:00PM – 6:00PM	KIPE-IEEE/IAS Meeting (Invitation Only)	Room A104
THURSDAY, SEPTEMBER 27		
10:00AM – 11:00AM	IEEJ/IAS-IEEE/IAS Meeting (Invitation Only)	Room C123

IEMDC Committee Meetings

MONDAY, SEPTEMBER 24		
12:00PM – 1:00PM	IEMDC 2019 Organizing Committee Meeting (Invitation Only)	Room C123
TUESDAY, SEPTEMBER 25		
12:00PM – 1:00PM	IEMDC Steering Committee Meeting (Invitation Only)	Room C123

ECCE Committee Meetings

TUESDAY, SEPTEMBER 25		
7:30AM – 8:30AM	ECCE 2018, 2019, and 2020 Handover (Invitation Only)	Room C123
8:30AM – 9:30AM	ECCE 2019 Organizing Committee Meeting (Invitation Only)	Room C123
10:15AM – 12:00PM	ECCE Steering Committee Meeting (Invitation Only)	Room C123



SPECIAL EVENTS

ECCE Welcome Reception

Sunday, September 23 | 6:00PM – 8:00PM

Location: Oregon Ballroom Lobby

Kick off ECCE 2018 with food, drink and conversation at the Sunday Welcome Reception! This is your opportunity to meet the presidents of IAS and PELS, and get to know colleagues who have become IEEE Fellows this year!

Newcomer's Orientation

Sunday, September 23 | 8:00PM – 8:30PM

Location: Room C120

The Newcomer's Orientation is designed for first-time attendees and will cover everything you need to know about the conference, schedules, program offerings, behind-the-curtain tricks and tidbits to help you navigate the conference.

Expo Hall Opening Reception

Monday, September 24 | 4:30PM – 7:30PM

Location: Expo Hall A

Join us for the opening of the ECCE 2018 Exhibit Hall as we celebrate 10 years! Enjoy a drink and hors d'oeuvres as you mingle with industry partners and friends and explore the latest advances in products and services to meet the needs of current and future challenges facing the energy conversion industry.

Industry Night Out Reception

Wednesday, September 26 | 7:00PM – 9:30PM

Location: Oregon Ballroom

This unique night brings together members from both ECCE and IAS to enjoy games, music, and mingling. Expand your network and knowledge during the Industry Night Out reception. Heavy appetizers and beverages will be provided.

IEEE Awards Luncheon

Thursday, September 27 | 12:10PM – 2:30PM

Location: Oregon Ballroom

Join us at the IEEE Awards Luncheon as we gather to celebrate the many achievements of our colleagues.

Tour Options

Bonneville Dam Tour

Tuesday, September 25, 10:00AM – 12:00PM

Take a two-hour guided tour, which includes visits to the Bradford Visitor Center, PHI Gallery, and Navigation Lock. After the tour, there will also be a 30-minute visit to the beautiful Multnomah Falls on the way back to the Convention Center. *The bus will depart the Oregon Convention Center at 8:45 am and will arrive back at the same location at approximately 2:00 pm.*



Daimler Portland

Tuesday, September 25, 1:00PM – 3:00PM

This two-hour tour of Daimler Portland, which is the parent company of Mercedes-Benz, includes a walk-by discussion of the materials lab and prototype parts development, a tour of ccb and full vehicle shaker lab, cold chamber, climatic wind tunnel, components test lab, structures and dynamics lab, wind tunnel, and Corp 12-RDC. *The bus will depart the Oregon Convention Center at 12:45 pm and will arrive back at the same location at approximately 3:15 pm.*

TOUR SIGN UP

Pre-registration and payment for tours are required. To sign up for a tour, visit the ECCE Registration Desk located in Pre-Function A.

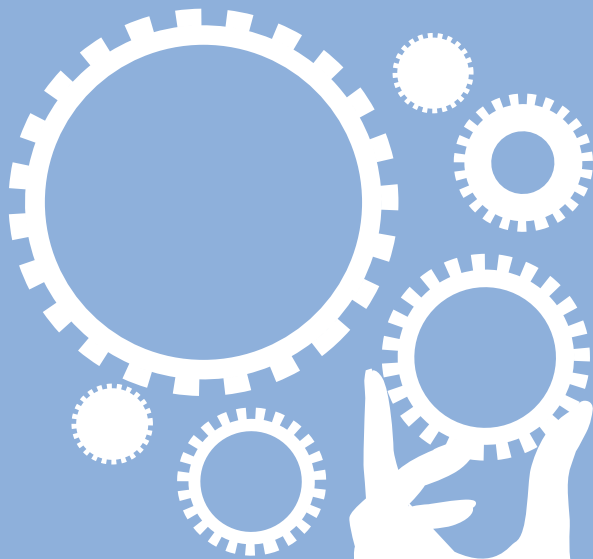


WiE Evening Event

Monday, September 24 | 7:30PM

Location: Room A105

All women in engineering are invited to attend this event to learn about how they can become involved in WiE activities. A roundtable will also be offered, covering topics related to tools supporting wider women participation at ECCE.



Women in Engineering (WiE) Events

Women in PEES (WPEES) Breakfast

Wednesday, September 26 | 8:00AM – 9:00AM

Location: Room C126

All are invited to this breakfast, where prominent women in power electronics share their career challenges and triumphs. This event is partnered with Wolfspeed, and is sponsored by the Power Electronics Society (PEES).

Travel Grant Program

WiE is excited to share that 20 travel grants have been awarded to women engineers traveling to attend ECCE 2018 from Countries including Bangladesh, Canada, China, India, Peru, Spain, Tunisia, the United Kingdom and the United States.

Special Session SS7

Wednesday, September 26 | 2:00PM – 3:40PM

Location: Room B115

Four female presenters, two from academia and two from industry with a common back-ground in power electronics, will share their experience in the effort to foster collaboration between industry and academia.

Oral Presenters

SPEAKER READY ROOM

Sunday through Thursday

Room A106

All oral presenters must check in at the Speaker Ready Room at least four (4) hours prior to their scheduled session. Even if you have submitted your presentation in advance and have no changes, you must check and confirm that the presentation is correct.

Speaker Ready Room Hours:

Sunday, September 23	8:30AM – 5:00PM
Monday, September 24	8:30AM – 5:00PM
Tuesday, September 25	8:30AM – 12:00PM
Wednesday, September 26	8:30AM – 6:00PM
Thursday, September 27	8:30AM – 12:00PM

You may also edit your presentation during speaker ready room hours. If you have edits to your presentation, you will need to re-upload your presentation by 4:00PM the day prior for speakers presenting before 12:00PM or by 12:00PM for speakers presenting after 1:00PM. Please note: you will not be able to use personal laptops for presentations. The AV team requires this so that all presentations run smoothly.

ORAL PRESENTERS' ORIENTATION

A Presenters' Orientation Breakfast will be held for oral presenters and session chairs from 7:30AM – 8:30AM Monday through Thursday in Oregon Ballroom 201. Oral presenters should meet with their respective session chairs to review the format and timing of their session and alert conference management of any changes. Oral Presenters should attend the orientation each day that they are scheduled to provide an oral presentation (or chair a session); you may only attend on days on which you are scheduled to speak.



USE OF PERSONAL COMPUTERS PROHIBITED

Please note that the use of personal laptops for presentations is not permitted. All presentations must be uploaded to the show computers. AV personnel will be on-hand to assist in uploading your presentation.

Poster Presenters

POSTER PRESENTATION SCHEDULE

Monday, September 24 and Tuesday, September 25

Exhibit Hall A

POSTER SESSION I

Monday, September 24 5:00PM – 7:30PM

POSTER SESSION II

Tuesday, September 25 10:30AM – 1:00PM

POSTER SESSION III

Tuesday, September 25 2:30PM – 5:00PM

Posters will be on display on Monday and Tuesday in Exhibit Hall A. Poster presenters should be available for questions at their display boards during their scheduled poster presentation time. If you are unsure which session your poster should be presented, please review the complete Technical Session schedule. Poster Presenters will have access to Exhibit Hall A to set up and tear down their posters at the times listed below.

POSTER SESSION I

Monday, September 24

Set-Up 4:30PM – 5:00PM

Poster Session 5:00PM – 7:30PM

Breakdown 7:30PM – 8:00PM

Presenters for Poster Session I must have their posters set-up no later than 5:00PM. Any posters that remain on the poster boards at 8:00PM and do not belong in Poster Session II will be removed and kept at the Registration Desk.

POSTER SESSION II

Tuesday, September 25

Set-Up 9:30AM – 10:30AM

Poster Session 10:30AM – 1:00PM

Breakdown 1:00PM – 1:30PM

Presenters for Poster Session II must have their posters set-up no later than 10:00AM. Any posters that remain on the poster boards at 1:30PM and do not belong in Poster Session III will be removed and kept at the Registration Desk.

POSTER SESSION III

Tuesday, September 25

Set-Up 2:00PM – 2:30PM

Poster Session 2:30PM – 5:00PM

Breakdown 5:00PM – 5:30PM

Presenters for Poster Session III must have their posters set-up no later than 2:30PM. Any posters that remain on the poster boards at 5:30PM will be removed and kept at the Registration Desk. Uncollected posters will be discarded.

POSTER PRESENTERS' ORIENTATION

Poster Presenters should attend the Poster Presenter's Orientation, held at the Oregon Convention Center, each day that they are scheduled to provide a poster presentation; you may only attend on days on which you are scheduled to present.

Monday, September 24 3:00PM – 3:30PM

Tuesday, September 25 8:00AM – 8:30AM



SiC Power Devices – High Impact Applications and Path to Wide Adoption

Dr. Victor Veliadis

*CTO, PowerAmerica, and
North Carolina State University*

In an increasingly electrified technology-driven world, power electronics is central to the entire manufacturing economy. Silicon (Si) power devices have dominated power electronics due to their low cost volume production, excellent starting material quality, ease of processing, and proven reliability. Although Si power devices continue to make significant progress, they are approaching their operational limits primarily due to their relatively low bandgap and critical electric field that result in high conduction and switching losses, and poor high temperature performance. In this presentation, the favorable material properties of Silicon Carbide (SiC), which allow for highly efficient power devices with reduced form factor and relaxed cooling requirements, will be highlighted. Foundry considerations and cost reduction strategies will be outlined elucidating the path to the projected \$1B SiC device market by 2022. SiC MOSFETs, currently being inserted in the majority of SiC based power electronic systems, will be introduced from a power electronics user perspective. Emphasis will be placed on high impact application opportunities where SiC devices are expected to displace their incumbent Si counterparts. These include variable frequency drives for efficient high power electric motors at reduced overall system cost; automotive power electronics with reduced losses and relaxed cooling requirements; novel data center topologies with reduced cooling loads and higher efficiencies; “more electric aerospace” with weight, volume, and cooling system reductions contributing to energy savings; and more efficient, flexible, and reliable grid applications with reduced system footprint. The efforts of the PowerAmerica manufacturing Institute to bridge gaps in wide bandgap power technology to enable manufacturing job creation and energy savings will also be discussed.



Power Semiconductors – Enabling a Powerful Decade of Changes

Dr. Stephanie Watts Butler

*Technology Innovation Architect,
Texas Instruments*

The decade of ECCE has coincided with an unprecedented shift in technology for power generation, delivery, and conversion. This shift, coupled with the advent of smart phones and IOT, has enabled an explosive growth in electrification in industrial, consumer, and automotive markets. According to IC Insights, power management ICs ship in greater quantity than any other type of IC device. The resulting broad application corresponds with an impressive expansion in the features and capabilities of power semiconductors to address the vast scope of end equipment needs. This presentation will examine the changes in power management semiconductors over the past decade. Integration, system in package, voltage levels, and process technologies will be discussed. How different features are more necessary for different markets and applications will be considered. Finally, predictions for changes coming in the next decade will be provided.



Data Centers – Disruptive Facility Architectures with Fuel Cells and Load Side Integration

Mr. Sean James

*Director of Energy Research,
Microsoft*

Deploying onsite generation is not a new concept and fuel cells systems are becoming an alternative to conventional power generation equipment. However, simply using fuel cells as an alternative to grid or standby generators does not begin to leverage the disruptive nature of this technology. Microsoft has been researching and testing a new architecture that integrates a simple VDC SOFC system with a server rack. The benefits include cost savings and high efficiency but more importantly simplicity in design. We will review various architectures that can benefit many industries, not only the datacenter market.



Ocean Energy – Wave and Tidal Energy Opportunities

Mr. Jason Busch

*Executive Director,
Pacific Ocean Energy Trust*

The maritime sector consists of several well established markets, such as transportation, fishing, ocean observation/science, and conventional energy. Renewable energy has emerged as an important new sector that is not only a part of the “blue economy,” it also undergirds many of the sectors that make up the blue economy. From energy utilities to aquaculture, port electrification to desalination, clean energy is a key component of economic growth, as well as decarbonizing existing industries. The Pacific Ocean Energy Trust and its previous iterations, has been engaged in various aspects of marine renewable energy for over a decade. With a mission to promote the responsible development of marine renewable energy, POET has worked to advance marine renewable energy technologies toward commercialization. With over \$14,000,000 of funding from the State of Oregon, POET has funded technology R&D, environmental studies, stakeholder outreach, education, and policy development. Worldwide, marine renewables are quickly tracking toward commercial viability. The question is not whether machines can be built to reliably extract energy from the ocean’s winds, waves, and currents; the question is whether the levelized cost of energy (LCOE) of those machines are competitive with other sources of energy. Additionally, these technologies provide benefits not reflected in the LCOE, including resilience, environmental, and coastal economic development, as well as grid benefits. The technologies themselves vary across sources and markets. Floating wind energy marries established wind technologies with oil and gas technologies, and is most promising for large utility projects. Tidal technologies reflect well established turbine technologies, as well as variations of helical and Archimedes screws. Predictable and backed by established OEMs, these technologies are already coming to market. Wave energy, perhaps the most promising in its flexibility and potential, is the last to converge and commercialize.



Hyperloop – Creating the Future of Transportation

Dr. Jiaqi Liang

*Director of Power Electronics,
Hyperloop One*

High speed transportation is one of the most exciting areas of research and development. Its advancement has and will continue to profoundly impact everyone’s life on this planet. With speeds 2-3 times faster than high-speed rail, hyperloop can reduce a 300 km (180 mile) commute to under 20 minutes smashing today’s traditional commuting boundaries. Hyperloop can extend the range of autonomous urban mobility, providing an on-demand physical and digital backbone for connected vehicles. This talk will share Virgin Hyperloop One’s vision and journey in engineering the first new mode of transport in 100 years, making high speed transportation effortless and affordable. Advanced electromagnetic and electrical energy conversion systems are some of the key enabling components for hyperloop. We leveraged the latest computational and optimization tools to predict our system performance, iterate our designs with less time, and develop prototypes at much lower cost. Our full-scale DevLoop testing facility in Nevada is the only one of its kind in the world, allowing us to test and validate our prototypes at scale, and integrate various complex components and subsystems—all in the controlled environment of the tube. We will share some of our latest design and results from the DevLoop systems.

Monday, September 24, 2018

SS1 | Smart Transformers: Which Impact of the SiC Technology?

SS1A | 12:30PM – 2:10PM

SS1B | 2:20PM – 4:25PM

Room B116

The increasing connection of renewables and new loads is challenging the distribution grids. The Smart Transformer (a power electronics-based transformer with control and communication functionalities), can provide ancillary services to the distribution grids to support the grid management, in addition to the voltage adaptation. The Smart Transformer is a natural connection point for hybrid (AC and DC) grids both at MV and LV levels and offer an optimal possibility to integrate storage and electric vehicles charging stations. While pilot projects aiming at demonstrating the functionalities of the Smart Transformer in the electrical grid are on-going, the further development and wider application of SiC in Medium Voltage is expected to significantly contribute to make possible the realization of Intelligent Solid-State Substation. In the Special Section different aspects will be covered including: DC-connectivity and the realization of isolated DC converter suitable for MV and MW range, use of SiC until 10 kV, modular and non-modular approaches and impact of the SiC technology in realizing the asynchronous connection of AC networks.

Chair:

Marco Liserre, *University of Kiel, Germany*

Presenters:

Rik W. De Doncker, *RWTH Aachen University, Aachen, Germany*, Subhashish Bhattacharya, *NC State University, USA*, Hirofumi Akagi, *Tokyo Institute of Technology, Japan*, Johannes Kolar, *ETH, Switzerland*, Rolando Burgos, *VirginiaTech, USA*, Alex Huang, *University of Texas at Austin, USA*, Deepak Divan, *GeorgiaTech, USA*, Marco Liserre, *University of Kiel, Germany*

Wednesday, September 26, 2018

SS3 | Power Electronics for Sustainable Energy Systems and Energy Sustainability

SS3A | 8:30AM – 10:10AM

SS3B | 10:30AM – 12:10PM

SS3C | 2:00PM – 3:40PM

SS3D | 4:00PM – 5:40PM

Room B114

Energy sustainability and sustainable energy systems are the basis of long-term sustenance of human existence, advancement, and prosperity, social equity and mobility, energy security and surety, and environmental sustenance. It is, therefore, incumbent on us – the IEEE Power Electronics Society (PELS) – to play its part in making an attempt to explore, propose, pursue, and validate ideas that attempt to at least partly address and resolve these grand challenges using plurality of pathways ranging from component-level innovations to system-of-systems solutions that address plurality of issues ranging from economy of scale, universality, environmental compatibility, compactness and portability, energy surety and security to enhanced energy-conversion efficiency and efficacy. Overall, the main objectives of this Special Session, championed by IEEE PELS Technical Committee on Sustainable Energy Systems (TC5), is to bring together leaders and experts in related areas to share their vision and expertise with the broad ECCE'18 audience

Chair:

Sudip K. Mazumder, *FIEEE, University of Illinois at Chicago; Chair, PELS TC on Sustainable Energy Systems*

Presenters:

Isik Kizilyalli, *Program Director, Advanced Research Projects Agency – Energy*, Alan Mantooth, *FIEEE, PELS President, Professor at University of Arkansas*; Hendrik F. Hamann, *Distinguished Researcher and Senior Manager, IBM*; Frede Blaabjerg, *FIEEE, Danish NAE, PELS President-Elect; Professor, Aalborg University*; Vladimir Blasko, *FIEEE, Senior Research Fellow, United Technologies*; Deepak Divan, *FIEEE, US NAE, Past PELS President, Professor, Georgia Tech*; Ty McNutt, *Director, Business Development, Cree/Wolfspeed*; Liuchen Chang, *Canadian NAE, PELS VP Conference, Professor, University of New Brunswick*

SS4 | Trends in SiC, GaN, and Diamond Power Semiconductor Devices

8:30AM – 10:10AM

Room B115

The need for high-voltage, high-power density devices operating at high frequencies and temperature is increasing, especially for advanced power electronics. Si-based power devices are not able to meet these requirements without connecting many devices in series and in parallel, using snubbers and expensive cooling systems. Thus, the limitations of Si power devices have been debated, and wide band gap semiconductors have attracted considerable attention. Research into SiC, GaN, and diamond as materials for power devices has been carried out over the past 20 years. Their wide band gap energy enables devices to operate at elevated temperatures

(600 °C) while retaining low leakage current. The higher breakdown strength for a given blocking voltage of SiC, GaN and diamond results in smaller drift layers or channel lengths as compared to Si devices. As a result, the storage of the minority carriers or the input and output capacitance and, therefore, the switching losses are reduced. This leads to an increase of the switching frequency high than 0.5 MHz, reducing power systems passive components size and cost. This workshop will offer insights into the trends for SiC, GaN and diamond devices.

Presenters:

Tanya Gachovska, Ph.D., *Solantra Semiconductor Corp., Ottawa ON, Canada*

SS6 | Challenges of Simulating Power Electronic Systems in Real Time – Sampling Frequency vs. Model Fidelity

10:30AM – 12:10PM

Room B115

The growth of electric vehicles, development of renewable energy systems and microgrids, and broader adoption of motor control from industrial equipment to consumer products is driving the use of power electronics. More complex systems integrate an increasing amount of embedded software for closed-loop control, signal processing, supervisory, and fault detection functions. Waiting to test hardware-software integration until prototypes are ready runs the risk of finding design errors late in the development process, potentially causing program delays and damaging expensive hardware.

Presenters:

Jost Allmeling, *Plexim*; Hua Jin, *Powersim*; Sudipta Chakraborty, *OPAL-RT*;
Hui Ding, *RTDS Technologies*; Daniel Krähenbühl, *Speedgoat*

SS7 | Collaboration between Industry and Academia: How To Foster it?

2:00PM – 3:40PM

Room B115

Industry and academia are the two pillars that move technology forward. It is important that these two institutions work together in the same direction to reach important goals using joint resources.

Four female presenters will share their experience to show how the combined effort between industry and academia can lead to successful achievements and fruitful collaborations.

Four female presenters, two from academia and two from industry with a common back-ground in power electronics, will share their experience in the effort to foster collaboration between industry and academia.

Presenters:

Dr Noriko Kawakami, *Toshiba Mitsubishi-Electric Industrial Systems*;
Dr. Karen Butler-Purry, *Electrical and Computer Engineering Texas A&M University*;
Dr. Liliana De Lillo, *Electrical and Electronic Engineering Nottingham University*;
Dr. Xin Wu, *Staff Research Engineer UTRC*

SS2 | The Power Electronics Workforce of the Future – Do Internships and Apprenticeships Really Pay Off?

4:00PM – 5:40PM

Room: C121

To cultivate an ever more highly skilled and innovative power electronics workforce, PEIC members believe the industry must attract a broader and more diverse pool of technical talent. Internships offer one way to work towards this goal, yet do these programs really help to train and retain prospective new employees or are they often less than effective? Session presentations from several prominent industry organizations are targeted towards students as well as companies with an interest in internship programs; followed by an interactive panel discussion moderated by David Morrison, editor of How2Power, an online power electronics publication and information website for engineers.

Presenters:

Elie Naim, *Technical Specialist Electrification, AVL*; Ron Demcko, *Fellow, AVX*;
Dakshina Murthy-Bellur, *Power Electronics Engineering Lead, Electrification Technologies, Corporate R&T, Cummins, Inc.*; Minyu Cai, *Power Electronics Engineer, Electrification Technologies, Corporate R&T, Cummins, Inc.*;
Victor Veliadis, *Deputy Executive Director & CTO, PowerAmerica Institute*;
Rich Lukaszewski, *Manager Hardware Group, Low Voltage and Medium Voltage Drives, Rockwell*

SS8 | Advancements, Challenges, and End-Games in Power Supply on Chip (PwrSoC)

4:00PM – 5:40PM

Room B115

With the universal push for more integration, smaller devices, and higher performance spreads across the whole industry, power supply designs have been under an increasing pressure to catch up with other electronic parts. Engineers and researchers have worked tirelessly to deliver advancements in converter topologies, passive component technologies, wide-bandgap devices and circuits and new concepts for integration and manufacturing. All these efforts are aimed at miniaturizing power management circuits and passive components initially in package (power supply in a package – PSiP) but ultimately on-chip (power supply on chip – PwrSoC), for a wide range of applications from powering high-performance processors to automotive and bio-medical systems. In this special panel, a number of industry and academic expert panelists will discuss challenges, technology advancements, and their perspectives from different areas in PwrSoC. The session will then have an interactive panel discussion, moderated by Prof. Hanh-Phuc Le from University of Colorado Boulder.

Presenters:

José A. Cobos, *Professor, Universidad Politécnica de Madrid*; Mohamed Mehdi Jatlaoui, *RF/Analog Engineer, muRata, France*; Hanh-Phuc Le, *Assistant Professor, University of Colorado Boulder*; Rinkle Jain, *Research Scientist, Intel*; Noah Sturcken, *CEO, Ferric, USA*; Hoi Lee, *Professor, University of Texas at Dallas*

Sunday, September 23

8:00AM – 11:45AM

AM Tutorials

Chair: Po-tai Cheng

AM1 | High Power/Voltage Power Converters and Applications – Opportunities and Challenges Offered by HV SiC Power Devices

Room B113

Instructors: Subhashish Bhattacharya; Richard Byron Beddingfield

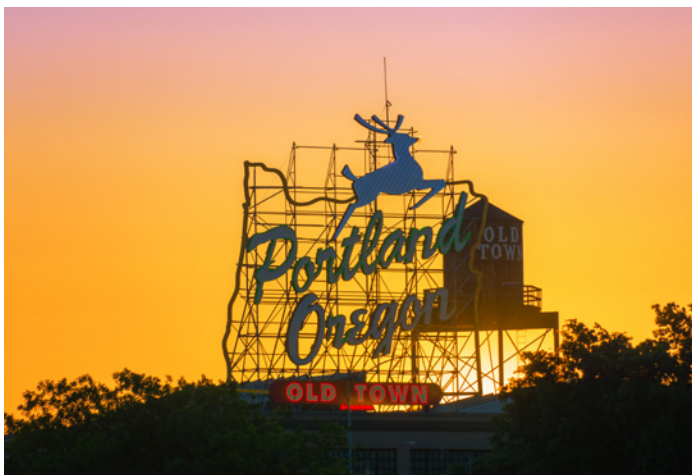
The opportunities for HV SiC devices for MV and high power converters and utility applications and the challenges to apply HV SiC devices successfully will be presented in-depth for SiC 1200V to 1700V MOSFETs, and SiC 10 kV – 15 kV MOSFETs, JBS diodes, and 15 kV SiC IGBTs. The potential and challenges of the SiC 10-15 kV devices to enable MV power conversion systems, including MV motor drives, FACTS and MVDC grids will be explored with demonstrated application examples of SST, MV SiC power converters for grid tied solar applications, MV motor drives, and MV DC grids. Magnetics for High Power Converters with the latest advances in magnetic material qualification and characterization will be discussed.

AM2 | From the Solid-State-Transformer (SST) to the Smart Transformer?

Room B111

Instructors: Marco Liserre; Giampaolo Buticchi; Dr. Markus Andresen; Dr. Giovanni De Carne

The increasing connection of renewables and new loads is challenging the distribution grids. The Smart Transformer (ST), a power electronics-based transformer, can provide ancillary services to the distribution grids to support the grid management, in addition to the voltage adaptation. The Smart Transformer is a natural connection point for hybrid (AC and DC) grids both at MV and LV levels. In the tutorial the Smart Transformer is defined and the topologies and controllers are explored. Current challenges in hybrid grids are presented and proposed solutions are described. New services enabled with the Smart Transformer technology, for instance load sensitivity evaluation in LV grids and voltage and frequency regulation in MV/HV grids are explained. Reliability aspects of the Smart Transformer are reviewed and active measures to increase it and to enable prognostic maintenance are discussed.



AM3 | Hybrid AC/DC Microgrids: Configuration, Power Management and Converter Control

Room B115

Instructors: Yunwei (Ryan) Li; Kai Sun; Farzam Nejabatkhah

During the past decade, hybrid AC/DC microgrids have gained significant progress. In this tutorial, a panoramic introduction of hybrid AC/DC microgrids will be given first. Power management strategies will be discussed. Effective solutions to deal with the challenges due to high penetration integration of renewable generation in a hybrid AC/DC microgrid will be presented, which include power converter structures and coordination control between renewable generation and energy storage. Moreover, power quality control is one of the most critical operation aspects. Strategies to explore the potential of interfacing converters in a hybrid AC/DC microgrid to control the power quality (such as unbalance and harmonics) will be presented.

AM4 | Control for Grid-Friendly Power Converter Systems

Room B112

Instructors: Frede Blaabjerg; Yongheng Yang; Yi Tang

This tutorial is intended to introduce the recent advancements of grid-friendly power converter systems and their associated control techniques. The tutorial will start with the discussion of flexible active power control for renewable generation systems, which can limit the power ramp rate and reserve part of the active power for power system frequency regulation. The tutorial will then review the basic concept of power system inertia and discuss the challenges caused by the high penetration of renewables in modern and future power systems. The last part of the tutorial will present several emerging virtual inertia techniques enabled by power electronics.

AM5 | Photo-Electro-Thermal-Theory for LED Systems and its Applications

Room B117

Instructors: Ron Hui; Siew-Chong Tan

Light science of light-emitting diodes (LED) is a complex discipline involving highly nonlinear interactions of four elements (namely light, heat, power and color). The Photo-Electro-Thermal (PET) Theory is the system theory that unifies the interactions of these four elements under one mathematical framework. The PET Theory has the steady and dynamic forms that can now be used as a general design tool for LED system design and optimization. This tutorial will cover the basic theory and its applications. This is the first time this tutorial is made available to the professional community. This tutorial suits both researchers and professional engineers in lighting technology.



AM6 | Power Converters for Energy Storage Applications – Analysis and Design from Theory to Practice

Room B116

Instructor: Dr. Petar J. Grbovi

Power electronics play significant role the modern civilization. The demand for energy storage technologies grows dramatically in recent years, so do the power electronics needed to integrate various energy storage technologies. This tutorial starts with a review of state of the art energy storage devices, their applications, design and sizing. Later, we will discuss in deep details interface power converters, including their topologies, multi-cell and multi-level converters, isolated and non-isolated converters, full and partial power rated converters, and etc. Control strategies of different concepts will also be presented with several case studies and design.

AM7 | Optimization Techniques for Solar Power Plants

Room B110

Instructors: Martin Ordenez; Emanuel Serban; Francisco Paz

Solar power installations are extremely sensitive to cost, payback time, and the availability of energy over time. Many factors must be weighed in the design of PV systems, including the number of panels, array configuration, and inverter selection. However, traditional design rules are too simplistic and do not make use of critical real-life information. Often, oversized components are used that do not produce any advantages for the PV system. This tutorial will present techniques aimed for the optimization of the PV systems, from the hardware components to the energy extraction strategies.

AM8 | Predictive Control – A Simple and Powerful Method of Control Power Converters and Drives

Room B114

Instructors: Ralph M. Kennel; José Rodríguez; Zhenbin Zhang

Until today the control of electrical power using power converters has been based on the principle of mean value, using pulse width modulation (PWM) with linear controllers in a cascaded structure. Recent research works have demonstrated that it is possible to use Predictive Control to control electrical energy with the use of power converters, without using any modulators and linear controllers. This is a new approach that will have a strong impact on control in power electronics in coming decades. The main advantages are: – Concepts are very intuitive and easy to understand. – Simple consideration of non-linearities in the model.

AM9-1 | Permanent Magnet Fundamentals

Room B119

Instructor: Stan Trout

Starting with the simple things we learned about magnets in the first grade, this seminar will present the basics of permanent magnets and magnetic materials more broadly. Attendees will understand the definitions, parameters and arcane units of magnetism, both CGS and SI. They will learn how magnets are processed, magnetized, characterized and affected by temperature. This small investment of your time will increase your magnet “IQ” and make this complex technology easier to navigate.

AM9-2 | Sequence Impedance Modeling and Analysis of Wind and PV Inverters Considering Coupling over Frequency

Room B119

Instructor: Jian Sun

This tutorial presents a systematic study of the small-signal responses of grid converters, and a practical method to account for it in system impedance analysis. After a brief review of the small-signal sequence impedance theory, we identify all nonlinearities in the inverter and control that contribute to such coupling, and examine its mechanism. Analytical models are presented to characterize the coupled current response and the mechanism between the coupling and inverter-grid system stability. This leads to a simple method to account for the coupling in impedance-based system analysis. Extension of this model to complex wind and PV farms is also presented. The tutorial concludes with a theory that explains how system resonance creates sustained harmonics, which is often observed in practice.

AM10 | High Voltage Rotating Machines-Design and Diagnostics

Room B118

Instructor: Mladen Sasic

Condition diagnostics of complex systems, such as high voltage rotating machines was never a simple task. Design requirements, use of different materials and demanding operating conditions require multiple off line tests and on line monitors to get information on machine condition. However, some tests just provide simple measurement results, without high diagnostic value. Basics of High Voltage motors and generators design and available on-line monitors and off-line tests will be explained.

PM1 | Application of Silicon-Carbide (SiC) Power Devices and Converters: Opportunities, Challenges and Potential Solutions

Room B113

Instructors: Xibo Yuan; Alex Q. Huang; Dr. Xu She

This tutorial will review the performance of state-of-the-art SiC devices and converters. While the opportunities in performance improvement with SiC devices are clear, there are also significant design challenges relating to high speed, high voltage and high temperature operation. These challenges will be analyzed and several solutions aiming to fully exploit the superior characteristics of SiC devices will be given. Several design examples such as high-density power converters based on SiC MOSFETs, high temperature converters with SiC BJTs and high voltage SiC converters for solid state transformer applications will be given to demonstrate the opportunities, design challenges and proposed solutions.

PM2 | Harmonic Modeling and Stability of Power Electronic Based Power Systems

Room B111

Instructors: Xionfei Wang; Frede Blaabjerg

The legacy power grids that are dynamically dominated by electrical machines are evolving as power electronic based power systems. The wide timescale control dynamics of converters tend to interact at different levels, leading to the harmonic instability in the form of resonances or abnormal harmonics. A number of incidents have been reported recently with the grid integration of large-scale renewable power plants and high-speed trains. This tutorial intends to provide a systematic discussion on the harmonic stability of power electronic based power systems, ranging from the basic concept, modeling and analysis methods, to active damping techniques.

PM3 | Electrical Drives Measurements and Testing: Past, Present, and Future

Room B115

Instructors: Eric Armando; Aldo Boglietti; Radu Bojoi

The tutorial is addressed to industry research and development centers and academia. The tutorial presents an overview concerning what to measure and how to measure electrical and mechanical quantities in electrical drives. The measurement procedures using power-meters and data-recorders along with sensors for electrical and mechanical quantities, will be discussed in detail. The right use of the measured values for the determination of induction and synchronous motor parameters and the efficiency will be focused with the aims at defining advanced testing methods of AC machines under inverter supply. The discussed approaches lead to significant reductions of the testing time and the results of the tests allows a completely characterization of the AC machines in terms of efficiency, losses, flux linkage maps, inductance maps, and Maximum Torque Per Ampere (MTPA) and Maximum Torque Per Volt (MTPV) profiles. The tutorial will include testing results for different machines including Induction motors (IM), Surface Mount (SM) PM machines, Internal Permanent Magnet (IPM) machines and Synchronous Reluctance (SynchRel) machines.

PM4 | Condition Monitoring, Diagnostics and PHM of Electric Machine and Drive Systems

Room B112

Instructor: Pinjia Zhang, PhD

The application of electric machine and drive systems has been growing dramatically in the past few decades. It is critical to develop monitoring, prognostics and health management technology for electric machine and drive systems to proactively prevent sudden malfunction or failure. This tutorial provides an overview of monitoring, diagnostics, prognostics and health management technology for electric machine and drive systems. The tutorial will cover the following topics: 1. Typical failure modes of electric machine and drive systems; 2. Offline testing technique for machine and drive systems; 3. Online monitoring technique for machine and drive systems; 4. Prognostics technique for machine and drive systems.

PM5 | Power Electronics Enabled Technologies in Power Systems Connecting Utilities and Customers

Room B117

Instructors: Iqbal Husain; Srdjan Lukic; M. A. Awal; Hui Yu

This tutorial covers the components and devices, system architectures and controls, ancillary services and grid support, and customer interactions and benefits in the context of microgrids and networked power electronics based systems. This tutorial is organized into four parts: Part I provides a review of basic power electronics components in a modern power system; Part II presents system architecture, stability issues, primary and secondary control, grid synchronization techniques, and interconnection standards for DERs; Part III covers enabling communication technologies; and Part IV presents few case studies both at the residential and utility scale, finally concluding with trends into the future for widespread industrial adoption.

PM6 | Advanced Digital Current Regulation Strategies for Grid Connected Inverters

Room B116

Instructors: Grahame Holmes; Brendan McGrath

The basic concept of inverter current regulation is simple – minimize the error between a target reference and the actual measured current. However, achieving this goal in practice is very challenging. This tutorial presents state-of-the-art concepts for current regulation of grid connected inverters, looking at linear regulator gain constraints, the challenges of grid connected inverter current regulation with LCL filters, how to design a current regulator in the sampled z-domain space while managing modulation saturation, and how to accommodate common mode EMI. The tutorial will conclude by considering current regulation with grid harmonics, unbalanced grid voltages and high impedance grid networks.

PM7 | Modeling and System Design of Solid-State Lighting Drivers

Room B110

Instructors: Ray-Lee Lin

This tutorial explores the modeling and system design of solid-state lighting drivers. The multi-branch linear-model and the Taylor-series expression-based model are introduced to describe the V-I characteristic curves of the solid-state light sources. According to four parameters in datasheets, the voltage-controlled piece-wise linear-model can be built for circuit simulation work. The DC and AC equivalent circuit models of LEDs and LED arrays can be derived. The models of CCM single-loop control, CCM dual-loop and DCM dual-loop LED Drivers are developed to determine the optimal LED-array combinations. The Bode graphical approach is used for the compensator design.

PM8 | Battery Management Systems for Lithium-ion Batteries

Room B114

Instructors: Daniel-Ioan Stroe, PhD; Maciej Swierczynski, PhD

The objective of this tutorial is to provide the audience with an extensive overview of the Li-ion battery energy storage technology, its operating principles, advantages/drawbacks and performance behavior. As many BMS diagnostic algorithms are based on battery performance models, a deep understanding regarding the dependence of the battery performance parameters on various factors such as, temperature, load current, or number of cycles will be provided. The second part of the tutorial will focus on the BMS and their most important roles: charge/discharge management, battery cell balancing, and monitoring to ensure safety protection. Because BMSs are continuously developing, they will have new functionalities such as battery SOC and SOH estimation and they will be used for diagnostics purposes. Thus, different methods for battery SOC and SOH estimation will be discussed.

PM9-1 | Design, Modelling and Control of Linear Induction Motors (LIM) for Industrial Applications

Room B119

Instructors: Wei Xu; Marcello Pucci; Ion Boldea

With the ability to generate direct thrust without any mechanical transmission, the linear machines serve as excellent choice for industrial applications requiring linear motion, such as linear metros, MAGLEVs (see the people transfer system to/from Pudong Airport in Shanghai at maximum 400Km/h), servo systems, conveyors, wave-energy generators, series hybrid-electric car generators small compressors, Stirling engine generators, fast action solenoids, loudspeakers, microphones, printers etc. Due to the special characteristics of linear machines, e.g., the cut-open magnetic circuit, the large air-gap length, the half-filled end slots, the end-effects, engineers face massive challenges in both design techniques and control strategies for high performance linear machines, drives, MAGLEVs, and so on. This tutorial aims to present the latest theoretical and technological ideas regarding the linear induction motors (LIM), with specific regard to: design techniques, dynamic modeling including end effects, parameters estimation techniques, electrical losses minimization techniques (ELMTs), linear and non-linear control techniques, and sensorless techniques.

PM9-2 | Lose Your Bearings: An Introduction to Magnetically Suspended Shafts

Room B119

Instructors: Eric Severson; Akira Chiba; Wolfgang Gruber; Rafal Jastrzebski

The goal of this tutorial is to train participants on how to use magnetic suspension in their motor systems in place of conventional bearings. Participants will analyze the shortcomings of conventional bearings, explore basic principles of magnetic forces, identify control techniques of magnetic bearings and bearingless motors, examine magnetic suspension technology for a broad range of power and speed motor systems, and investigate the history of and exciting new trends in research on bearingless motors. Ultimately, participants will evaluate the potential for magnetic suspension technology to disrupt their product development or research field.

PM10 | Interpretation of IEEE 519-2014 for Industrial and Commercial Applications

Room B118

Instructors: Mahesh M. Swamy

Minimizing harmonics will minimize inefficient operation of electrical equipment, reduce heat in electrical apparatus that carry power to rectifier loads, and minimize interference with sensitive loads, thereby reducing costly downtime and improving the life of electrical equipment. However, there is confusion in the Industrial and Commercial world as to which IEEE 519 document should one refer to in order to establish rough guidelines regarding voltage and current harmonics, since there are two versions of the IEEE 519 circulating in the drives application world. They are: a. IEEE 519-1992 and IEEE 519-2014. This tutorial is geared to show the significant difference between the old and new standard and will also bring out the presenters interpretation of the new standard as it applies to different applications.



TECHNICAL PROGRAM SCHEDULE

ORAL SESSIONS

The following Oral Sessions cover all areas of technical interest to the practicing power electronics professional.

Monday, September 24

12:30PM – 2:10PM

S1 | Control of Solar PV Systems

Room A107

Chairs: Pedro Rodriguez; Aparna Saha

12:30PM | Evaluation of Low-Voltage Loss Under Partial Shading Conditions in Solar Photovoltaic Systems [#18703]

Hayder Ali and Hassan Abbas Khan, *Dept. of EE, LUMS, Pakistan*

12:55PM | Adaptive Dual Maximum Power Point Tracking Algorithm for PV DC-DC Conversion Stage [#18833]

Ala Hussein, Anirudh Pise, Xi Chen and Issa Batarseh, *University of Central Florida, United States*

1:20PM | Universal Control Strategy using Operating Point Projection Technique for Solar Array Hardware Emulation [#19658]

Thusitha Wellawatta and Sung-Jin Choi, *University of Ulsan, Korea (South)*

1:45PM | Multi-time-horizon Solar Forecasting Using Recurrent Neural Network [#18623]

Sakshi Mishra and Praveen Palanisamy, *Planning Engineer at American Electric Power, United States; Alumni, Robotics Institute, Carnegie Mellon Univ, United States*

S2 | Microgrid Control-I

Room B111

Chairs: Maryam Saeedifard; Amir Yazdani

12:30PM | A Novel RLC Load Emulation for Anti-Islanding Test Bench for Inverter and Machine Based Distributed Generation [#18206]

Nakul Narayanan Kuruvetttil, Umanand Loganathan and Shan Shine, *Indian Institute of Science, India*

12:55PM | Control of Autonomous Single Phase Utility Interactive Reconfigurable Microgrid [#18389]

Shailendra Kumar and Bhim Singh, *Indian Institute of Technology Delhi, India*

1:20PM | Grid Synchronization of Wind Turbines during Severe Symmetrical Faults with Phase Jumps [#18777]

Mads Graungaard Taul, Xiongfei Wang, Pooya Davari and Frede Blaabjerg, *Energy Technology at Aalborg University, Denmark*

1:45PM | Modeling a DC Microgrid with Real Time Power Management using DC Bus Signalling [#19022]

Akansha Garg, Bhakti Joshi and Ramesh Oruganti, *IIT Mandi, India*

S3 | Energy and Power Management

Room B117

Chairs: Jae-Do Park; Norma Anglani

12:30PM | An Energy Routing Algorithm Based on Power Transaction in Energy Internet [#18372]

Hui Guo, Fei Wang, Lijun Zhang, Xiayun Feng and Jian Luo, *Shanghai University, China*

12:55PM | Lifetime Control of Modular Smart Transformers Considering the Maintenance Schedule [#18534]

Vivek Raveendran, Markus Andresen and Marco Liserre, *Chair of Power Electronics, Kiel University, Germany*

1:20PM | Smart Home Energy Management Considering Real-Time Energy Pricing of Plug-in Electric Vehicles [#18563]

Sima Aznavi, Poria Fajri and Arash Asrari, *University of Nevada, Reno, United States; Southern Illinois University, United States*

1:45PM | Real Time Electricity Price Forecasting for Energy Management in Grid-Tied MTDC Microgrids [#18607]

Md Habib Ullah, Subrata Paul and Jae-Do Park, *University of Colorado Denver, United States*

S4 | Inductive Power Transfer

Room C120

Chairs: Liliana De Lillo; Rashmi Prasad

12:30PM | A Novel Integrated Boost Modular Multilevel Converter for High Power Wireless EV Charging [#18895]

Wenwei Victor Wang, Duleepa J Thrimawithana, Baljit Riar and Regan Zane, *The University of Auckland, New Zealand; Utah State University, United States*

12:55PM | Methods to Reduce Air-Gap Center Region Magnetic and Electric Fields for Large Gap Inductive Wireless Power Transfer Systems [#19091]

Guangqi Zhu, Apoorva Athavale and Robert D. Lorenz, *University of Wisconsin – Madison, WEMPEC, United States*

1:20PM | A Litz Wire Based Novel Passive Shield Design for Wireless Charging System for Electric Vehicle [#19696]

Mostak Mohammad, Haque Moinul and Choi Seungdeog, *The University of Akron, United States; Mississippi State University, United States*

1:45PM | A Comparison of Multi-Coil Pads in IPT Systems for EV Charging [#18620]

Fei Yang Lin, Grant Covic and John T Boys, *The University of Auckland, New Zealand*

S5 | Multi-Level Converters 1

Room B119

Chairs: Yuan Xibo; Shafiq Ahmed Odhano

12:30PM | Cascaded Open-Circuit Fault Ride-Through of Modular Multilevel Converters with Model Predictive Control [#18087]

Dehong Zhou, Pengfei Tu, Huan Qiu and Yi Tang, *Nanyang Technological University, Singapore*

12:55PM | DC Fault Tolerant Modified Parallel Hybrid Converter with Enhanced Operating Range [#18948]

Siba Kumar Patro, Anshuman Shukla and Mahendra Ghat, *Indian Institute of Technology Bombay, India*

1:20PM | Grid-Connected Voltage Source Converters with Integrated Multilevel-Based Active Filters [#19077]

Daniel Bernet, Lukas Stefanski, Ruediger Schwendemann, Christoph Rollbuehler and Marc Hiller, *Karlsruhe Institute of Technology, Germany*

1:45PM | Open-End Winding Multilevel Unidirectional Six-Phase Rectifier With Reduced Switch Count [#19279]

Ivan da Silva, Cursino Brandao Jacobina, Reuben Palmer Rezende Sousa, Ayslan Caisson Noroes Maia, Nayara Brandao de Freitas and Isaac Soares de Freitas, *Federal University of Campina Grande, Brazil; Federal University of Paraiba, Brazil*

S6 | DC-DC Non-Isolated 1

Room C122

Chairs: Santanu Mishra; Dazhong Gu

12:30PM | A Non-Isolated Single-Stage 48V-to-1V VRM with a Light Load Efficiency Improvement Technique [#18561]

Somnath Khatua, Debaprasad Kastha and Santanu Kapat, *Indian Institute of Technology Kharagpur, India*

12:55PM | Novel Actively Tuned Resonant Filter based Buck Converter with Tunable Capacitor [#19516]

Ben Guo, Suman Dwari, Priya Shashank, Ngo Khai, Burgos Rolando and Nies Craig, *United Technologies Research Center, United States; Virginia Polytechnic Institute and State University, United States; AVX Corporation, United States*

1:20PM | Control Method of Flying Capacitor Converter Operated in Discontinuous Current Mode and Critical Current Mode [#19064]

Jun-ichi Itoh, Ryoichi Ishibashi, Hoai Nam Le, Nagisa Takaoka, Keisuke Kusaka and Katsutaka Tanabe, *Nagaoka University of Technology, Japan; Omron Co., Ltd, Japan*

1:45PM | Resonant Cross-Commutated Point-of-Load Converter [#18599]

Ting Ge, Brian Carpenter and Khai Ngo, *CPES, Virginia Tech, United States; Texas Instruments, Inc., United States*

S7 | Modeling and Control of DC-DC Converters 1

Room A108

Chairs: Xinbo Ruan; Koji Orikawa

12:30PM | Modeling and Control for Interleaved Voltage-Doublers Boost Converter [#18347]

Hung-Chi Chen, Tien-Hung Chen and Chung-Yi Li, *National Chiao Tung University, Taiwan; National Chiao Tung University, Taiwan; Chang Gung University, Taiwan*

12:55PM | Triple-Phase-Shift Control Strategy for Full-Bridge Three-Level (FBTL) DC/DC Converter [#18735]

Dong Liu, Yanbo Wang, Fujin Deng and Zhe Chen, *Aalborg University, Denmark; Southeast University, China*

1:20PM | High-Speed High/Low Pulse Operation by Deadbeat Control Considering Control Delay in Three-Phase Interleaved DC/DC Converter [#18124]

Yu Hosoyamada, Itsuo Yuzurihara, Yasutaka Fujimoto and Atsuo Kawamura, *Kyosan Electric MFG. Co., LTD., Japan; Yokohama National University, Japan*

1:45PM | A Compact Constant On-time Buck Converter with Analog Transient-optimized On-Time Control and Body Diode Control [#18279]

Yu Chen Li, Ching Jan Chen and Chieh Ju Tsai, *National Taiwan University, Taiwan*

S8 | Converter Control in Microgrids and Distributed Generation 1

Room C121

Chairs: Stefano Bifaretti; Yu-Chen Liu

12:30PM | AC Voltage Sensorless Method With Bumpless Start for Current-Controlled Converters Connected to Microgrids [#18749]

Diego Perez-Estevéz and Jesus Doval-Gandoy, *University of Vigo, Spain*

12:55PM | Concurrent Control for Three-Phase Four-Wire Five Levels E-Type Inverter for Microgrids [#19725]

Marco di Benedetto, Alessandro Lidozzi, Luca Solero, Petar J. Grbovic and Fabio Crescimbeni, *Roma Tre University, Italy; Huawei Technologies Duesseldorf GmbH, Germany*

1:20PM | Power Quality Improvement in a Single-Phase Energy Management System Operating in Islanding Mode [#19730]

Alexander Julian, Giovanna Oriti, Chao Ji and Pericle Zanchetta, *Consultant, United States; Naval Postgraduate School, United States; Protean Electric Limited, United Kingdom; University of Nottingham, United Kingdom*

1:45PM | Explore the Capability of Power Electronic Converters in Providing Power System Virtual Inertia [#18897]

Huan Qiu, Jinyang Fang and Yi Tang, *Nanyang Technological University, Singapore*

S9 | Thermal Modelling of Electric Machines 1

Room B112

Chairs: Zbigniew Gmyrek; Konstantinos Gyftakis

12:30PM | Short-Time Transient Thermal Model Identification of Multiple Three-Phase Machines [#18762]

Paolo Pescetto, Simone Ferrari, Gianmario Pellegrino, Enrico Carpaneto and Aldo Boglietti, *Politecnico di Torino, Italy*

12:55PM | Cooling of Windings in Electric Machines via 3D Printed Heat Exchanger [#19736]

William Sixel, Mingda Liu, Bulent Sarlioglu and Gregory Nellis, *University of Wisconsin-Madison, United States*

1:20PM | Permanent Magnets Aging in Variable Flux Permanent Magnet Synchronous Machines [#19078]

Daniel Fernandez, Maria Martinez, David Reigosa, Juan Manuel Guerrero, Carlos Suarez and Fernando Briz, *University of Oviedo, Spain*

1:45PM | Load Capability of Multiphase Machines under Normal and Open-Phase Fault Conditions [#18604]

Aldo Boglietti, Radu Bojoi, Sandro Rubino and Marco Cossale, *Politecnico di Torino, Italy; BRUSA Elektronik AG, Switzerland*

S10 | Md. Azizur Rahman Memorial - IPM Motors 1

Room B114

Chairs: Peter Rasmussen; Akira Chiba

12:30PM | Large-Scale Electromagnetic Field Analysis on Conductor Eddy Current Loss in Bar-Wound Coil Type Permanent Magnet Synchronous Motor for Automotive Applications [#18119]

Masahiro Aoyama, Jianing Deng, Yoshihiko Sunayama and Masahiko Miwa, *Shizuoka University, Japan; SUZUKI Motor Corporation, Japan; JSOL Corporation, Japan*

12:55PM | Analytical Calculation of Maximum Mechanical Stress on the Rotor of the Interior Permanent-Magnet Synchronous Machine [#18840]

Guoyu Chu, Rukmi Dutta, Howard Lovatt, Bulent Sarlioglu and Faz Rahman, *The University of New South Wales, Australia; CSIRO, Australia; University of Wisconsin-Madison, United States*

1:20PM | A Novel Dual-Layer PM Variable Flux Hybrid Magnet Memory Machine [#19491]

Hui Yang, Heyun Lin, Z. Q. Zhu, Shukang Lyu and Haitao Wang, *Southeast University, China; The University of Sheffield, United Kingdom*

1:45PM | Partially-Coupled d-q-0 Components of Magnetically-Isolated FSCW IPM Machines in Pre- and Post-Fault Control [#18540]

Fan Wu, Hao Ge and Ayman EL-Refaei, *Marquette University, United States; McMaster University, Canada*

S11 | Induction Machines

Room B118

Chairs: Renato Lyra; Luigi Alberti

12:30PM | A Direct Analysis of Induction Motor Using Finite Element [#19027]

Matteo Carbonieri, Nicola Bianchi and Luigi Alberti, *University of Padova, Italy*

12:55PM | Parameter Identification of Induction Motors for Railway Traction Applications [#19219]

Jing Tang, Yongheng Yang, Lijun Diao, Jie Chen, Yujie Chang and Zhigang Liu, *Beijing Jiaotong University, China; Aalborg University, Denmark*

1:20PM | Towards an IE4 Efficiency Class for Induction Motors with Minimal Manufacturer Impact [#18648]

Andrea Cavagnino, Silvio Vaschetto, Luca Ferraris, Zbigniew Gmyrek, Emmanuel Agamloh and Gerd Bramerdorfer, *Politecnico di Torino, Italy; Technical University of Lodz, Poland; Advanced Energy, United States; Johannes Kepler University Linz, Austria*

1:45PM | Comparison of PWM and Sinusoidal excitation conditions of Induction Machines [#18892]

Boglietti Aldo, Armando Eric and Agamloh Emmanuel, *Politecnico di Torino, Italy; Advanced Energy, United States*

S12 | Multiphase Drives

Room B113

Chairs: Luca Zarri; Juan Manuel Guerrero

12:30PM | A Multiphase Machine and Converter Topology for Renewable Energy Generation [#18432]

Mupambireyi Ushindibaba, Crane Allan, Ran Li and Mawby Phil, *GE Power Conversion, United Kingdom; University of Warwick, United Kingdom*

12:55PM | A Simple PWM-based Direct Torque Control for Dual Three-phase Permanent Magnet Synchronous Machine Drives [#19234]

Yuan Ren, Ziqiang Zhu, James E. Green, Yun Li, Shiwu Zhu and Zijian Li, *The University of Sheffield, United Kingdom; Dynex Semiconductor Ltd., United Kingdom*

1:20PM | Non-Sinusoidal Power Supply Technology Based on Space Vector PWM for Multiphase Variable Speed Drives [#18034]

Xu Liu, Wubin Kong, Ronghai Qu and Qiwei Xu, *Huazhong University of Science and Technology, China; Chongqing University, China*

1:45PM | Diagnosis and Tolerance of Common Faults in Dual Three-Phase PMSM Drives [#18578]

Xueqing Wang, Zheng Wang, Zhixian Xu, Ming Cheng and Yihua Hu, *Southeast University, China; University of Liverpool, United Kingdom*

S13 | Sensorless Control of Electric Drives at Low Speed

Room B110

Chairs: Roberto Petrella; Mario Pacas

12:30PM | Fixed Current Angle Operation Strategy in Low-Speed Sensorless Drive for Improved Torque Capability over Critical Point [#18529]

Younggi Lee, Chae-Eun Hwang, Seung-Ki Sul, Mustafa Mohamadian, Lakshmi Narayanan Srivatchan, Daniel R. Luedtke and Nitinkumar Patel, *Seoul National University, Korea (South); FCA US LLC, United States*

12:55PM | Zero Synchronous Speed Stable Operation Strategy for Speed Sensorless Induction Motor Drive with Virtual Voltage Injection [#18486]

Wei Sun, Kang Liu, Dong Jiang and Ronghai Qu, *Huazhong University of Science and Technology, China*

1:20PM | Hybrid Sensorless Control of a Interior Permanent Magnet Synchronous Machine using Current Derivative Measurements and a Sliding Mode Observer [#18843]

Minh Xuan Bui, Rahman Faz and Xiao Dan, *M.X. Bui, Australia; M. F. Rahman, Australia; D. Xiao, Australia*

1:45PM | Angular Voltage Step Excitation Strategy in Induction Machines for Sensorless Position Estimation Using One Single Active Switching State [#18221]

Eduardo Rodriguez Montero, Johannes Eberle, Markus Vogelsberger and Thomas Wolbank, *Technische Universitaet Wien, Austria; Bombardier Transportation Austria GmbH, Austria*

S14 | Power Modules 1: Sensing & Monitoring

Room A105

Chairs: Ashish Kumar; Fang Luo

12:30PM | Condition Monitoring the Thermal Path Degradation of IGBT Module Using the Time Constants of Junction Temperature Cooling Curves [#18870]

Yaoyi Yu, Xiong Du, Jun Zhang, Pengju Sun and Heng-Ming Tai, *Chongqing University, China; University of Tulsa, United States*

12:55PM | Online Aging Parameter Extraction with Induced Voltage veE between Kelvin and Power Emitter in Turn-off Progress for IGBT Modules [#19421]

Renju Zheng, Haoge Xu, Chengmin Li, Wuhua Li, Xiangning He, Haoze Luo and Daohui Li, *Zhejiang University, China; Dynex Semiconductor Ltd, United Kingdom*

1:20PM | Current Sensing Integration with Lead Frames in 6-in-1 IGBT Modules [#19090]

Minhao Sheng, Hiroyuki Nogawa, Muhammad Alvi and Robert Lorenz, *University of Wisconsin-Madison, WEMPEC, United States; Fuji Electric Co., Ltd., Japan*

1:45PM | 20 MHz Integrated Current Sensing for WBG Systems with EMI Suppression [#18838]

Minhao Sheng, Muhammad Alvi and Robert Lorenz, *UW Madison, WEMPEC, United States*

S15 | SiC Device Monitoring and Protection

Room B115

Chairs: Bilal Akin; Dong Jiang

12:30PM | Oscillatory False Triggering of Parallel Si and SiC MOSFETs during Short-Circuit Turn-off [#18191]

Craig Timms, Liang Qiao, Fred Wang, Zheyu Zhang and Dong Dong, *University of Tennessee, United States; GE Global Research, United States*

12:55PM | SiC Device Junction Temperature Online Monitoring [#19680]

Ruxi Wang, Juan Sabate, Krishna Mainaili, Tomas Sadilek, Peter Losee and Yash Singh, *GE Global Research, United States; GE Global Research, United States*

1:20PM | Phase Current Sensor and Short-Circuit Detection based on Rogowski Coils Integrated on Gate Driver for 1.2 kV SiC MOSFET Half-Bridge Module [#18197]

Slavko Mocevic, Jun Wang, Rolando Burgos, Dushan Boroyevich, Marko Jaksic, Mehrdad Teimor and Brian Peaslee, *Center for Power Electronics Systems, United States; GM Global Propulsion Systems, United States*

1:45PM | Novel Bipolar Active Miller Clamp for Parallel SiC MOSFET Power Modules [#19140]

Eddy Aeloiza, Rostan Rodrigues and Arun Kadelugu, *ABB Inc., United States*

Workshop: Smart Transformers: Which Impact of The SiC Technology?

Room B116

Chairs: Marco Liserre

Monday, September 24

2:20PM – 4:25PM

S16 | Wind Energy Conversion Systems

Room A107

Chairs: Alex De Abreu-Garcia; Eduard Muljadi

2:20PM | Modelling and Control to Mitigate Dynamic Effects of Unbalanced Masses in Wind Turbine Systems [#18104]

Jishnu Kambrath, Changwoo Yoon, Youyi Wang and Yong-jin Yoon, *Nanyang Technological University, Singapore*

2:45PM | Converting Waste Vehicle Aerodynamic Energy into Electricity [#19212]

Matthew Penne, Wei Qiao, Jerry L. Hudgins, *University of Nebraska-Lincoln, United States*

3:10PM | Centralized Power Reserve Algorithm of De-Loaded Wind Farm for Primary Frequency Regulation [#18370]

Abdullah Bubshait, Abdulhakeem Alsaleem and Marcelo Simoes, *King Faisal University, Saudi Arabia; Colorado School of Mines, United States*

3:35PM | Comparison of Voltage Control Strategies for Wind Parks [#18647]

Shahab Asadollah, Rongwu Zhu and Marco Liserre, *Kiel University, Germany*

4:00PM | Minimizing the Expected Energy Deficiency of a Distributed Generation System Using Dynamic Optimal Power Management [#19761]

Salman Harasis, Yilmaz Sozer and Malik Elbuluk, *University of Akron, United States*

S17 | Solid State Transformers and Transformer Applications

Room B111

Chairs: Rajendra Prasad Kandula; Elisabetta Tedeschi

2:20PM | A DC Solid State Transformer with DC Fault Ride through Capability [#18822]

Haoyuan Weng, Keyan Shi, Min Chen, Philip T. Krein and Dehong Xu, *Zhejiang University, China; Zhejiang University, United States*

2:45PM | Mobile Utility Support Equipment based Solid State Transformer (MUSE-SST) for MV Grid Interconnection with Gen3 10 kV SiC MOSFETs [#19402]

Anup Anurag, Sayan Acharya, Yos Prabowo, Venkat Jakka and Subhashish Bhattacharya, *North Carolina State University, United States*

3:10PM | Continuous Operation of Smart Transformer-fed Distribution on Grid with Single-phase Faults [#19056]

Zhu Rongwu and Liserre Marco, *Chair of Power Electronics, Kiel University, Germany*

3:35PM | Isolated Multilevel HVDC Converter for Off-shore DC Distribution [#19270]

Amin Rahnama Sadat, Harish Sarma Krishnamoorthy and Srikanth Yerra, *University of Houston, United States*

4:00PM | Active Redundancy in the Low Voltage Stage of Smart Transformers [#19603]

Victor Ferreira, Markus Andresen, Braz Cardoso and Marco Liserre, *Federal University of Minas Gerais, Brazil; University of Kiel, Germany*

S18 | Protection of Power Systems

Room B117

Chairs: Xiu Yao; John Shen

2:20PM | On the Protection of the Power Flow Control Converter in Meshed Low Voltage DC Networks [#18727]

Pavel Purgat, Mackay Laurens, Zian Qin and Pavol Bauer, *TU Delft, Netherlands*

2:45PM | Short Circuit Fault Location in DC Power Networks Using Intelligent SiC Solid-State Circuit Breaker [#18784]

Yuanfeng Zhou, Yanjun Feng, Tianjiao Liu and Z. John Shen, *Illinois Institute of Technology, United States*

3:10PM | A Novel Series Arc Fault Detection Method using Sparks in DC Microgrids with Power Electronics Interface [#19397]

Lu Yue, Vu Le, Yang Ziheng and Xiu Yao, *University at Buffalo, United States*

3:35PM | A Parameter Identification Approach to Series DC Arc Fault Detection and Localization [#19500]

Luis Herrera and Xiu Yao, *University at Buffalo, United States*

4:00PM | A New Communication-less Harmonic-based Protection Architecture for Meshed Microgrids [#19713]

Siavash Beheshtaein, Robert Cuzner, Andrea Benigni, Mehdi Savaghebi and Josep Guerrero, *Aalborg University, Denmark; University of Wisconsin Milwaukee, United States; University of South Carolina, United States; Aalborg University, Denmark*

S19 | Transportation Electrification Applications

Room C120

Chairs: Antonio J. Marques Cardoso; Mengqi Wang

2:20PM | Stability Analysis of the Electrical Power Generation System for a More Electric Aircraft [#18100]

Sumeet Singh Thakur, Heo Peng Gabriel Ooi, Souvik Dasgupta, Joseph Kiran Banda, Mark Husband and Changyun Wen, *Rolls-Royce at NTU Corp Lab, Singapore; Rolls-Royce Electrical, RRSPL, Singapore; Rolls-Royce Electrical, RRPLC, United Kingdom; Nanyang Technological University, Singapore*

2:45PM | An Integrated Bidirectional Three-Phase AC Charger for Vehicle Applications with Buck-Boost Capability [#19371]

Philippe Gray, Peter Lehn and Sitan Wang, *University of Toronto, Canada*

3:10PM | Multi-Interval DC Traction System Simulator for Stray Current and Rail Potential Distribution [#18494]

Hao Xue, Xiaofeng Yang, Yuhao Zhou and Trillion Q. Zheng, *Beijing Jiaotong University, China*

3:35PM | The Voltage Difference Control of DCAT Traction Power Supply System for Urban Rail Transit [#18581]

Miao Wang, Xiaofeng Yang, Trillion Zheng and Gu Jingda, *Beijing Jiaotong University, China*

4:00PM | Modeling Dual Active Bridge Converter Considering the Effect of Magnetizing Inductance for Electric Vehicle Application [#19563]

Saeed Anwar and Daniel Costinett, *The University of Tennessee, Knoxville, United States*

S20 | AC-AC Converters I

Room B119

Chairs: Dong Cao; Andrea Formentini

2:20PM | Single-Phase Three-Wire Power Converters Based on Two-Level and Three-Level Legs [#19687]

Bruna Seibel Gehrke, Cursino Brandao Jacobina, Reuben Sousa, Italo da Silva, Nayara Brandao de Freitas and Mauricio Correa, *Federal University of Campina Grande, Brazil; Federal Rural University of Pernambuco, Brazil*

2:45PM | An Improved Model Predictive Dual Current Control Method for Indirect Matrix Converter Fed Induction Motor Drives [#18275]

Yang Mei, Weichao Huang and Lisha Chen, *North China University of Technology, China*

3:10PM | Expansion of FRT Operation Range and Reduction of Grid Current Distortion for Grid-Tied Matrix Converter [#18696]

Jun-ichi Itoh, Kyota Asai, Keisuke Kusaka and Satoshi Nagai, *Nagaoka University of Technology, Japan*

3:35PM | Single-Phase AC-DC-AC Multilevel Converter with Transformers Applied to Grid Voltage Compensation [#19160]

Rodrigo de Lacerda, Cursino Jacobina, Edgard Fabricio and Phelipe Rodrigues, *Federal University of Campina Grande, Brazil; Federal Institute of Paraiba, Brazil*

4:00PM | Dead-Time Compensation Method Based on UCE-Measurement for Direct Converters [#19161]

Nico Remus, Martin Leubner and Wilfried Hofmann, *Technische Universitaet Dresden, Germany*

S21 | AC-DC Multi-Phase I

Room C122

Chairs: Dong Jiang; Giacomo Scelba

2:20PM | A Zero-Voltage-Switching Three-Phase Four-Wire Four-Leg Rectifier [#18653]

An Zhao, Keyan Shi, Changsheng Hu and Dehong Xu, *Zhejiang University, China*

2:45PM | A New Modulation Method for a Bidirectional Isolated Three-Phase AC/DC Dual-Active-Bridge Converter to Realize Higher Efficiency in Wide Output Voltage Range [#19735]

Koji Shigeuchi, Kensuke Sakuma, Jin Xu, Noboru Shimosato and Yukihiko Sato, *Chiba University, Japan; Myway Plus Corporation, Japan*

3:10PM | A Comparison of Continuous and Discontinuous Modulation Schemes for a Non-Isolated Single-Phase Differential-mode Cuk Rectifier [#19727]

Nikhil Gupta, Sudip K Mazumder and Ankit Gupta, *University of Illinois, Chicago, United States*

3:35PM | Two-phase Interleaved Boost PFC Converter with Coupled Inductor under Single-phase Operation Condition [#18297]

Chun hui Li, Fei Yang, Yong Cao, Kai Yao, Bin Fang and Hongliang Li, *Nanjing University of Science and Technology, China*

4:00PM | Multilevel Rectifier Based On Cascaded Transformer With Single DC-Link And Shared Legs [#19138]

Alan Felinto, Gregory Carlos, Cursino Jacobina, Joao Mello, Nayara Freitas and Ivan Silva, *Federal University of Campina Grande, Brazil; Federal Institute of Alagoas, Brazil*

S22 | Modeling, Control and Stability of Dual Active Bridge Converter

Room C121

Chairs: Tsorng-Juu Liang; Arijit Banerjee

2:20PM | An Optimized Control Scheme for Reducing Conduction and Switching Losses in Dual Active Bridge Converters [#19148]

Bochen Liu, Pooya Davari and Frede Blaabjerg, *Aalborg University, Denmark*

2:45PM | A Generalized Modulation Scheme for Soft Switched Dual Active Bridge Converter With Wide Voltage and Power Ranges [#19256]

Amit Bhattacharjee and Issa Batarseh, *UCF, United States*

3:10PM | Fast Response Dual Active Bridge Converter with Elimination of Transient DC Offset By Intermediate Asymmetric Modulation [#19258]

Amit Bhattacharjee, S. Milad Tayebi and Issa Batarseh, *UCF, United States*

3:35PM | Unified State-space Modeling Method for Dual-active-bridge Converters Considering Bidirectional Phase Shift [#18368]

Haixu Shi, Kai Sun, Hongfei Wu, Yunwei Li and Xi Xiao, *Tsinghua University, China; Nanjing University of Aeronautics and Astronautics, China; University of Alberta, Canada*

4:00PM | Modelling, Analysis and Mitigation of the Transformer Current Ringing in Dual Active Bridge Converters [#18661]

Zian Qin, Zhan Shen, Frede Blaabjerg and Pavol Bauer, *Delft University of Technology, Netherlands; Aalborg University, Denmark*

S23 | Modeling and Control of Modular Multilevel Converters 1

Room A108

Chairs: Navid Zargari; Xiaonan Lu

2:20PM | A Novel Discharging Control Strategy for Modular Multilevel Converter Submodules without Using External Circuit [#18800]

Jiangu Pan, Ziwei Ke, Muneer Al Sabbagh, Risha Na, Julia Zhang, Jin Wang and Longya Xu, *The Ohio State University, United States*

2:45PM | Control of the Hybrid Cascaded Converter Based on Distributed Architecture [#18901]

Yu-chen Su, Ping-heng Wu and Po-tai Cheng, *National Tsing Hua University, Taiwan*

3:10PM | Improved Balancing and Sensing of Sub-module Capacitor Voltages In Modular Multi-level Converters [#18963]

Shamkant Joshi, Anshuman Shukla and Mukul Chandorkar, *Indian Institute of Technology Bombay, India*

3:35PM | Anticipative Sorting Control of Modular Multilevel Converters [#18938]

Cristian Lascu, Cosmin Pondiche, Emanuel Serban and Tomislav Dragicevic, *Aalborg University, Denmark; Schneider Electric, Canada*

4:00PM | Circulating Current Resonant Oscillation in Modular Multilevel Converters for Variable Frequency Operation and Its Suppression Method [#19536]

Jiangu Pan, Ziwei Ke, Risha Na, Muneer Al Sabbagh, Julia Zhang, Jin Wang and Longya Xu, *The Ohio State University, United States*

S24 | Ronald Gordon Harley Memorial – Fault Diagnosis

Room B114

Chairs: Thomas Habetler; David Dorrell

2:20PM | Performance Analysis of Dual Wound Permanent Magnet Synchronous Machines under Winding Fault Scenarios [#19678]

Mazharul Chowdhury, Anant Singh, Ramakrishnan Raja, Mohammad Islam and Abraham Gebregergis, *Halla Mechatronics, United States; Veoneer, United States*

2:45PM | Impedance-based Induction Motor Bearing Failure Detection Applied to X-Ray Tube [#18177]

Jayakrishnan Unnikrishnan, Nidhishri Tapadia, John Breunissen and Uwe Wiedmann, *GE Global Research, United States; GE Healthcare, United States*

3:10PM | Inter-turn Short Circuit Ratio Estimation in IPMSM Based on a Fault Index Current and Magnet Flux Linkage Observer [#19348]

Pablo Castro Palavicino, Dheeraj Bobba and Bulent Sarlioglu, *University of Wisconsin-Madison, United States*

3:35PM | Online Detection and Classification of Rotor and Load Defects in PMSMs based on Hall Sensor Measurements [#19127]

Park Yonghyun, Yang Chanseung, Sang Bin Lee, Dongmyung Lee, Daniel Fernandez, David Reigosa and Fernando Briz, *Korea University, Korea, Republic of; Hongik University, Korea, Republic of; University of Oviedo, Spain*

4:00PM | Simultaneous Torque And Radial and Force Ripple Control for Reduction of Acoustic Noise in Switched Reluctance Machines [#19755]

Omer Gundogmus, Mohammed Elamin, Yilmaz Sozer and Akira Chiba, *University of Akron, United States; Tokyo Institute of Technology, Japan*

S25 | Special and Non-Conventional Machines

Room B118

Chairs: Elena Lomonova; Yingjie Li

2:20PM | Rotary-Reciprocating Movement Switched Reluctance Machines with Auxiliary Poles [#19165]

Parham Hekmati and Ian P. Brown, *Illinois Institute of Technology, United States*

2:45PM | Principle of a Radial-Force-Based Electromagnetic Swirling Actuator for Low-Speed Applications [#19330]

Lingyu Chen, Ryosuke Hoshi, Akira Chiba, Masao Nagano and Kimiaki Nakamura, *Tokyo Institute of Technology, China; Tokyo Institute of Technology, Japan; Honda Research and Development Co.,Ltd., Japan*

3:10PM | A Novel Partitioned-primary Hybrid-Excited Flux-switching Linear Machine with Dual-PM [#18022]

Zhiqiang Zeng and Qinfen Lu, *Zhejiang University, China*

3:35PM | Double Stator Linear-Rotary Actuator with a Single Set of Mover Magnets [#18984]

Spasoje Miric, Marcel Schuck, Arda Tuysuz and Johann Walter Kolar, *ETH Zurich, Power Electronic Systems Laboratory, Switzerland*

4:00PM | A Three-Phase Adjustable-Voltage-Ratio Transformer Based on Magnetic Flux Valves [#19774]

Junwei Cui, Liyan Qu and Wei Qiao, *University of Nebraska-Lincoln, United States*

S26 | Fault Tolerant Drives and Fault Diagnosis

Room B110

Chairs: Thomas Wolbank; Sang Bin Lee

2:20PM | Voltage Sag Ride-Through Capabilities of Electrolytic Capacitor-Less Adjustable Speed Drive System During Power Interruptions [#18701]

Zhentian Qian, Wenxi Yao and Kevin Lee, *Zhejiang University, China; Eaton Corporation, United States*

2:45PM | Permanent Magnet Synchronous Machine Non-Uniform Demagnetization Detection Using Zero-Sequence Magnetic Field Density [#18475]

David Reigosa, Daniel Fernandez, Maria Martinez, Yonghyun Park, Sang Bin Lee and Fernando Briz, *University of Oviedo, Spain; Dept. of Elec. Eng., Korea University, Seoul, Korea (South)*

3:10PM | Multifrequency Current Control for Multiphase Machines With Antiwindup, Distortion-Free Saturation and Full DC-Link Utilization [#18585]

Alejandro Yepes, Jesus Doval-Gandoy and Hamid Toliyat, *University of Vigo, Spain; Texas AM University, United States*

3:35PM | Performance Comparison at Maximum Torque per Ampere Control between Rare Earth and Rare Earth Free Five-phase PMA-SynRM Under Open Phase Faults [#19653]

Akm Arafat, Haque Moinul Shahidul, Islam Md. Zakirul and Seungdeog Choi, *University of Akron, United States; Mississippi State University, United States*

4:00PM | A Novel Stator Current Observer for Fault-Tolerant Control in VSCF System of DFIG [#18698]

Zhiyong Lan, Li Li, Cheng Deng, Yuzhi Zhang, Wenxin Yu and Pop Wong, *Xiangtan University, China; Corporate Research Center, ABB Inc., United States; Hunan University of Science and Technology, China*

S27 | Efficiency Issues in Electric Drives

Room B113

Chairs: Mahesh Swamy; Fernando Briz

2:20PM | Performance Comparison Between Two-Level and Three-Level SiC-Based VFD Applications with Output Filters [#18480]

Seunghoon Baek, Younghoon Cho, Byung-Geuk Cho and Chanook Hong, *Dept. of Electrical Eng. Konkuk University, Korea (South); LS IS Co., Ltd, Korea (South)*

2:45PM | A Megawatt-Scale Medium-Voltage High Efficiency High Power Density Hybrid Three-Level ANPC Inverter for Aircraft Hybrid-Electric Propulsion Systems [#19474]

Di Zhang, Jiangbiao He, Di Pan, Mark Dame and Michael Schutten, *GE Global Research, United States*

3:10PM | ESC Based Optimal Stator Frequency Control of DFIG-DC System for Efficiency Enhancement [#18445]

Yan Xiao, Mario Rotea, Yaoyu Li and Babak Fahimi, *University of Texas at Dallas, United States*

3:35PM | Fast Calculation of the Magnetic Field and Loss Distributions in the Stator Core End Packets and Finger Plates of Large Synchronous Generators [#19398]

Sufei Li, Cheng Gong, Liang Du, J. Rhett Mayor, Ronald G. Harley and Thomas G. Habetler, *Georgia Institute of Technology, United States; Temple University, United States*

4:00PM | Optimal Energy Efficiency Evaluation in Induction Machines Driven by Adjustable Speed Drives Under EN 50598-2 and IEC 61800-9-1 Standards [#18178]

Kevin Lee, Peter Zhai, Thomas Ruchti, Benjamin Haberkorn and Joseph Zhou, *Eaton, United States*

S28 | SiC Ruggedness and Reliability

Room B112

Chairs: Rostan Rodrigues; Victor Veliadis

2:20PM | Impact of the Gate Oxide Reliability of SiC MOSFETs on the Junction Temperature Estimation Using Temperature Sensitive Electrical Parameters [#18660]

Jose Ortiz Gonzalez and Alatisè Olayiwola, *University of Warwick, United Kingdom*

2:45PM | Comparison Study of Surge Current Capability of Body Diode of SiC MOSFET and SiC Schottky Diode [#19003]

Xi Jiang, Dongyuan Zhai, Jianjun Chen, Fanxing Yuan, Zongjian Li, Zhizhi He, Z. John Shen and Jun Wang, *Hunan University, China*

3:10PM | 4H-SiC Junction Barrier Schottky Diodes and Power MOSFETs with High Repetitive UIS Ruggedness [#19205]

Amaury Gendron-Hansen, Dumitru Sdrulla, Avinash Kashyap, Bruce Odekirik, William Brower and Laird Thornhill, *Microsemi, United States*

3:35PM | Precursors of Gate Oxide Degradation in Silicon Carbide MOSFETs [#19207]

Ujjwal Karki and Fang Peng, *Michigan State University, United States*

4:00PM | Non-Destructive and Destructive Short-Circuit Characterization of a High Current SiC MOSFET [#19782]

Amy Romero and Rolando Burgos, *CPES (Virginia Tech), United States*

S29 | GaN Devices & Applications

Room B115

Chairs: Hanh-Phuc Le; Feng Qi

2:20PM | Assessment of Switching Frequency Effect on a Compact Three-Phase GaN-Based Inverter Design [#18679]

Bingyao Sun, Rolando Burgos and Dushan Boroyevich, *Virginia Tech, CPES, United States*

2:45PM | Novel Monolithically Integrated Bidirectional GaN HEMT [#18382]

Carsten Kuring, Oliver Hilt, Mihaela Wolf, Jan Boecker, Joachim Wuerfl and Sibylle Dieckerhoff, *Technische Universitaet Berlin, Germany; Ferdinand Braun Institut, Germany*

3:10PM | Infinity Sensor: Temperature Sensing in GaN Power Devices Using Peak di/dt [#19742]

Jianjing Wang, Mohammad Hedayati, Dawei Liu, Salah-Eddine Adami, Harry Dymond, Jeremy Dalton and Bernard Stark, *University of Bristol, United Kingdom*

3:35PM | Characterization of 650 V Enhancement GaN HEMT Under Cryogenic Temperature [#18986]

Ren Ren, Gui Handong, Zhang Zheyu, Chen Ruirui, Niu Jiahao, Wang Fred, M. Tolbert Leon, Costinett Daniel Jes, B. Choi Benjamin and V. Brown Gerald, *University of Tennessee, United States; NASA Glenn Research Center, United States*

4:00PM | Optimal Dead Time Setting and Loss Analysis for GaN-Based Voltage Source Converter [#18956]

Paige Williford, Edward Jones, Zhe Yang, Jianliang Chen, Fred Wang, Sandeep Bala and Jing Xu, *University of Tennessee, United States; Efficient Power Conversion (EPC), United States; ABB, United States*

S30 | Wireless Power Transfer I

Room A105

Chairs: Al-Thaddeus Avestruz; Carl Ho

2:20PM | Comprehensive Design for 6.78 MHz Wireless Power Transfer Systems [#18504]

Jie Li and Daniel Costinett, *University of Tennessee, United States*

2:45PM | Coil and Circuit Design of Omnidirectional Wireless Power Transfer System for Portable Device Application [#18464]

Junjie Feng, Qiang Li and Fred Lee, *Center for Power Electronics Virginia Tech, United States*

3:10PM | Maximum-Efficiency Operation of a 3.7 kW Inductive Wireless Charging System by Using On-Off Keying Modulation [#18673]

Wenxing Zhong, Hao Li, Hongzhi Cui, S.Y.R. Hui and Dehong Xu, *Zhejiang University, China; The University of Hong Kong, Hong Kong*

3:35PM | Two Half-Bridge Resonant Inverters with Coupled Coils for AC/AC Induction Heating Application [#19135]

Ruan Gomes, Montie Vitorino, Diego Acevedo-Bueno and Mauricio Correa, *Federal University of Campina Grande, Brazil*

4:00PM | Feasibility Study on the All Metal Induction Cooker Systems Considering Topology and Control [#18808]

Eunsu Jang, Sang Min Park, Dongmyoung Joo, Hyo Min Ahn and Byoung Kuk Lee, *Sungkyunkwan University, Korea (South)*

Workshop: Smart Transformers: Which Impact of the SiC Technology?

Room B116

Chairs: Marco Liserre

Tuesday, September 25

8:30AM – 10:10AM

S49 | Health and Condition Monitoring of Energy Storage Systems

Room A107

Chairs: Ahmed Elasser; Mithat Kisacikoglu

8:30AM | Online Condition Monitoring of Sealed Lead Acid and Lithium Nickel-Cobalt-Manganese Oxide Batteries using Broadband Impedance Spectroscopy [#18107]

Olakunle Alao and Paul Barendse, *University of Cape Town, South Africa*

8:55AM | Cell Failure Evaluations under Environmental and Safety Tests of Multiple 18650 Li-Ion NCA and NMC cells for Space Cells Qualification Establishment [#18224]

Jonghoon Kim, Woonki Na, Seongjun Lee, Minho Jang and Chulwoo Lim, *Chungnam National University, Korea, Republic of; California State University, Fresno, United States; Chosun University, Korea, Republic of; Korea Aerospace Research Center, Korea, Republic of; Satellite Technology Research Center, Korea, Republic of*

9:20AM | A Non-Linear Electrical Model for Iron Doped Sodium Metal Halides Batteries [#18792]

Alfonso Damiano, Mauro Boi, Andrea Salimbeni and Daniele Battaglia, *University of Cagliari, Italy*

9:45AM | Time-Frequency Analysis of the Chirp Response for Rapid Electrochemical Impedance Estimation [#18012]

Fabusuyi Aroge and Paul Barendse, *University of Cape Town, South Africa*

S50 | Microgrid Control-II

Room B117

Chairs: Sara Ahmed; Amir Yazdani

8:30AM | A Hardware-in-the-Loop Real-Time Testbed for Microgrid Hierarchical Control [#18547]

Hao Tu, Yuhua Du, Hui Yu, Srdjan Lukic, Mary Metelko, Peter Volgyesi, Abhishek Dubey and Gabor Karsai, *North Carolina State University, United States; Vanderbilt University, United States*

8:55AM | Distributed Microgrid Synchronization Strategy Using a Novel Information Architecture Platform [#18568]

Yuhua Du, Hao Tu, Srdjan Lukic, Abhishek Dubey and Gabor Karsai, *North Carolina State University, United States; Vanderbilt University, United States*

9:20AM | Accurate Current Sharing and PCC Voltage Restoration in LVDC Microgrid without Communication Network [#18754]

Khanh Duc Hoang, Dong-Choon Lee and Hong-Hee Lee, *University of Ulsan, Korea (South); Yeungnam University, Korea (South)*

9:45AM | Implementation and CHIL Testing of a Microgrid Control System [#18760]

Chu Sun, Paquin Jean Nicolas, Fares Al Jajeh, Geza Joos and Francois Bouffard, *McGill University, Canada; OPAL-RT TECHNOLOGIES Inc., Canada*

S51 | Studies and Designs For UPS

Room B111

Chairs: Xiaofeng Lyu; He Niu

8:30AM | Integrated Single-Stage Bi-Directional UPS with One-Cycle Mode Switching and Active Deadtime Control for Automotive Electronics [#18318]

Dong Yan, Xugang Ke and D. Brian Ma, *The University of Texas at Dallas, United States*

8:55AM | Zero Common-Mode Voltage Three-Level Buck DC-DC Converter using 1.2 kV SiC MOSFET Neutral-Point-Clamped (NPC) Modules for UPS Applications [#19379]

Paul Rankin, Sungjae Ohn, Jianghui Yu, Rolando Burgos, Dushan Boroyevich, Harish Suryanarayana and Christopher Belcastro, *CPES, Virginia Tech, United States; ABB, United States*

9:20AM | Three Terminal Common-Mode EMI Model and EMI Mitigation Strategy for Full SiC UPS [#19136]

Sungjae Ohn, Jianghui Yu, Paul Rankin, Rolando Burgos, Dushan Boroyevich, Harish Suryanarayana and Christopher Belcastro, *CPES, Virginia Tech, United States; ABB, United States*

9:45AM | Ultra-fast Utility Disconnect Switch for High Efficiency Medium Voltage UPS [#19190]

Pietro Cairoli, Rostan Rodrigues, Simon Walton, Nick Elliott and Debrup Das, *ABB Inc. USCR, United States; ABB Inc USCR, United States; ABB Ltd, New Zealand*

S52 | Batteries Modelling and Management 2

Room C120

Chairs: Long Wu; Arash Nassiri Bavili

8:30AM | Analysis and Modeling of Dual-Half-Bridge Converter Applied in High-Voltage Battery Balancing [#18812]

JieYi Sun, Chang She, Tao Cai, Shanxu Duan and Changsong Chen, *Huazhong University of Science and Technology, China*

8:55AM | Enhancement of Li-ion Battery Performance at Low Temperatures by DC-DC Converter Duty-Cycle Autotuning [#18834]

Ala Hussein, Anirudh Pise, Xi Chen and Issa Batarseh, *University of Central Florida, United States*

9:20AM | A Hierarchical ZVS Battery Equalizer Based on Bipolar CCM Buck-Boost Units [#18875]

Faxiang Peng, Haoyu Wang and Liang Yu, *ShanghaiTech University, China*

9:45AM | Lithium-Ion Battery Rate-of-Degradation Modeling for Real-Time Battery Degradation Control during EV Drive Cycle [#18859]

Ruxiu Zhao, Robert Lorenz and Thomas Jahns, *University of Wisconsin-Madison, United States*

S53 | Multi-Level Converters 2

Room B119

Chairs: Francisco Daniel Freijedo; Yongsug Suh

8:30AM | Six-Leg AC-DC-AC Single-Phase Multilevel Converter for Grid Overvoltage Mitigation [#19734]

Rodrigo P. de Lacerda, Cursino Jacobina, Edgard L. Fabricio, Ulisses G. Lima and Phelipe L. S. Rodrigues, *Federal University of Campina Grande, Brazil; Federal Institute of Paraiba, Brazil*

8:55AM | A Control Scheme of Nine-Arm Modular Multilevel Converter [#18544]

Futian Qin, Feng Gao, Tao Xu, Decun Niu and Zhan Ma, *Shandong University, China*

9:20AM | Capacitor Voltage Balancing Techniques of Single-Phase Cascaded H-Bridge Inverters [#19154]

Amanda Monteiro, Cursino Jacobina, Joao Mello, Nayara De Freitas and Rafael Matias, *Federal University of Campina Grande, Brazil; University Federal of Piaui, Brazil*

9:45AM | Battery Integrated Modular Multifunction Converter for Grid Energy Storage [#18989]

Weilun Warren Chen, Baljit Riar and Regan Zane, *United Technologies Research Center, United States; Utah State University, United States*

S54 | DC-DC Non-Isolated 2

Room C122

Chairs: Youim (Kelly) Tray; Juan Rivas Davila

8:30AM | Optimized Parameter Design for a 20MHz Class E DC-DC Converter With ON-OFF Control [#18627]

Ying Li, Xinbo Ruan, Li Zhang and Jiandong Dai, *Nanjing Univ. of Aero. and Astro., China*

8:55AM | Control of Bidirectional Interleaved DC-DC Converter with Single Current Sensor [#18027]

Hung-Chi Chen, Che-Yu Lu and Chi-Hsiu Lu, *National Chiao Tung University, Taiwan*

9:20AM | Applying Diode-Capacitor Voltage Multiplier to Coupled Inductor Boost Converter for Novel DC-DC Converter with High Voltage Gain and Low Voltage Stress [#18629]

Manxin Chen, Kerui Li and Yongheng Yang, *Sun Yat-sen University, China; The University of Hong Kong, Hong Kong; Aalborg University, Denmark*

9:45AM | High-Performance Megahertz-Frequency Resonant DC-DC Converter for Automotive LED Driver Applications [#19487]

Mausamjeet Khatua, Ashish Kumar, Wahid Yousefzadeh, Alihossein Sepahvand, Montu Doshi, Dragan Maksimovic and Khurram Afridi, *University of Colorado Boulder, United States; Texas Instruments, United States*

S55 | Modeling and Control of Multilevel Converters 1

Room B116

Chairs: Leon M Tolbert; Matthias Preindl

8:30AM | A Closed-Loop Power Decoupling Control for Capacitance Reduction in CHB-based Regenerative Motor Drive Systems [#18089]

Zezhou Yang, Jianjun Sun, Yi Tang, Xiaoming Zha and Cheng Cheng, *Wuhan University, China; Nanyang Technological University, Singapore; School of Electrical Engineering, Wuhan University, China*

8:55AM | Universal Neutral Point Balancing Algorithm for Three-phase Three-Level Converters with Hybrid of Zero-sequence Signal Injection and Virtual Zero-Level Modulation [#18914]

Jun Wang, Xibo Yuan, Kfir J. Dagan, Andrew Bloor, Phil Mellor and David Drury, *University of Bristol, United Kingdom; Safran Electrical and Power UK, United Kingdom*

9:20AM | A Novel ZVS Turn-On Triangular Current Mode Control with Phase Synchronization for Three Level Inverters [#19764]

Nidhi Haryani, Sung Jae Ohn, Jiewen Hu, Paul Rankin, Rolando Burgos and Dushan Boroyevich, *CPES, Virginia Tech, United States*

9:45AM | SVM of Three-Level NPC Inverter with Unbalanced DC-Link [#18086]

Ciro Attaianesi, Giuseppe Tomasso, Mauro Di Monaco, Umberto Abronzi and D'Arpino Matilde, *University of Cassino and Southern Lazio, Italy; The Ohio State University, United States*

S56 | Stability in Power Converters 1

Room C121

Chairs: Brendan McGrath; Joseph Olorunfemi Ojo

8:30AM | Small-Signal Modelling and Control Design of VSCs in Multi-terminal Railway Applications [#19093]

Alberto Rodriguez-Cabero, Javier Roldan-Perez and Milan Prodanovic, *IMDEA Energy Institute, Spain*

8:55AM | Analysis of the Behavior of Synchronverters Operating in Parallel by Means of Component Connection Method (CCM) [#18587]

Roberto Rosso, Marco Liserre and Soenke Engelken, *WRD GmbH, Germany; University of Kiel, Germany*

9:20AM | Influence of Reactive Power Flow on the DC-Link Voltage Control in Voltage-Source Converters [#19100]

Dapeng Lu, Xiongfei Wang and Frede Blaabjerg, *Aalborg University, Denmark*

9:45AM | Refined Small-Signal Sequence Impedance Models of Type-III Wind Turbines [#19543]

Ignacio Vieto and Jian Sun, *Rensselaer Polytechnic Institute, United States*

S57 | Modeling and Control of DC-AC Converters 1

Tuesday, September 25, 8:30AM-10:10AM, Room A108

Chairs: Liliana De Lillo; Jiacheng Wang

8:30AM | A DSP-Based Modeling and Digital Control of Single-Phase Quasi-Z-Source Inverter [#18452]

Xuliang Hou, Faleh Alskran and Marcelo Godoy Simoes, *Illinois Institute of Technology, United States; Colorado School of Mines, United States*

8:55AM | Performance Analysis of H2 Optimally Controlled Three-Phase Embedded Grids [#19618]

David Dewar, Andrea Formentini, Pericle Zanchetta, Kang Li and Pat Wheeler, *University of Nottingham, United Kingdom*

9:20AM | Disturbance-Observer Assisted Controller for Stand-Alone Four-Leg Voltage Source Inverter [#18778]

Marco di Benedetto, Mi Tang, Alessandro Lidozzi, Andrea Formentini, Luca Solero and Pericle Zanchetta, *Roma Tre University, Italy; University of Nottingham, England; University of Nottingham, Italy*

9:45AM | Closed-loop Elimination of Low-order Sideband Harmonics in Parallel-Connected Low-Pulse Ratio VSIs [#19155]

Tao Xu, Feng Gao, Xiongfei Wang, Tianqu Hao, Dongsheng Yang and Frede Blaabjerg, *Shandong University, China; Aalborg University, Denmark*

S58 | Machines for Transportation 1

Room B114

Chairs: Ronghai Qu; Sara Roggia

8:30AM | Design of an Electric Machine for a 48-V Mild Hybrid Vehicle [#19732]

Alireza Fatemi, Thomas Nehl, Xiaofeng Yang, Lei Hao, Suresh Gopalakrishnan, Avoki Omekanda and Chandra Namuduri, *General Motors, United States*

8:55AM | Aligning the Reluctance and Magnet Torques in Permanent Magnet Synchronous Motors for Improved Performance [#18093]

Maged Ibrahim and Pragasen Pillay, *Concordia University, Canada*

9:20AM | Scalability and Key Tradeoffs of Variable Flux PM Machines for Electric Vehicle Traction Motor Systems [#18767]

Apoorva Athavale, David Diaz Reigosa, Kan Akatsu, Kazuto Sakai and Robert D. Lorenz, *University of Wisconsin-Madison, WEMPEC, United States; University of Oviedo, Spain; Shibaura Inst. of Technology, Japan; Toyo University, Japan*

9:45AM | Modelling AC Winding Losses in a PMSM with High Frequency and Torque Density [#18966]

Giuseppe Volpe, Mircea Popescu, Fabrizio Marignetti and James Goss, *University of Cassino and Southern Lazio, Italy; Motor Design Ltd., United Kingdom*

S59 | High Speed and Bearingless Motors 2

Room B112

Chairs: Wei Xu; Junichi Asama

8:30AM | Investigation of Efficiency Enhancement of an Ultra-high-speed Bearingless Motor at 100,000 r/min by High Switching Frequency Using SiC-MOSFET [#19010]

Yu Fu, Masatsugu Takemoto, Satoshi Ogasawara and Koji Orikawa, *Hokkaido University, Japan*

8:55AM | Novel Bearingless Flux-Switching Motor with Exterior Rotor [#19608]

Wolfgang Gruber, Radman Karlo and Goebel Elisabeth, *Johannes Kepler University Linz, Austria; Linz Center of Mechatronics GmbH, Austria*

9:20AM | Speed and Stability Limits for High-Speed Bearingless Disc Drives [#18010]

Patricio Peralta, Douglas Martins Araujo and Yves Perriard, *Laboratory of Integrated Actuators, EPFL, Switzerland*

9:45AM | Design Optimization of Permanent Magnet Bearingless Motor Using Differential Evolution [#19778]

Rafal Jastrzebski, Pekko Jaatinen, Akira Chiba and Olli Pyrhonen, *Lappeenranta University of Technology, Finland; Tokyo Tech, Japan*

S60 | Low Speed Machines

Room B118

Chairs: Jonathan Bird; Siavash Pakdelian

8:30AM | Comparison of Modular Dual 3-phase PM Machines with Overlapping/Non-Overlapping Windings [#18231]

Yanxin Li, Zi-Qiang Zhu, Arwyn Sean Thomas, Zhanyuan Wu and Ximeng Wu, *The University of Sheffield, United Kingdom; The University of Sheffield, United Kingdom; Siemens Gamesa Renewable Energy Limited, United Kingdom*

8:55AM | Optimal Flux Modulation Pole Number in Vernier Permanent Magnet Synchronous Machines [#18007]

Huayang Li, Z. Q. Zhu and Yue Liu, *The University of Sheffield, United Kingdom*

9:20AM | A Parameterized Linear Magnetic Equivalent Circuit for Air Core Radial Flux Coaxial Magnetic Gears with Halbach Arrays [#18441]

Matthew Gardner, Derek Janak and Hamid Toliyat, *Texas A and M University, United States*

9:45AM | Conveyor System with a Highly Integrated Permanent Magnet Gear and Motor [#19049]

Simon Staal Nielsen, Rasmus Koldborg Holm and Peter Omand Rasmussen, *Aalborg University, Denmark*

S61 | Sensorless Control of Electric Drives

Room B110

Chairs: Fernando Briz; Liang Du

8:30AM | Discrete-Time Control of High-Speed Sensorless Electrical Drives [#19722]

Federica Fugaro, Marco Palmieri and Francesco Cupertino, *Politecnico di Bari, Italy*

8:55AM | Position and Capacitor Voltage Sensorless Control of High-Speed Surface-Mounted PMSM Drive with Output Filter [#19039]

Yu Yao, Fei Peng and Yunkai Huang, *Southeast University, China*

9:20AM | Integral Sliding-Mode Method Based on Back-EMF for Restarting Speed Sensorless Controlled Induction Motor at Free Running Status [#18170]

Lifeng Gou, Zisui Zhang, Chenchen Wang, Xiaojie You, Minglei Zhou and Jian Wang, *Beijing Jiaotong University, China*

9:45AM | Integration of Capture Based Phase Voltage Measurement for Surface Permanent Magnet Machine Position Sensorless Drive [#18789]

Guan-Ren Chen, Shih-Chin Yang and Yu-Liang Hsu, *National Taiwan University, Taiwan; Feng Chia University, Taiwan*

S62 | High Speed Drives

Room B113

Chairs: Alireza Fatemi; Thomas Wolbank

8:30AM | Open-End Winding Induction Motor Drive with a Floating Capacitor Bridge and Overmodulation of the Primary Inverter [#18505]

Albino Amerise, Michele Mengoni, Luca Zarri, Gabriele Rizzoli, Angelo Tani and Giovanni Serra, *University of Bologna, Italy*

8:55AM | Analysis of the Rotor Robustness of Ultra-High Speed Switched Reluctance Machines over 1 Million rpm Using Cohesive Zone Model [#19149]

Cheng Gong, Sufei Li and Thomas Habetler, *Georgia Institute of Technology, United States*

9:20AM | Improving Torque Control Accuracy and Dynamics for High Power or High Speed Induction Machine Drives that Inherently Operate at Low Switching-to-Fundamental Frequency Ratios [#19134]

Yukai Wang, Yang Xu and Robert Lorenz, *University of Wisconsin-Madison, United States*

9:45AM | Cascaded Converter for Electrolytic Capacitor-Less PMSM Drive System to Reduce Torque Ripple within Wide Speed Range [#18965]

Li Quan, Kesong Zhu, Chao Zhang, Xiaoyong Zhu and Yuefei Zuo, *Jiangsu University, China*

S63 | Medium Voltage Components and Systems

Room B115

Chairs: Eddy Aeloiza; Fred Wang

8:30AM | A Survey on Recent Advances of Medium Voltage Silicon Carbide Power Devices [#19567]

Boxue Hu, Xintong Lyu, Diang Xing, Dihao Ma, John Brothers, Risha Na and Jin Wang, *The Ohio State University, United States*

8:55AM | Electrical Field Analysis and Insulation Evaluation of a 6 kV H-bridge Power Electronics Building Block (PEBB) using 10 kV SiC MOSFET Devices [#18613]

Yue Xu, Mona Ghessemi, Jun Wang, Rolando Burgos and Dushan Boroyevich, *Center for Power Electronics Systems (CPES), United States*

9:20AM | High Frequency Transformer Insulation in Medium Voltage SiC enabled Air-cooled Solid-State Transformers [#19466]

Qin Chen, Ravisekhar Raju, Dong Dong and Mohammed Agamy, *Applied Materials, United States; GE Global Research Center, United States*

9:45AM | High-Voltage High-Frequency Testing for Medium-Voltage Motor Insulation Degradation [#19649]

Arshiah Mirza, Weiqiang Chen, Hiep Nguyen, Yang Cao and Ali Bazzi, *UCONN, United States; Ms, United States*

S64 | Wireless Power Transfer 2

Room A105

Chairs: Qiang Li; Chi-Kwan Lee

8:30AM | Performance Comparisons of Synchronous and Uncontrolled Rectifiers for Wireless Power Transfer Using Current-Mode Class D Converters [#19522]

Xin Zan and Al-Thaddeus Avestruz, *University of Michigan, United States*

8:55AM | Analytical Optimization of a Litz Wire Spiral Coil Based Underwater IPT System [#19510]

Anindya Chitta Bagchi, Abhilash Kamineni and Regan Zane, *Utah State University, United States*

9:20AM | Simple Control Method of Wireless Power Transfer System Using Matrix Converter [#18845]

Hiromasa Motoyama, Yuji Hayashi and Takaharu Takeshita, *Nagoya Institute of Technology, Japan*

9:45AM | High-Performance Capacitive Wireless Power Transfer System for Electric Vehicle Charging with Enhanced Coupling Plate Design [#19479]

Brandon Regensburger, Jose Estrada, Ashish Kumar, Sreyam Sinha, Zoya Popovic and Khurram Afridi, *University of Colorado Boulder, United States*

Wednesday, September 26

8:30AM – 10:10AM

S101 | Solar PV Converters I

Room A107

Chairs: Hua Zhang; Fei Lu

8:30AM | Comparison of Secondary Topology of the LLC Converter for Photovoltaic Application [#19217]

Jinghui Yan, Xiaonan Zhao, Cheng-wei Chen and Jih-Sheng Lai, *Virginia Tech Future Energy Electronic Center, United States*

8:55AM | A High-Performance Cost-Effective Resonant Converter with a Wide Input Range in Solar Power Applications [#19307]

Fariborz Musavi, *Washington State University, United States*

9:20AM | An Extremely Low-Cost Multi-Panel PV Emulator for Research and Education [#19361]

Sanchit Mishra, Siddharth Raju, Abhijit Kshirsagar and Ned Mohan, *University of Minnesota, United States*

9:45AM | Transformerless Three Phase NPC Inverter With Reduced Switches [#19441]

Liwei Zhou, Feng Gao, Weiqi Wang and Matthias Preindl, *Columbia University, United States; Shandong University, China*

S102 | Microgrid Control-III

Room B117

Chairs: Mehdi Narimani; Ke Ma

8:30AM | A Droop Based Controller for Super-capacitor to Compensate the Transient Current and Pulsed Load in DC Microgrid [#18765]

Duy-Hung Dam, Sung-Jin Choi and Hong-Hee Lee, *University of Ulsan, Korea (South)*

8:55AM | Slim DC-Link Three-Phase PWM Converter with Full Symmetrical Sequence Current Capability for Voltage Rebalancing in Weak LV Networks [#18873]

Markus Holbein and Gerd Griepentrog, *Technical University of Darmstadt, Germany*

9:20AM | Distributed Coordinated Control of AC/DC Microgrid Voltage Containing Electric Vehicles [#19444]

Meiqin Mao, Yufeng Liu, Yangyang Wang, Liuchen Chang and Nikos Hatzigiorgiou, *Hefei University of Technology, China; University of New Brunswick, Canada; National Technical University of Athens, Greece*

9:45AM | Reducing Energy Consumption In Industrial Plants Using Behind the Meter Conservation Voltage Reduction [#19645]

Sathish Jayaraman, Mohammadreza Miranbeigi, Prasad Kandula, Trevor Grant and Deepak Divan, *Georgia Tech, United States; Candura Instruments, Canada*

S103 | Electric Drive-Trains

Room C120

Chairs: Jae-Do Park; Bulent Sarioglu

8:30AM | A Restart Strategy of a Rotating Induction Machine for Inrush Current Elimination [#18527]

Liangju Tao, Jian Li, Ronghai Qu, Junhua Chen and Kun He, *Huazhong University of Science and Technology, China*

8:55AM | Regenerative Braking Performance of Different Electric Vehicle Configurations Considering Dynamic Low Speed Cutoff Point [#18565]

Shoeib Heydari, Poria Fajri, Iqbal Husain and Jong-Won Shin, *University of Nevada, Reno, United States; North Carolina State University, United States; Chung-Ang University, Korea (South)*

9:20AM | Busbar Design for Distributed dc-Link Capacitor Banks for Traction Applications [#19388]

Rana Alizadeh, Marcelo Schupbach, Tyler Adamson, Juan Carlos Balda, Yue Zhao, Shanshan Long, Chirag Rajan Kharangate, Mehdi Asheghi and Kenneth E Goodson, *University of Arkansas, United States; Wolfsped, United States; Stanford University, United States*

9:45AM | Development and Optimization of a Hybrid Coupled Inductor Pair for High Power and High Density Multi-Phase DC-DC Converters [#19546]

Yu Du, Taosha Jiang, Tero Viitanen, Jukka-Pekka Kittila and Teemu Salmia, *ABB Inc., United States; ABB Oy, Finland*

S104 | Multi-Level Converters 3

Room B119

Chairs: Abhijit Kshirsagar; Milijana Odavic

8:30AM | Model Predictive Circulating Current Regulator for Single-Phase Modular Multilevel Converter [#19123]

Joan-Marc Rodriguez-Bernuz and Adria Junyent-Ferre, PhD Student, *United Kingdom; Lecturer, United Kingdom*

8:55AM | Hybrid Modular Multilevel Converter Configurations for Low-Frequency Operation [#18539]

Qichen Yang and Maryam Saeedifard, *Georgia Institute of Technology, United States*

9:20AM | IGBT-based Direct AC/AC Modular Multilevel Converters for Pumped Hydro Storage Plants [#18768]

Michail Vasiladiotis, Remo Baumann, Christoph Haederli and Juergen Steinke, *ABB Switzerland Ltd., Switzerland*

9:45AM | Integrating Phase-Shifted Pulse-Width Modulation to Model Predictive Current Control of Modular Multilevel Converters [#18085]

Dehong Zhou, Shunfeng Yang and Yi Tang, *Nanyang Technological University, Singapore*

S105 | DC-DC Non-Isolated 3

Room C122

Chairs: Dong Cao; Lijung He

8:30AM | A Modular Cascaded Multilevel Buck Converter Based on GaN Devices Designed for High Power Envelope Elimination and Restoration Applications [#18409]

Chao Wang, Peiwen Xing, Liang Zhang, Kui Wang and Yongdong Li, *Tsinghua University, China; Beijing Shengfeifan Electronic System Technology, China*

8:55AM | A Low Current-Ripple Coupled-Inductor Step-Up DC-DC Converter for Voltage-Multiplier Topology Solar PV Applications [#18188]

Abdulhakeem Alsaleem, Abdullah Bubshait and Marcelo Simoes, *Colorado School of Mines, United States; King Faisal University, Saudi Arabia*

9:20AM | A Burst-Mode Control Method for Phase-Shift Controlled Switched-Capacitor-based Resonant Converters [#18903]

Hadi Setiadi and Hideaki Fujita, *Tokyo Institute of Technology, Japan*

9:45AM | Non-Inverting Three-Level Buck-Boost Converter for Wide Voltage Range Application [#18472]

Fang Li, Ruixiang Hao, Haodong Lei, Xiaojie You, Chong Ke and Jian Wang, *Beijing Jiaotong University, China, China*

S106 | Modeling and Control of Grid Connected Converter 1

Room B116

Chairs: Yunwei (Ryan) Li; Karthik Kandasamy

8:30AM | Robust AC Voltage Controller With Harmonic Elimination for Stand-Alone and Weak-Grid-Connected Operation [#18751]

Diego Perez-Esteviz, Jesus Doval-Gandoy and Josep Guerrero, *University of Vigo, Spain; Aalborg University, Denmark*

8:55AM | A Voltage Sensorless Control of a Three Phase Grid Connected Inverter Based on Lyapunov Energy Function Under Unbalanced Grid Voltage Condition [#18094]

Vikram Roy Chowdhury, Subhajyoti Mukherjee and Jonathan Kimball, *Missouri University of Science and Technology, United States*

9:20AM | Variable Switching Frequency PWM for Three-Level Grid-Connected Inverters with LCL Filters [#18163]

Xuan Zhao, Jianan Chen and Dong Jiang, *Huazhong University of Science and Technology, China*

9:45AM | Decentralized Synchronization of AC-Stacked Voltage Source Converters [#18614]

M a Awal, Hui Yu, Iqbal Husain, Wensong Yu and Srdjan Lukic, *North Carolina State University, United States*

S107 | Stability in Power Converters 2

Room C121

Chairs: Xiongfei Wang; Samir Kouro

8:30AM | Discrete-Time Modeling and Stability Analysis of Peak-Current-Mode Controlled Buck Converter with Constant Current Load [#18373]

Shuhan Zhou, Guohua Zhou, Jianping Xu, Taiqiang Cao, Yanyan Jin and Ping Yang, *Southwest Jiaotong University, China; Xihua University, China; Chengdu Technological University, China*

8:55AM | Impedance Modeling and Stability Analysis of Dual-Active Bridge Converter Interfacing DC Grids [#19195]

Jingxin Hu, Zheng An, Shenghui Cui, Nurhan Rizqy Averous and Rik W. De Doncker, *PGS, E.ON Energy Research Center, RWTH Aachen, Germany; CDE, Georgia Institute of Technology, United States*

9:20AM | Active Damping of LCL filters with All-pass Filters Considering Grid Impedance Variations and Parameter Drifts [#19480]

Wenli Yao, Yongheng Yang, Yan Xu, Frede Blaabjerg, Shuyong Liu and Gary Wilson, *Nanyang Technological University, Singapore; Aalborg University, Denmark; Rolls-Royce Singapore Pte. Ltd, Singapore*

9:45AM | Harmonic Suppression and Stability Enhancement for Grid-Connected Inverter Based on UPQC [#18955]

Zhaohui Ni, Qiang Qian, Shaojun Xie, Jiming Xu and Bo Zeng, *Nanjing University of Aero. and Astronautics, China*

S108 | Modeling and Control of DC-AC Converters 2

Room A108

Chairs: Jian Sun; Feng Gao

8:30AM | Disturbance Predictive Control of the LC Coupled Voltage Source Inverter [#18775]

Lucas Koleff, Bruno Angelico, Eduardo Pellini and Lourenco Matakas, *University of Sao Paulo, Brazil*

8:55AM | Digital Variable Frequency Control of a Single-Phase Energy-Buffered Inverter with Multiple Modulation Strategies [#19199]

Regina Ramos, Diego Serrano, Jesus A. Oliver, Pedro Alou and Jose A. Cobos, *Universidad Politecnica de Madrid, Spain*

9:20AM | ZVS Turn-on Triangular Current Mode (TCM) Control for Three Phase 2-Level Inverters with Reactive Power Control [#19322]

Nidhi Haryani, Blngyao Sun and Rolando Burgos, *CPES, Virginia Tech., United States*

9:45AM | DC Bus Regulation in Cascaded Three Phase AC Power Converters with only Decoupling Capacitors [#19499]

Mahima Gupta and Giri Venkataramanan, *University of Wisconsin – Madison, United States*

S109 | Modelling and Analysis Methods 1

Room B112

Chairs: Vandana Rallabandi; Shanelle Foster

8:30AM | Estimation of PWM-Induced Iron Loss in IPM Machines Incorporating the Impact of Flux Ripple Waveshape and Nonlinear Magnetic Characteristics [#18670]

Le Chang, Thomas Jahns and Rolf Blissenbach, *University of Wisconsin – Madison, United States; General Motors Global Propulsion Systems, United States*

8:55AM | Theoretical and Experimental Investigation of the Brushless Doubly-Fed Machine with a Multiple-Barrier Rotor [#19172]

Peng Han, Julia Zhang and Ming Cheng, *The Ohio State University, United States; Southeast University, China*

9:20AM | A Mission Profile Emulator for Permanent Magnet Synchronous Machine Drive System Based on Single-Phase H-Bridge Circuit [#18702]

Yubo Song, Ran Cheng and Ke Ma, *Shanghai Jiao Tong University, China*

9:45AM | Analytical Methods for Spatially Varying MMF Vectors to Adjust Back-EMF Harmonics and Torque Ripple in Variable Magnetization Pattern Machines [#19186]

Ryoko Imamura and Robert Lorenz, *UW-Madison, WEMPEC, United States*

S110 | Magnetic Gears and Low Speed Machines

Room B118

Chairs: Siavash Pakdelian; Ziaur Rahman

8:30AM | Electromagnetic and Mechanical Design of a Hermetically Sealed Magnetic Gear for a Marine Hydrokinetic Generator [#19526]

Hossein Baninajar, Sina Modaresahmadi, Jonathan Bird and Wesley Williams, *Portland State University, United States; University of North Carolina at Charlotte, United States*

8:55AM | A Magnetically Geared Lead Screw without Translator Skewing [#19067]

Mojtaba Bahrami Kouhshahi, Jonathan Bird, Joshua Kadel, Wesley Williams and Andrew Jannsen, *Portland State University, United States; University of North Carolina at Charlotte, United States*

9:20AM | Controlled Backdrivability of Radial-Gap Magnetic-Screw Type RotLin Actuator [#19038]

Christophe Cyusa and Yasutaka Fujimoto, *Yokohama National University, Japan*

9:45AM | Comparison of Surface Permanent Magnet Coaxial and Cycloidal Radial Flux Magnetic Gears [#19020]

Matthew Gardner, Matthew Johnson and Hamid Toliyat, *Texas A and M University, United States*

S111 | Estimation Techniques for Electric Drives

Room B110

Chairs: Mazharul Chowdhury; Giacomo Scelba

8:30AM | Real-Time Parameter Estimation in Back-EMF Self-Sensing Mode with the Synergy of Induction Machine Deadbeat-Direct Torque and Flux Control Drives [#19174]

Kang Wang, Noor Baloch and Robert Lorenz, *University of Wisconsin-Madison, United States; Yaskawa Electric Corporation, Japan*

8:55AM | Temperature Estimation of Field-Oriented Control Induction-Motor Based on DC-Current Injection Suitable for Low Inertia [#18743]

Fernando Baneira, Lucian Asiminoaei, Jesus Doval-Gandoy, Hernan Miranda, Alejandro Yepes and Jens Godbersen, *University of Vigo, Spain; Danfoss Drives A/S, Denmark*

9:20AM | Magnet Temperature Estimation in Permanent Magnet Synchronous Machines Using the High Frequency Inductance [#18473]

David Reigosa, *University of Oviedo, Spain*

9:45AM | Online Parameter Estimation of a Brushless Synchronous Starter/Generator with Signal Injection [#18259]

Shuai Mao, Weiguo Liu, Ningfei Jiao, Jichang Peng and Zan Zhang, *Northwestern Polytechnical University, China*

S112 | Predictive Control of Electric Drives

Room B113

Chairs: Michael Harke; Yue Zhao

8:30AM | Multi-Step Model Predictive Control for a High-Speed Medium-Power PMSM [#19069]

Stefan Walz, Radu Lazar and Marco Liserre, *Christian-Albrechts-University Kiel, Germany; Danfoss Drives A/S, Denmark*

8:55AM | Model Predictive Pulse Pattern Control of Medium-Voltage Neutral-Point-Clamped Inverter Drives [#19126]

Tobias Geyer, Vedrana Spudic, Wim van der Merwe and Ester Guidi, *ABB Switzerland, Switzerland*

9:20AM | A Simple Method to Compensate Steady State Errors in the Deadbeat Predictive Control of the PMSM [#18998]

Cheng Xu and Shuai Lu, *Chongqing University, China*

9:45AM | A New Deadbeat Model Predictive Control of Induction Motor Drives without Speed Sensor [#19363]

Yongchang Zhang, Boyue Zhang and Yuning Bai, *North China University of Technology, China*

S113 | Thermal Management In Power Converters

Room A105

Chairs: Jun Wang; Juan Sabate

8:30AM | Thermal Characterization of Power Semiconductors with H-bridge Testing Circuit [#18634]

Ye Zhu and Ke Ma, *Shanghai Jiao Tong University, China*

8:55AM | Comparison of Cooling Solutions to Improve Overload Capability of Power Semiconductor Devices [#19117]

Rostan Rodrigues, Taosha Jiang and Debrup Das, *ABB Inc, United States*

9:20AM | Thermal Comparison of Planar Versus Conventional Transformers Used in LLC Resonant Converters [#19524]

Rouhollah Shafaei, Mohammad Ali Saket and Martin Ordenez, *The University of British Columbia (UBC), Canada*

9:45AM | Thermal Modeling and Sizing of PCB Copper Pads [#19325]

Yanfeng Shen, Huai Wang and Frede Blaabjerg, *Aalborg University, Denmark*

S114 | LED Drivers

Room B111

Chairs: Marco Dalla Costa; Xiaofeng Lyu

8:30AM | A Novel Color Control Method for Multi-Color LED Systems to Achieve High Color Rendering Indexes [#18243]

Xiaoqing Zhan, Wenguan Wang and Henry Shu-hung Chung, *City University of Hong Kong, Hong Kong*

8:55AM | An Electrolytic Capacitor-less AC/DC LED Driver with a Low Power Processing Auxiliary Circuit and Ceramic Capacitors for Ripple Power Decoupling [#18848]

Zhenyu Shan, Xiaomei Chen, Shengwen Fan, Juri Jatskevich and Chi K. Tse, *North China University of Technology, China; University of British Columbia, Canada; Hong Kong Polytechnic University, Hong Kong*

9:20AM | LED Driver Achieves Electrolytic Capacitor-Less and Flicker-Free Operation with an Energy Buffer Unit [#19305]

Peng Fang, Bo Sheng, Yan Zhang and Yan-Fei Liu, *Queen's University, Canada; Xi'An Jiao Tong University, China*

9:45AM | Parallel Energy Buffering LED Driver Achieves Electrolytic Capacitor-Less and Flicker-Free Operation [#19316]

Peng Fang, Bo Sheng, Wen-Bo Liu, Yan-Fei Liu and Paresh C Sen, *Queen's University, Canada*

Workshop: Special Session: Sustainable Energy Systems and Energy Sustainability

Room B114

Chairs: Sudip Mazumder

Workshop: Trends in SiC, GaN, and Diamond Power Semiconductor Devices

Room B115

Chairs: Tanya Gachovska

Wednesday, September 26

10:30AM – 12:10PM

S115 | Energy Storage Systems

Room A107

Chairs: Adel Nasiri; Rakesh Mitra

10:30AM | Critical Capacity Analysis for Optimal Sizing of PV and Energy Storage for a Household [#18806]

Brett Donnellan, Wen Soong and David Vowles, *The University of Adelaide, Australia*

10:55AM | Voltage Equalization Scheme for Onboard Supercapacitor Based on Sliding Mode Observer [#19381]

Hongwei Cao, Jianfeng Liu, Yanhui Zhou, Chengzhang Lyu, Heng Li and Zhiwu Huang, *Central South University, China*

11:20AM | Efficiency Analysis and Optimization Operation Method for the Energy Stored qZSI System [#19446]

Yujie Wang, Jie Dang, Sideng Hu, Zipeng Liang and Xiangning He, *Zhejiang University, China; Zhejiang University, China*

11:45AM | A PWM Based Adaptive Sliding Mode Dc-Dc Buck Converter Control and a Voltage and Parameter Observer Scheme for Battery Charge Applications [#19314]

Emeka Sunday, Adeola Balogun, Olorunfemi Ojo and Agoro Sodiq, *University of Lagos, Nigeria; Tennessee Technological University, United States*

S116 | Microgrid Control-IV

Room B117

Chairs: Grahame Holmes; Blane Wilson

10:30AM | Consensus-Based Cooperative Droop Control for Accurate Reactive Power Sharing in Islanded AC Microgrid [#19434]

Jiuyang Zhou, Meng-jiang Tsai and Po-tai Cheng, *National Tsing Hua University, Taiwan*

10:55AM | Real-Time Control and Operation for a Flexible Microgrid with Dynamic Boundary [#19442]

Yiwei Ma, Xiaotong Hu, He Yin, Lin Zhu, Yu Su, Fred Wang, Leon Tolbert and Yilu Liu, *University of Tennessee, United States*

11:20AM | Effect of Wireless Communication Delay on DC Microgrids Performance [#19519]

Mahmoud Saleh, Yusef Esa and Ahmed Mohamed, *The City College of New York, United States*

11:45AM | High Quality Voltage Regulation of Single Phase Autonomous Microgrids Under Nonlinear Load Conditions [#19703]

Afif Nazib, Donald Grahame Holmes and Brendan Peter McGrath, *RMIT University, Australia*

S117 | Modular Multilevel Converters

Room B111

Chairs: Suman Debnath; Jiangchao Qin

10:30AM | Synthetic-Inertia-Based Modular Multilevel Converter Frequency Control for Improved Micro-Grid Frequency Regulation [#18125]

Shunfeng Yang, Jingyang Fang, Yi Tang, Huan Qiu, Chaoyu Dong and Peng Wang, *Nanyang Technological University, Singapore; Tianjin University, China*

10:55AM | Triangular Current Mode For High Step Ratio Modular Multilevel DC-DC Converter [#18420]

Cristian Pineda, Javier Pereda, Xiaotian Zhang and Felix Rojas, *Pontificia Universidad Catolica de Chile, Chile; Xian Jiaotong University, China; University of Santiago of Chile, Chile*

11:20AM | Thermal Analysis of Modular Multilevel Converters Under Subsynchronous Oscillation [#19511]

Yongxia Liu, Jing Sheng, Yufei Dong, Renju Zheng, Wuhua Li, Xiangning He, Zhichao Zhou and Rui Xie, *Zhejiang University, China; Zhejiang Electric Power Design Institute of Chin, China*

11:45AM | Real-Time Simulation of Modular Multilevel Converters [#19741]

Suman Debnath, *Oak Ridge National Laboratory, United States*

S118 | Applications of Electric Propulsion

Room C120

Chairs: Suresh Gopalakrishnan; Wen Ouyang

10:30AM | Robust Predictive Control of 3L-NPC Converter Fed PMSM Drives for Electrical Car Applications [#19044]

Zhenbin Zhang, Jose Rodriguez and Ralph Kennel, *Shandong University, China; Universidad Andres Bello, Chile; TU-Muenchen, Germany*

10:55AM | Weight Minimization of LCL Filters for Aircraft Variable Frequency Starter/Generator System Based on Simplified Constraints Multi-Objective Models [#19261]

Zhao Dan, Shen Ke, Liu Weiguo, Lang Lang and Zhao Guodong, *Northwestern Polytechnical University, China*

11:20AM | Multi-Domain Design Optimization of dv/dt Filter for SiC-Based Three-Phase Inverters in High-Frequency Motor-Drive Applications [#19751]

Jiangbiao He, Cong Li, Anoop Jassal, Naveenan Thiagarajan, Yichao Zhang, Satish Prabhakaran, Carlos Feliz, James Graham and Xiaosong Kang, *GE Global Research, United States; GE Aviation, United States*

11:45AM | Comparison of Electrical Machine Types for Electrically Driven Engine Accessories Using Multiphysics Simulation Tools [#19773]

Lavanya Vadamodala, Shuvajit Das, Omer Gundogmus, Tausif Husain, Salman Harasis, Sifat Chowdhury, Yilmaz Sozer, Fernando Venegas and David Colavincenzo, *University of Akron, United States; Bendix CVS, United States*

S119 | Multi-Level Converters 4

Room B119

Chairs: Vito Giuseppe Monopoli; Koji Orikawa

10:30AM | A New Topology for Medium-Voltage Applications [#18551]

Guo Chen and Mehdi Narimani, *McMaster University, Canada*

10:55AM | An Improved PWM Strategy for "SiC+Si" Three-Level Active Neutral Point Clamped Converter in High-Power High-Frequency Applications [#19666]

Jiangbiao He, Di Zhang and Di Pan, *GE Global Research, United States*

11:20AM | A Real-Time Real-Power Emulator of a Medium-Voltage High-Speed Induction Motor Coupled With a Mechanical Load [#18401]

Saito Kenichiro and Akagi Hirofumi, *Tokyo institute of technology, Japan*

11:45AM | Development of A Flexible Modular Multilevel Converter Test-Bed [#19040]

Shuoting Zhang, Shuyao Wang, Nattapat Praisuwan, Le Kong, Li Yalong, Robert Martin, Fred Wang and Leon Tolbert, *The University of Tennessee, United States; Texas Instruments, United States; the University of Tennessee, United States*

S120 | DC-DC Converters

Room C122

Chairs: Hanh-Phuc Le; Ignacio Castro

10:30AM | Novel Transformer-Less DAB Converters for the Regulated First-Stage of a Two-Stage 48 V VRM [#18560]

Somnath Khatua, Debaprasad Kastha and Santanu Kapat, *Indian Institute of Technology Kharagpur, India*

10:55AM | A High-Power-Density High-Efficiency Three-Level Buck Converter for Cellphone Battery Charging Applications [#19106]

Yushi Liu, Ashish Kumar, Dragan Maksimovic and Khurram Afridi, *University of Colorado Boulder, United States*

11:20AM | A Comprehensive Comparison of MHz GaN-Based ZVS Step-Down Converters for Low Power Integrated On-Chip Applications [#19299]

Xiaonan Zhao, Chih-Shen Yeh, Cheng-Wei Chen and Jih-Sheng Lai, *Virginia Tech, United States*

11:45AM | A Novel ZVT Switched-Capacitor Converter for the Input-Stage of a Cascaded Two-Stage 48 V VRM [#19579]

Somnath Khatua, Debaprasad Kastha and Santanu Kapat, *Indian Institute of Technology Kharagpur, India*

S121 | Modeling and Control of Grid Connected Converter 2

Room B116

Chairs: Brandon Grainger; Pablo Garcia

10:30AM | Robust Constant Switching Frequency Predictive Current Control with a Dichotomy Solution for Three-Phase Grid-Connected Inverters [#18686]

Zhixun Ma, Xin Zhang, Jinsong He and Zheng Zeng, *Nanyang Technology University, Singapore; Nanyang Technological University, Singapore*

10:55AM | Precision State Space Resonant Filter Structures for Digital Fixed-Point Converter Control Systems [#18461]

Brendan McGrath, Carlos Teixeira and Grahame Holmes, *RMIT University, Australia*

11:20AM | Robust Feedback-Linearization Technique for Grid-Tied LCL Filter Systems Using Disturbance Estimation [#18385]

Ahmed Al-Durra and Rachid Errouissi, *Khalifa University of Science and Technology, United Arab Emirates*

11:45AM | Passive-Damped LCL Filter Optimization for Single-Phase Grid-Tied Inverters Operating in both Continuous and Discontinuous Current Mode [#19267]

Nam Hoai Le and Jun-ichi Itoh, *Nagaoka University of Technology, Japan*

S122 | Stability in Power Converters 3

Room C121

Chairs: Vladimir Blasko; Xiongfei Wang

10:30AM | Stability Analysis and Resonance Suppression in Converter System with Coupled LCL and LC filters [#18926]

Ran Cheng, Yubo Song and Ke Ma, *Shanghai Jiao Tong University, China*

10:55AM | DC Current Bus Distributed Power System and Its Stability Analysis [#18092]

Yuqi Wei, Quanming Luo, Si Chen, He Qingqing and Luowei Zhou, *Chongqing University, China*

11:20AM | Improved Real-Time Stability Assessment of Grid-Connected Converters Using MIMO-Identification Methods [#18151]

Roni Luhtala, Tommi Reinikka, Tomi Roinila, Tuomas Messo and Jussi Sihvo, *Tampere University of Technology, Finland*

11:45AM | A Stability Criterion Based on the Common Denominator of System-Level Transfer Functions for the Multiple Multifunctional Converter Systems [#18933]

Ye Zhu and Dehong Xu, *Zhejiang University, China*

S123 | Design by Optimization of Power Converters

Room A108

Chairs: Fred Wang; Francesco Tardelli

10:30AM | Design Method of DC Power Supply for Superposing 20kHz/100A Peak to Peak Sinusoidal Current with Several Hundred DC Current to Analyze Battery AC Impedance [#18868]

Jin Xu, Toshihiko Kishimoto and Noboru Shimosato, *Myway Plus Corporation, Japan*

10:55AM | Efficiency Comparison in Power Converters under Transient Operation Conditions: Application to Hybrid Energy Storage Systems [#19300]

Jorge Garcia, Cristina Gonzalez-Moran, Pablo Garcia and Pablo Arboleya, *University of Oviedo, Spain*

11:20AM | A Reduced-Order Technique for Stability Investigation of Voltage Source Inverters [#19167]

Aswad Adib, Fariba Fateh, Mohammad Shadmand and Behrooz Mirafzal, *Kansas State University, United States*

11:45AM | Rapid Co-optimisation of Turn-on and Turn-off Gate Resistor Values in DC:DC Power Converters [#19557]

Harry Dymond, Jeremy Dalton and Bernard Stark, *University of Bristol, United Kingdom*

S124 | Soft Magnetic Materials

Room B118

Chairs: Jose Antonino-Daviu; Alfredo Munoz

10:30AM | Investigation and Modeling of Local Degradation in Soft Magnetic Materials [#18601]

Marco Cossale, Martin Kitzberger, Gereon Goldbeck, Gerd Bramerdorfer, Dietmar Andessner and Wolfgang Amrhein, *Johannes Kepler University Linz, Austria; Linz Center of Mechatronics, Austria*

10:55AM | Characterization and Modeling of Soft Magnetic Materials for Improved Estimation of PWM-Induced Iron Loss [#18669]

Le Chang, Thomas Jahns and Rolf Blissenbach, *University of Wisconsin – Madison, United States; General Motors Global Propulsion Systems, United States*

11:20AM | Compaction of SMC Materials by Applying External Magnetic Fields to the Mold [#19625]

Emir Poskovic, Luca Ferraris, Enrico Pallavicini and Cavagnino Andrea, *Politecnico di Torino, Italy*

11:45AM | Embedded Stator End-Windings in Soft Magnetic Composite and Laminated Surface PM Machines [#19584]

Yik Ling Lim, Wen L. Soong, Nesimi Ertugrul and Solmaz Kahourzade, *The University of Adelaide, Australia*

S125 | Synchronous Reluctance Machines

Room B112

Chairs: Abraham Gebregergis; Koji Kato

10:30AM | FEA-Augmented Design Equations for Synchronous Reluctance Machines [#19616]

Simone Ferrari and Gianmario Pellegrino, *Politecnico di Torino, Italy*

10:55AM | Design Improvement of Dual Pole Synchronous Reluctance Motor [#19405]

Bikrant Poudel, Ebrahim Amiri and Dimitrios Charalampidis, *University of New Orleans, United States*

11:20AM | Analytical Calculation of the Air-Gap Flux Density and Magnetizing Inductance of Synchronous Reluctance Machines [#18323]

Hang Shao, Sufei Li and Thomas Habetler, *Georgia Institute of Technology, United States*

11:45AM | Asymmetric Synchronous Reluctance Rotor Geometry Design: A Practical Approach [#19021]

Giacomo Bacco and Nicola Bianchi, *University of Padova, Italy*

S126 | Induction Motor Drives

Room B110

Chairs: Prerit Pramod; Rakib Islam

10:30AM | Improvement of Output Voltage Waveform in Dual Inverter Fed Open-Winding Induction Motor at Low Speed Area [#18887]

Akihito Mizukoshi and Hitoshi Haga, *Nagaoka University of Technology, Japan*

10:55AM | Torque and Speed Response Differences between Deadbeat-Direct Torque and Flux Control and Indirect Field Oriented Control for Induction Machine Drives [#19181]

Kang Wang, Noor Baloch and Robert Lorenz, *University of Wisconsin-Madison, United States; Yaskawa Electric Corporation, Japan*

11:20AM | Improved Sensorless Speed Control Method for Linear Induction Motor Based Extended Adaptive Full-Order Observer [#18284]

Renjun Dian, Wei Xu, Dong Hu and Yi Liu, *Huazhong University of Science and Technology, China*

11:45AM | Modulated Model Predictive Direct Power Control of DFIM Considering Magnetic Saturation Effects [#19237]

Shafiq Ahmed Odhano, Sandro Rubino, Pericle Zanchetta and Radu Bojoi, *The University Of Nottingham, United Kingdom; Politecnico di Torino, Italy*

S127 | Predictive and Other Control Techniques for Electric Drives

Room B113

Chairs: Giulio De Donato; Pinjia Zhang

10:30AM | Model-Predictive Flux Control of 3L-NPC Fed Induction Motor Drives with Stator Flux Error Based Two-stage Optimization [#18017]

Ilham Osman, Xiao Dan, S M Showybul Islam Shakib and Rahman Faz, *The University of New South Wales, Australia*

10:55AM | Model Predictive Direct Flux Vector Control of Surface Permanent Magnet Motor Drives [#19651]

Sandro Rubino, Radu Bojoi, Eric Armando and Alberto Tenconi, *Politecnico di Torino, Italy*

11:20AM | Fast and Robust Model Free Predictive Control for Synchronous Reluctance Motor Drives [#18745]

Paolo Gherardo Carlet, Fabio Tinazzi, Mauro Zigliotto and Silverio Bolognani, *University of Padova, Italy*

11:45AM | Harmonic Torque Reduction Using Adaptive Sector-Based Torque Feedforward Method for PMSM Drive [#18333]

Jun Lee and Jung-ik Ha, *Seoul National University, Korea (South)*

S128 | WBG Gate Driver Design

Room A105

Chairs: Shuo Wang; Han Peng

10:30AM | Design of Gate Drive Power Supply with Air Core Transformer for High Dv/Dt Switching [#19365]

Krishna Mainali, Ruxi Wang, Juan Sabate, Yash Veer Singh and Steven Klopman, *General Electric Global Research, United States*

10:55AM | A New Proportional Base Driver Technique for Minimizing Driver Loss of SiC BJT [#18546]

Shiwei Liang, Linfeng Deng, Zhigao Peng, Yize Shi, John Shen and Jun Wang, *Hunan University, China; Hunan University, China; Hunan University, United States*

11:20AM | A High-Speed Gate Driver with PCB-Embedded Rogowski Switch Current Sensor for a 10 kV, 240A, SiC MOSFET Module [#19445]

Jun Wang, Slavko Mocevic, Yue Xu, Christina DiMarino, Rolando Burgos and Dushan Boroyevich, *CPES, Virginia Tech, United States*

11:45AM | Voltage Balancing Control for Series Connected MOSFETs Based on Time Delay Adjustment Under Start-Up and Steady-State Operations [#19717]

Keiji Wada and Katsuya Shingu, *Tokyo Metropolitan University, Japan*

Workshop: Special Session: Sustainable Energy Systems and Energy Sustainability

Room B114

Chairs: Sudip Mazumder

Panel Session: Challenges of Simulating Power Electronic Systems in Real Time – Sampling Frequency vs. Model Fidelity

Room B115

Chairs: Tony Lennon

Wednesday, September 26

2:00PM – 3:40PM

S129 | Wind Energy Applications

Room A107

Chairs: Tausif Husain; Paul Barendse

2:00PM | Wind Energy Conversion System Based On DFIG With Three-Phase Series Active Filter Operating With Floating Capacitors [#19227]

Italo Andre Cavalcanti de Oliveira, Cursino Brandao Jacobina, Nady Rocha and Phelipe Leal Serafim Rodrigues, *UFCG, Brazil; UFPB, Brazil*

2:25PM | A SiC-Based, Fully Soft-Switched Bridge-less AC/DC Converter with High Voltage Conversion Ratio Based on Current Fed Voltage Quadrupler Modules for MVDC Conversion in Wind Energy Application [#19326]

Mehdi Abbasi and John Lam, *York University, Canada*

2:50PM | Improved DFIG Control Strategy under Three Phase Asymmetrical Grid Faults [#19707]

Yipeng Song, Dao Zhou and Frede Blaabjerg, *Aalborg University, Denmark*

3:15PM | Small Signal Dynamic Model of a Self-Synchronising Current Regulated Rectifier for a Permanent Magnet Wind Energy Conversion System (WECS) [#19719]

Brendan McGrath, Oscar Lopez Sanchez and Grahame Holmes, *RMIT University, Australia; University of Vigo, Spain*

S130 | HVDC Converter Systems

Room B117

Chairs: Liyan Qu; Wei Qiao

2:00PM | Improved Fault Current Calculation Method for Pole-to-Pole Faults in MMC Multi-Terminal HVDC Grids Considering Control Dynamics [#18766]

Marius Langwasser, Giovanni De Carne, Marco Liserre and Matthias Biskoping, *University of Kiel, Germany; ABB Research Center Ladenburg, ABB AG, Germany*

2:25PM | Series-Stacked Hybrid Modular Converter with DC Fault Blocking Capability for HVDC Application [#18946]

Mahendra Ghat and Anshuman Shukla, *Indian Institute of Technology Bombay, India*

2:50PM | Modular Universal Converter for MVDC Applications [#19663]

Liran Zheng, Xiangyu Han, Zheng An, Rajendra Kandula, Karthik Kandasamy, Maryam Saeedifard and Deepak Divan, *Georgia Institute of Technology, United States*

3:15PM | Modular Directed Series Multilevel Converter for HVDC Application [#18953]

Siba Kumar Patro and Anshuman Shukla, *Indian Institute of Technology Bombay, India*

S131 | Power Quality

Room B111

Chairs: Babak Parkhideh; Iqbal Husain

2:00PM | Mitigating the Harmonics of Parallel-inverter Systems Considering Nonlinear Loads and Deadtime [#18355]

Jiazhe Liu, Yang Qi and Yi Tang, *Nanyang Technological University, Singapore*

2:25PM | Artificial Neural Network based Dynamic Voltage Restorer for Improvement of Power Quality [#18443]

Md. Samiul Haque Sunny, Eklas Hossain, Mikal Ahmad and Fuad Un-Noor, *Khulna University of Engineering and Technology, Bangladesh; Oregon Tech, United States*

2:50PM | Modified Particle Swarm Optimization Based Harmonic Minimization in Hybrid Cascaded Multilevel Inverter [#19052]

Abhinandan Routray, Rajeev Kumar Singh and Ranjit Mahanty, *Indian Institute of Technology (BHU), Varanasi, India*

3:15PM | An Active Compensator to Counteract the Effects of Grid Impedance in Grid-Connected Inverter with an LCL Filter [#19353]

He Yuanbin, Hang Lijun, Xie Xiaogao, Chung Shu-hung and Zhan Xiaoqing, *Hangzhou Dianzi University, China; City University of Hong Kong, Hong Kong*

S132 | Batteries Modelling And Management 1

Room C120

Chairs: Phillip Kollmeyer; Mazharul Chowdhury

2:00PM | Application Layer Design for Smart Battery Pack Control with Wi-Fi Feedback [#19642]

Jan-Ludwig Lafrenz, Phillip Scheff, Mattia Ricco, Kerekes Tamas, Rasmus Loevenstein Olsen, Teodorescu Remus and Marco Liserre, *University of Kiel, Germany; Aalborg University, Denmark*

2:25PM | Differential Power Processing Three-port Dual Active Bridge Converter for Active Balancing in Large Battery Packs [#19301]

Dorai Babu Yelaverthi, Muhammad Muneeb Ur Rehman and Regan Zane, *Utah State University, United States*

2:50PM | A Cooperative Cell Balancing Approach for Reconfigurable Supercapacitor Energy Storage Systems [#19409]

Fu Jiang, Zhiqiang Meng, Heng Li, Hongtao Liao, Yun Jiao, Muxin Han, Jun Peng and Zhiwu Huang, *Central South University, China*

3:15PM | Efficient On-Board Health Monitoring for Multicell Lithium-Ion Battery Systems Using Gaussian Process Clustering [#19577]

Taesic Kim, Daewook Kang, Chang-Yeol Oh, Myoung-ho Kim and Juwon Baek, *Texas A and M University-Kingsville, United States; Korea Electrotechnology Research Institute, Korea (South)*

S133 | DC-DC Isolated 1

Room C122

Chairs: David Perreault; Ashish Kumar

2:00PM | Current Stress Optimization and Efficiency Increase of DAB with Triple-Phase-Shift Control Based on 2-Dimensional Ergodicity Method [#19373]

Qing Gu, Liqiang Yuan, Jintong Nie, Jianning Sun and Zhengming Zhao, *Tsinghua University, China*

2:25PM | A Zero-voltage-switched Isolated Resonant Converter with Reduced Voltage Stress [#18290]

Ling Gu and Kai Peng, *Nanjing University of Science and Technology, China*

2:50PM | Three-Port Series-Resonant Converter DC Transformer with Integrated Magnetics for High Efficiency Operation [#18863]

Kevin Tomas Manez, Zhe Zhang and Yudi Yao, *Technical University of Denmark, Denmark*

3:15PM | Synergetic Control of High-Frequency-Link Based Multi-Port Solid State Transformer [#19639]

Kai Li, Zhengming Zhao, Liqiang Yuan, Chunpeng Zhang, Wusong Wen and Jianning Sun, *Tsinghua University, Beijing, China*

S134 | Multi-Level Converters 5

Room B119

Chairs: Adam Skorek; Harish Krishnamoorthy

2:00PM | A New Seven-Level Active Boost Neutral Point Clamped (7L-ABNPC) Inverter [#19114]

Yam Siwakoti, Stephan Liese, Akshay Mahajan, Aswin Palanisamy, Dan Rogers and Frede Blaabjerg, *University of Technology Sydney, Australia; Fraunhofer Institute for Solar Energy System, Germany; Oxford University, United Kingdom; Aalborg University, Denmark*

2:25PM | A Super-Junction MOSFET-based 99%+ Efficiency T-Type Multilevel Converter [#18171]

Neville McNeill, Xibo Yuan and Bosen Jin, *University of Strathclyde, United Kingdom; University of Bristol, United Kingdom*

2:50PM | Multilevel Converter Topologies with Internally Paralleled Power Stages [#18795]

Zhongyi Quan and Yunwei Li, *University of Alberta, Canada*

3:15PM | Dual-Model Predictive Control for Cascaded H-Bridge Multilevel Active Rectifier with DC Voltage Balancing in a Solid-State Transformer [#18893]

Merlin Chai, Naga Brahmendra Yadav Gorla and Sanjib Kumar Panda, *National University of Singapore, Singapore*

S135 | Grid Synchronization Techniques

Room B116

Chairs: Yongheng Yang; Yongsug Suh

2:00PM | Single-Phase Multiple Delayed Signal Cancellation Filter-Based Enhanced Phase-Locked Loop for Accurate Estimations of Grid Voltage Information [#18077]

Srinivas Gude and Chia-Chi Chu, *National Tsing Hua University, Taiwan*

2:25PM | Dynamic Phasor Modeling of SRF-PLL-Based Grid-Tie Inverter Under Islanded Conditions [#18733]

Dev Venkatramanan and Vinod John, *Indian Institute of Science, Bangalore, India*

2:50PM | Linear Phase Locked Loop [#19600]

Vlatko Miskovic, Vladimir Blasko, Thomas Jahns, Robert Lorenz and Jorgensen Per, *Danfoss Drives, United States; United Technologies Research Center, United States; University of Wisconsin – Madison, United States*

3:15PM | Evaluation of Advanced PLL Concepts for Enhanced Fault Ride Through Response [#19113]

Hendrik Just, Huoming Yang and Sibylle Dieckerhoff, *Technische Universitaet Berlin, Germany; Shanghai Jiao Tong University, China*

S136 | Power Quality

Room B113

Chairs: Yam Siwakoti; Petar Grbovic

2:00PM | Adaptive Voltage Saturation Algorithms for Selective Harmonic Control in Shunt Active Power Filters [#19232]

Albino Amerise, Michele Mengoni, Luca Zarri, Angelo Tani, Gabriele Rizzoli and Domenico Casadei, *University of Bologna, Italy*

2:25PM | Power Factor Correction in Isolated SEPIC Converter Fed SRM Drive [#18728]

Aniket Anand and Bhim Singh, *IIT Delhi, India*

2:50PM | Robust Current Control Method for LCL-Type Shunt Active Power Filters with Inverter-Side Current Feedback Active Damping [#18908]

Lei Yang and Jia-qiang Yang, *Zhejiang University, China*

3:15PM | Harmonics Suppression and Control Design for General-Purpose Mission Profile Emulator of Three-phase Power Electronics System [#18700]

Yubo Song, Ran Cheng and Ke Ma, *Shanghai Jiao Tong University, China*

S137 | Reliability and Fault Tolerance in Multilevel Converters

Room A108

Chairs: Luca Solero; Peter Lehn

2:00PM | Detection and Identification of Power Switch Failures Using Discrete Fourier Transform for Fault-Tolerant Operation of Flying Capacitor Multilevel Converters [#18713]

Sai Tang, Xin Yin, Daming Wang, Chao Zhang, Z. John Shen and Jun Wang, *Hunan University, China*

2:25PM | Submodule Fault Diagnosis based on Capacitor Voltage Sliding-Mode Observer and Fast Diagnosis Criterion for Modular Multilevel Converter [#18936]

Zhao Shanshan, Li Zuoyu, Chen Yu, Peng Li, Zou Xudong and Kang Yong, *Huazhong univ. of Sci. and Tech., China; Inovance Technology Co., Ltd., China*

2:50PM | Submodule Level Power Loss Balancing Control for Modular Multilevel Converters [#18522]

Zhongxu Wang, Huai Wang, Yi Zhang and Frede Blaabjerg, *Aalborg University, Denmark*

3:15PM | Ageing Mitigation Control Method for Power Devices in Multilevel Inverters in Standalone PV Systems [#19631]

Mokhtar Aly, Emad M. Ahmed and Masahito Shoyama, *Aswan University, Egypt; Jouf University, Saudi Arabia; Kyushu University, Japan*

S138 | Materials and Loss Analysis

Room B118

Chairs: Alfredo Munoz; Jose Antonino-Daviu

2:00PM | Modeling and Verification of Electrical Stress in Inverter-Driven Electric Machine Windings [#19748]

Yanyan Xie, Julia Zhang, Franco Leonardi, Alfredo Munoz, Feng Liang and Michael Degner, *The Ohio State University, United States; Ford Motor Company, United States*

2:25PM | Analysis and Reduction of Circulating Current Loss of Armature Wires in Permanent Magnet Synchronous Machines [#18219]

Katsumi Yamazaki, Takahiro Furuhashi, Haiyan Yui, Hideki Ohguchi, Satoshi Imamori and Masao Shuto, *Chiba Institute of Technology, Japan; Fuji Electric Co., Ltd., Japan*

2:50PM | EM-Thermal Coupled Simulation Under Various Fault Conditions of a Triple Redundant 9-Phase PMASynRM [#18271]

Yanwen Shi, Jiabin Wang and Bo Wang, *University of Sheffield, United Kingdom*

3:15PM | Additive Manufacturing of Shaped Profile Windings for Minimal AC Loss in Electrical Machines [#19278]

Nick Simpson and Phil Mellor, *University of Bristol, United Kingdom*

S139 | Synchronous Machines

Room B112

Chairs: Cong Ma; Nicola Bianchi

2:00PM | Investigation of Damper Inter-Bar Currents in Hydro-Generators with Unbalanced Load [#18217]

Yang Zhan, Kangkang Kong, Guorui Xu and Haisen Zhao, *North China Electric Power University, China*

2:25PM | Design Optimization of Cylindrical-Rotor Synchronous-induction Motors [#19053]

Mkhululi Mabhula and Maarten. J Kamper, *Stellenbosch Univeristy, South Africa*

2:50PM | Unstable Equilibrium Points in Standalone Synchronous Generator [#19754]

Edwin Fonkwe Fongang, James Kirtley, Murilo Almeida and Ivan Celanovic, *Massachusetts Institute of Technology, United States; Typhoon HIL, United States*

3:15PM | Airgap Search Coil-Based Detection of Damper Bar Failures in Salient Pole Synchronous Motors [#18049]

Jangho Yun, Sanguk Park, Chanseung Yang, Sang Bin Lee, Jose Antonino-Daviu, Mladen Sasic and Greg Stone, *Hyundai Electric Co., Korea, Republic of; Korea University, Korea, Republic of; Universitat Polytechnica de Valencia, Spain; Quaitrol Corp – Iris Power Engineering, Canada*

S140 | Electric Drives with IPM Motors

Room B110

Chairs: David Diaz Reigosa; Rashmi Prasad

2:00PM | Distortion-Minimizing Flux Observer for IPMSM Based on Frequency-Adaptive Observers [#18632]

Hyeon-Sik Kim, Seung-Ki Sul, Hyunjae Yoo and Jaeyoon Oh, *Seoul National University, Korea (South); LG Electronics. Co., Korea (South)*

2:25PM | Experimental Identification of IPMSM Flux-Linkage Considering Spatial Harmonics for High-Accuracy Simulation of IPMSM Drives [#18814]

Joohyun Lee, Yong-Cheol Kwon and Seung-Ki Sul, *Seoul National University, Korea (South)*

2:50PM | Low Cost and High power density IPM Machine Drive System for Micro-Hybrid Application [#18999]

Lei Hao, Chandra Namuduri, Chandra Mavuru, Gopalakrishnan Suresh and Nehl Thomas, *General Motors, United States; General Motors, India; General Motors, United States*

3:15PM | Analytic Overmodulation Method and Application to IPMSM Current Control [#19094]

Seungmin Hong, Heekwang Lee, Kwanghee Nam and Jaehong Kim, *POSTECH, Korea, Republic of; Chosun University, Korea, Republic of*

S141 | Power Modules 2: Current Sharing and Reliability

Room A105

Chairs: Ty McNutt; Montie Vitorino

2:00PM | Die Current Balancing of a Press-Pack SiC MOSFET [#19315]

Nan Zhu, Min Chen, Rui Yan, Alan Mantooth and Dehong Xu, *Zhejiang University, China; University of Arkansas, United States*

2:25PM | Long Term Reliability of Power Modules with Low Amplitude Thermomechanical Stresses and Initial Defects [#18408]

Borong Hu, Sylvia Konaklieva, Li Ran, Nadia Kourra, Mark A. Williams, Wei Lai and Phil Mawby, *Chongqing University; The University of Warwick, United Kingdom; The University of Warwick, United Kingdom; Chongqing University, China*

2:50PM | Magnetic Integration into SiC Power Module for Current Balancing [#18811]

Zichen Miao and Khai Ngo, *Virginia Tech, United States*

3:15PM | Short Circuit Reliability of Automotive Traction Inverter Power Module [#19277]

Krishna Prasad Bhat, Chingchi Chen and Jonathan Barker, *Ford Motor Company, United States*

Workshop: Sustainable Energy Systems and Energy Sustainability

Room B114

Chairs: Sudip Mazumder

Collaboration between Industry and Academia: How to Foster it?

Room B115

Chairs: Sara Roggia; Giovanna Oriti

Wednesday, September 26

4:00PM – 5:40PM

S142 | Grid Integration of Renewable Energy Systems

Room A107

Chairs: Yilmaz Sozer; Dinesh Kumar

4:00PM | A Soft-Switched Four-Port DC-DC Converter for Renewable Energy Integration [#18348]

Jianwu Zeng, Taesic Kim and Vincent Winstead, *Minnesota State University, Mankato, United States; Texas AM | University-Kingsville, United States*

4:25PM | Modular Static Distribution Controller for Distributed Energy Resource Generation Applications [#19504]

Faris Alfaris, Nima Yousefpour and Subhashish Bhattacharya, *North Carolina State University, United States; Quanta Technology, United States*

4:50PM | Performance Verification of a New Integrated Droop Controller with a Novel Virtual-Impedance Based PLL for Parallel Operation of Inverters [#19587]

Subhrasankha Ghosh and Souvik Chattopadhyay, *Electrical Engg. Department, IIT Kharagpur, India*

5:15PM | A Center of Mass Determination for the Optimum Placement and Deployment of the Renewable Energy Sources for Micogrids [#19693]

Hassan Abdelgaber, Ali Elrayyah and Yilmaz Sozer, *University of Akron, United States; Environment and Energy Research Institute, Qatar*

S143 | Grid Connected Systems

Room B111

Chairs: Joseph Olorunfemi Ojo; Ke Ma

4:00PM | Damping for Multi-Paralleled Grid-Tied Inverters with LCL Filters [#18793]

Olorunfemi Ojo, *Tennessee Tech University, United States*

4:25PM | Current Ripple Oriented Design of LCL Filter for Three-Phase Voltage-Source Converter with Different Wire Connections and Modulations [#18823]

Weiyu Tang, Yubo Song, Ran Cheng and Ke Ma, *Shanghai Jiao Tong University, China*

4:50PM | An Adaptive Phase-Locked Loop for the Transient Stability Enhancement of Grid-Connected Voltage Source Converters [#18595]

Heng Wu and Xiongfei Wang, *Aalborg University, Denmark*

5:15PM | A Novel Grid-connected Harmonic Current Suppression Control for Autonomous Current Sharing Controller-based AC Microgrids [#18506]

Yajuan Guan, Wei Feng, Jinghang Lu, Josep M. Guerrero and Juan C. Vasquez, *Aalborg University, Denmark; Tsinghua University, China*

S144 | Grid Connected Converters- I

Room B117

Chairs: Robert S. Balog; Martin Ordonez

4:00PM | Channel Modeling for Powerline Communications in Series-Connected PV Inverters [#19673]

Daniel Evans and Robert Cox, *UNC Charlotte, United States*

4:25PM | Online Impedance Estimation in AC Grids Considering Parallel-Connected Converters [#19515]

Andres Suarez, Cristian Blanco, Pablo Garcia, Angel Navarro and Jose Manuel Cano, *Universidad de Oviedo, Spain*

4:50PM | A New Two Stage Differential Mode Power Converter for Large Scale PV Plants [#19478]

Sinan A Sabeeh Al-Obaidi and Prasad Enjeti, *Texas A and M University, United States*

5:15PM | Modelling of Interconnected Converter System with Coupled LCL and LC Filters [#18924]

Ran Cheng, Yubo Song, Ke Ma, Ke Guo and Yi Tang, *Shanghai Jiao Tong University, China; Nanyang Technological University, Singapore*

S145 | DC-DC Isolated 4

Room C120

Chairs: Ngo Khai; Zheyu Zhang

4:00PM | Design and Implementation of a Dual-Input LLC Converter for PV-Battery Applications [#19506]

Milad Tayebi, Xi Chen, Amit Bhattacharjee and Issa Batarseh, *University of Central Florida, United States*

4:25PM | A Quad Active Bridge based On-Board Power Electronic Interface for an Electric Vehicle [#19514]

Arun Chandrasekharan Nair, Vishal M.J. and B.G. Fernandes, *Indian Institute of Technology Bombay, India*

4:50PM | An Integrated Three-Port DC/DC Converter for High Voltage Bus Based Photovoltaic Systems [#18971]

Junyun Deng, Haoyu Wang and Ming Shang, *ShanghaiTech University, China*

5:15PM | Model Predictive Control for Isolated DC/DC Power Converters with Transformer Peak Current Shaving [#19731]

Linglin Chen, Luca Tarisciotti, Alessandro Costabeber, Pericle Zanchetta and Patrick Wheeler, *University of Nottingham, United Kingdom*

S146 | DC-DC Isolated 2

Room C122

Chairs: Khurram Afridi; Alessandro Lidozzi

4:00PM | A Dual-Transformer-Based LLC Resonant Converter With Phase-Shift Control For Hold-Up Time Compensation Application [#18298]

Zhiyuan Yu, Hongfei Wu, Wenmin Hua, Jianxin Zhu and Yan Xing, *Nanjing University of Aeronautics Astronautics, China*

4:25PM | Interleaved Half-Bridge Flyback Converter with Zero-voltage Switching [#18203]

Ming-Hsien Cheng, Tsong-Juu Liang, Wen-Yu Huang and Wei-Chin Yang, *National Cheng Kung University, Taiwan*

4:50PM | A Modular Soft-switched Silicon-Carbide Step-up Converter with a Dual Coupled LCL Resonant Networks and a Primary-Hybrid Variable Frequency/Phase-shift-Control [#19208]

Mehdi Abbasi, Reza Emamalipour, Muhammad Ali Masood Cheema and John Lam, *York University, Canada; Northern Transformer, Canada*

5:15PM | FB-ZCS DC-DC Converter with Adaptive Resonant Energy Using Phase-Shift Frequency Modulation [#19509]

Rohit Suryadevara and Leila Parsa, *Rensselaer Polytechnic Institute, United States; University of California Santa Cruz, United States*

S147 | Modeling and Control of DC-DC Converters 2

Room B119

Chairs: Abhijit Kshirsagar; Francesco Tardelli

4:00PM | Design and Control of Tunable Piezoelectric Transformer Based DC/DC Converter [#19540]

Le Wang, Qiong Wang, Mudit Khanna, Rolando Burgos, Khai D. T Ngo and Alfredo Vazquez Carazo, *Virginia Polytechnic Institute and State Univ., United States; Micromechatronics, Inc., United States*

4:25PM | Average Current-Mode Control of A-Source Converter [#18734]

Agasthya Ayachit, Mojtaba Forouzes, Yam Siwakoti, Marian Kazimierczuk and Frede Blaabjerg, *Wright State University, United States; Aalborg University, Denmark; University of Technology Sydney, Australia*

4:50PM | High Frequency Small Signal Model for Inverse Charge Constant On-time (IQCOT) Control [#19539]

Syed Bari, Qiang Li and Fred Lee, *CPES, ECE, Virginia Tech, United States; CPES, ECE, Virginia Tech, United States*

5:15PM | A Novel Capacitor Current Constant On-Time Controlled Buck Converter at 4-MHz Switching Frequency [#18841]

Sheng Hsiang Pan, Ching Jan Chen and Chieh Ju Tsai, *National Taiwan University, Taiwan*

S148 | Modeling and Control of AC-DC Converters

Room B116

Chairs: Zheng Wang; Shafiq Ahmed Odhano

4:00PM | Backstepping-Based DPC Scheme Of AC/DC Converter Under Unbalanced Power Supply [#18078]

Jingjing Huang and Xin Zhang, *Nanyang Technological University, Singapore*

4:25PM | Control Schemes for Reducing the Second Harmonic Current in Two-Stage Single-Phase Converter: An Overview from DC-Bus Port-Impedance Characterization [#18463]

Li Zhang and Xinbo Ruan, *Nanjing Univ. of Aeronautics and Astronautics, China*

4:50PM | An Improved Control Scheme for Single-Phase Buck-Type Rectifier with Low DC Voltage Ripple and AC Current Distortion [#19488]

Wenli Yao, Yan Xu, Yi Tang, Poh Chiang Loh, Bin Gou, Bingjie Li and Shuyong Liu, *Nanyang Technological University, Singapore; Chinese University of Hong Kong, Hong Kong; Northwestern Polytechnical University, China; Rolls-Royce Singapore Pte. Ltd, Singapore*

5:15PM | Robust Direct Power Control of PWM Rectifier with DC Voltage Ripple Elimination under Unbalanced Network [#19677]

Yongchang Zhang, Jian Jiao and Jie Liu, *North China University of Technology, China*

S149 | Modeling and Control of Modular Multilevel Converters 2

Room A108

Chairs: Hirofumi Akagi; Qin Lei

4:00PM | State-Space Modeling and Control of the Modular Multilevel Clamped Capacitor Converter [#18351]

Liyao Wu and Maryam Saeedifard, *Georgia Institute of Technology, United States*

4:25PM | Control Strategy and Simulation of a Modular Multilevel Converter (MMC) based Pump-Back System for Variable Speed Drive Application [#18429]

Yunpeng Si and Qin Lei, *Arizona State University, United States*

4:50PM | Investigation and Compensation of Circulating Current Errors in Low Frequency Operation of Modular Multilevel Converters [#18630]

Muneer Al Sabbagh, Jianyu Pan, Ziwei Ke and Longya Xu, *The Ohio State University, United States*

5:15PM | Frequency Domain Control Algorithm for Modular Multilevel Converter Under Grid Fault Conditions [#18559]

Rostan Rodrigues and Herb Ginn, *ABB Inc, United States; University of South Carolina, United States*

S150 | PM Machines

Room B112

Chairs: Nicola Bianchi; Yanwen Shi

4:00PM | Design and Characterization of a Radial Flux Wound Field and Permanent Magnet Hybrid Excitation Synchronous Machine [#19700]

Antonio Di Gioia, Ian P. Brown and Fabio Giulii Capponi, *IEMA US Inc., United States; Illinois Institute of Technology, United States; University of Rome "La Sapienza", Italy*

4:25PM | Novel Hybrid Excited Doubly Salient Permanent Magnet Machines with Asymmetric Stator Poles [#18332]

Mingjie He, Wei Xu and Caiyong Ye, *Huazhong University of Science and Technology, China*

4:50PM | Cogging Torque Minimization on a Mass-Produced Sub-Fractional Horsepower Brushless Direct Current Claw-Pole Motor [#18050]

Stefan Leitner, Hannes Gruebler and Annette Muetze, *CD-Lab BL-Drives, Graz University of Technology, Austria*

5:15PM | Influence of Clamping Bolts on Electromagnetic Performance of PMSM Machines and Its Restraining Methods [#18403]

Jiabei Zhu, Lijian Wu, Xiaoyan Huang and Youtong Fang, *Zhejiang University, China*

S151 | Peter Lawrenson Memorial – Switched Reluctance Machines

Room B118

Chairs: David Dorrell; Peter Wung

4:00PM | Rotor Configuration Which Reduces Copper Loss of Switched Reluctance Motors With Suppression of Torque Ripple and Input Current Ripple [#18772]

Takayuki Kusumi, Takuto Hara, Kazuhiro Umetani and Eiji Hiraki, *Okayama University, Japan*

4:25PM | Optimal Design of Outer Rotor Switched Reluctance Machines for Direct Drive Rim Applications [#19481]

Vandana Rallabandi, Jie Wu, Aaron Cramer, Ping Zhou and Dan Ionel, *University of Kentucky, United States; ANSYS, Inc, United States*

4:50PM | DC Input Current Ripple Reduction in SRM Drive for High Volumetric Power Density Application [#19770]

Sifat Chowdhury, Salman Harasis, Omer Gundogmus, Lavanya Vadmodala, Shuvajit Das, Yilmaz Sozer, Fernando Venegas and David Colavincenzo, *University of Akron, United States*

5:15PM | A Novel Self Cooling SRM for Electric Hand Tools [#19760]

Kouichi Koinuma, Kohei Aiso and Kan Akatsu, *Shibaura Institute of Technology, Japan; Shibaura Institute of Technology, Japan*

S152 | Control of Sync-Rel Drives

Room B113

Chairs: Gianmario Pellegrino; Di Pan

4:00PM | Automatic Inductance Measurements of Synchronous Reluctance Machines Including Cross-Saturation Using Real-time Systems [#19028]

Rajendra Thike and Pragasen Pillay, *Concordia University, Canada*

4:25PM | Flux Weakening Control for Synchronous Reluctance Machines Based on Parameters Estimated at Stand-still [#18639]

Sang-Hoon Lee, Hak-Jun Lee, Chanook Hong and Young-Doo Yoon, *SoluM, Korea, Republic of; LSIS, Korea, Republic of; Hanyang Univ., Korea, Republic of*

4:50PM | Over-Modulation with Improved Stability for Synchronous Reluctance Motor Drives Incorporating Field-Weakening Operation [#18032]

Xinan Zhang and Gilbert Foo, *Nanyang Technological University, Singapore; Auckland University of Technology, New Zealand*

5:15PM | An Improved Speed-Sensorless Flux Observer Based on Voltage Model for Synchronous Reluctance Machines [#19036]

Feilang Li, Sabei Liu, Wenxi Yao and Kevin Lee, *Zhejiang University, China; Eaton Corporation, United States*

S153 | SiC Devices and Applications

Room B110

Chairs: Rolando Burgos; Ruxi Wang

4:00PM | SiC MOSFET versus Si Super Junction MOSFET – Switching Loss Comparison in Different Switching Cell Configurations [#19103]

Handong Gui, Zheyu Zhang, Ren Ren, Ruirui Chen, Jiahao Niu, Leon M. Tolbert, Fred Wang, Benjamin J. Blalock, Daniel Jes Costinett and Benjamin B. Choi, *University of Tennessee, Knoxville, United States; NASA Glenn Research Center, United States*

4:25PM | Phase Shift Reduction for Integrated Field-based Current Sensing in Ni-plated SiC Power Modules [#19068]

Minhao Sheng, Muhammad Alvi and Robert Lorenz, *University of Wisconsin-Madison, WEMPEC, United States*

4:50PM | Sizing Selection Optimization of SiC/Si Hybrid Switch in DC/DC Buck Converters [#19272]

Fanxing Yuan, Jun Wang, Zongjian Li, Cheng Zeng, Zhizhi He, Xi Jiang and Z. John Shen, *Hunan University, China*

5:15PM | Development and Validation of a SiC-Based 50-kW Grid-Connected PV Inverter [#19393]

Akanksha Singh, Madhu Chinthavali, Scott Sudhoff, Kevin Bennion, Kumaraguru Prabakar, Xuhui Feng, Zhiqiang Wang and Steven Campbell, *National Renewable Energy Laboratory, United States; Oak Ridge National Laboratory, United States; Purdue University, United States; National Renewable Energy Laboratory, United States*

S154 | Wireless Power Transfer 3

Room A105

Chairs: Huai Wang; Hua Zhang

4:00PM | A Monotonic Output Regulation Method for Series-series Compensated Inductive Power Transfer Systems with Improved Efficiency and Communication-less Control [#19061]

Shuxin Chen, Hongchang Li and Yi Tang, *Nanyang Technological University, Singapore*

4:25PM | Radiative Noise Reduction Technique Using 12 Coils Suitable for High-Power Inductive Power Transfer [#18511]

Keisuke Kusaka, Keita Furukawa and Jun-ichi Itoh, *Nagaoka University of Technology, Japan*

4:50PM | DC Modeling of an LCC Resonant Compensation Network in Wireless Power Transfer Systems [#19701]

Reza Tavakoli and Zeljko Pantic, *Utah State University, United States*

5:15PM | Impedance Matching to Maximize Induced Current in Repeater of Resonant Inductive Coupling Wireless Power Transfer Systems [#19669]

Masataka Ishihara, Kazuhiro Umetani and Eiji Hiraki, *Okayama University, Japan; Okayama University, Japan*

The Power Electronics Workforce of the Future: Do Internships and Apprenticeships Really Pay Off?

Room C121

Chairs: Nanci Vogtli; Keith Evans

Workshop: Sustainable Energy Systems and Energy Sustainability

Room B114

Chairs: Sudip Mazumder

Advancements, Challenges, and End-Games in Power Supply on Chip (PwrSoC)

Room B115

Chairs: Hanh-Phuc Le

Presenters: José A. Cobos, *Universidad Politécnica de Madrid*; Mohamed Mehdi Jatlaoui, *muRata*; Noah Sturcken, *Ferric*; Rinkle Jain, *Intel*; Hanh-Phuc Le, *University of Colorado Boulder*

Thursday, September 27

8:30AM – 10:10AM

S155 | Solar PV Systems

Room A107

Chairs: Behrooz Mirafzal; Wasi Uddin

8:30AM | A GaN-Based High-Efficiency Solar Optimizer with Reduced Number of Power Devices [#18194]

Xiaonan Zhao, Cheng-Wei Chen and Jih-Sheng Lai, *Virginia Tech, United States*

8:55AM | Comparative Analysis of Non-Isolated and Isolated Type Partial-Power Optimizers for PV-Battery Series Inverter Architecture [#18969]

Namwon Kim and Babak Parkhideh, *University of North Carolina at Charlotte, United States*

9:20AM | Optimal Solar PV Sizing for Inverters Based on the Specific Local Climate [#19501]

Robabeh Nasiri, Mehdy Khayamy, Mohammad Rashidi, Adel Nasiri and Vijay Bhavaraju, *UW-Milwaukee, United States; Eaton Corporation, United States*

9:45AM | A Novel Differential Power Processing Architecture for a Partially Shaded PV String Using Distributed Control [#19590]

Somanna Mallangada Bose, Mohamed Badawy and Yilmaz Sozer, *San Jose State University, United States; The University of Akron, United States*

S156 | Grid Connected Converters- II

Room B117

Chairs: Mehdi Narimani; S. Ali Khajehoddi

8:30AM | Single-Step Commutation Method for Three-phase to Single-phase Matrix Converter [#19340]

Shunsuke Takuma, Keisuke Kusaka and Jun-ichi Itoh, *Nagaoka University of Technology, Japan*

8:55AM | Distributed Predictive Control Scheme for Grid Tied Cascaded Multilevel Impedance Source Inverter with LVRT Capability [#19530]

Sarthak Jain, Mitchell Easley, Fariba Fateh and Mohammad B Shadmand, *Texas A and M University, United States; Kansas State University, United States*

9:20AM | Zero-Voltage Switching Control of a Grid-Connected Interleaved Inverter with Variable Switching Frequency [#19533]

Yao Zhigang and Lu Shuai, *Chongqing University, China*

9:45AM | Current-Fed Quasi Z-Source Inverter based PV Distributed Generation Controller [#19636]

Faris Alfaris and Subhashish Bhattacharya, *North Carolina State University, United States*

S157 | Renewable Energy Systems- I

Room B111

Chairs: Jiangchao Qin; Shahab Mehraeen

8:30AM | A Universal Model Predictive Control for Practical AC Microgrids with PVs and Battery Energy Storage Systems [#18174]

Yinghao Shan, Jiefeng Hu, Ka Wai Cheng and Ming Liu, *The Hong Kong Polytechnic University, Hong Kong*

8:55AM | Integrated Series Transformer in Cascade Converters for Photovoltaic Energy Systems [#19362]

Cristian Verdugo, Mohamed A. Elsharty and Pedro Rodriguez, *Polytechnic University of Catalonia, Spain; Loyola Andaluca University, Spain*

9:20AM | An Average Model Predictive Control of Quasi-Z-Source Modular Cascaded Photovoltaic Converter [#18853]

Yushan Liu, Yaosuo Xue and Mohammad B. Shadmand, *Beihang University, China; Oak Ridge National Laboratory, United States; Kansas State University, United States*

9:45AM | Filter Design for Three-Level T-type NPC Transformerless PV Inverters with Reduced CMV Effects [#18866]

Changpeng Jiang, Zhongyi Quan and Yunwei Li, *University of Alberta, Canada*

S158 | DC-DC Isolated 3

Room C122

Chairs: Qiang Li; Daniel Costinett

8:30AM | Variable Frequency Phase Difference-Controlled CLLC Resonant Bidirectional DC-DC Converter Featuring Wide-Range ZVS Performance and Reactive Power Reduction [#18655]

Tomokazu Mishima and Yasutaka Koga, *Kobe University, Japan*

8:55AM | Modeling and Dynamic Control of a Three-Phase Dual-Active Bridge Converter Using a Hybrid Modulation Scheme [#18759]

Jingxin Hu, Zhiqing Yang, Nurhan Rizqy Averous and Rik W. De Doncker, *PGS, E.ON Energy Research Center, RWTH Aachen, Germany*

9:20AM | Dead-time Compensation with DC Offset Current Elimination Method using Three-level Operation for Dual Active Bridge DC-DC Converter [#19037]

Jun-ichi Itoh, Kengo Kawauchi and Hayato Higa, *Nagaoka University of Technology, Japan*

9:45AM | 10 kW High Efficiency Compact GaN-Based DC/DC Converter Design [#19385]

Bingyao Sun, Rolando Burgos, Dushan Boroyevich, Sandeep Bala and Jing Xu, *Virginia Tech, CPES, United States; ABB Corporate Research, United States*

S159 | DC-DC Isolated 5

Room C120

Chairs: Marcello Pucci; Markus Andresen

8:30AM | A Comparative Study of Conventional and T-type ZVS-PWM Full-Bridge Converters [#18609]

Javad Khodabakhsh and Gerry Moschopoulos, *Western University, Canada*

8:55AM | Analysis and Design of a Novel High-Gain Full-Bridge Converter for Renewable Energy Systems [#18617]

Prashanth Prabhu and Gerry Moschopoulos, *University of Western Ontario, Canada*

9:20AM | Current-Transformer Based Gate-Drive Power Supply with Reinforced Isolation [#19637]

Jiewen Hu, Jun Wang, Rolando Burgos and Dushan Boroyevich, *Center for Power Electronics Systems, United States*

9:45AM | A Three-Phase Dual-Active-Bridge DC-DC Immittance Converter [#18088]

Akif Zia Khan, Ka-Hong Loo and Yuk Ming Lai, *The Hong Kong Polytechnic University, Hong Kong*

S160 | DC-AC Single-Phase 3

Room B119

Chairs: Madhav Manjrekar; Keiji Wada

8:30AM | A Single-Phase Double T-Type Seven-Level Inverter [#18817]

Jianfei Chen, Dong Liu, Kewei Ding, Caisheng Wang and Zhe Chen, *Wayne State University, United States; Aalborg University, Denmark*

8:55AM | Design and Implementation of High Frequency Power Supply with Constant Power Output for Plasma Applications [#18208]

Jin Zhao, Jianzhong Zhang, Zakiud Din and Zhengguo Qian, *Southeast University, China*

9:20AM | Energy-Buffered Single-Phase Inverter Operating in the Fundamental Limit of Indirect Power [#19269]

Jose A. Cobos, Regina Ramos, Diego Serrano, Jesus Oliver and Pedro Alou, *Universidad Politecnica de Madrid, Spain*

9:45AM | A Battery-Integrated High-Frequency Transformer-Coupled Phase-Modulated PV Inverter [#19122]

Shayak Chaudhuri, Shiladri Chakraborty, Atul Banjare and Souvik Chattopadhyay, *Indian Institute of Technology Kharagpur, India*

S161 | Converter Control in Microgrids and Distributed Generation 2

Room B116

Chairs: Andrea Formentini; Junichi Itoh

8:30AM | Hybrid Energy Storage Control in a Remote Military Microgrid with Improved Supercapacitor Utilization and Sensitivity Analysis [#19786]

Giovanna Oriti, Norma Anglani and Alexander Julian, *Naval Postgraduate School, United States; University of Pavia, Italy, Italy; Consultant, United States*

8:55AM | Distributed Control Alternatives of Modular Power Converters for Hybrid DC/AC Microgrids [#19520]

Geber Villa, Carlos Gomez-Aleixandre, Pablo Garcia and Jorge Garcia, *University of Oviedo, Spain*

9:20AM | Autonomous DC-Link Voltage Restoration for Grid-Connected Power Converters Providing Virtual Inertia [#18929]

Ke Guo, Jingyang Fang and Yi Tang, *Nanyang Technological University, Singapore*

9:45AM | Communication-Less Control of Two-Stage Photovoltaic System with Multiple Distributed Dual-Input Central Capacitor Converters [#18942]

Jiaxin Liu, Feng Gao, Mengxing Chen and Gongke Wang, *Shandong University, China; Aalborg University, Denmark*

S162 | EMI in Power Converters

Room C121

Chairs: Jason Lai; Annette Muetze

8:30AM | Improved Common Mode Noise Models for Three Level T-Type Neutral Point Clamped Converters [#19564]

Srinivas Guler, Vishnu Mahadeva Iyer and Subhashish Bhattacharya, *North Carolina State University, United States*

8:55AM | Capacitive Coupling in T-shape Related EMI Filters: Mechanism, Effects, and Mitigation [#18593]

Bo Liu, Ren Ren, Fred Wang, Daniel Costinett, Zheyu Zhang and Yiwei Ma, *The University of Tennessee, United States*

9:20AM | A Technique to Predict EMI Noise Spectrum in Wide Frequency Ranges Based on the Principles of Spectrum Analyzers [#18492]

Le Yang, Hui Zhao, Shuo Wang and Yongjian Zhi, *University of Florida, United States; CRRC Zhuzhou Institute Co., Ltd, China*

9:45AM | Computationally Efficient Model Predictive Control for AC-DC-AC Converter with Common Mode Voltage Elimination [#18497]

Muslem Uddin, Galina Mirzaeva, Graham Goodwin and Pericle Zanchetta, *The University of Newcastle, Australia; The University Of Nottingham, United Kingdom*

S163 | Modulation Techniques

Room A108

Chairs: Yi Tang; Vito Giuseppe Monopoli

8:30AM | Common Mode Voltage Reduction in Active Front End Drives with Different PWM Switching Frequencies for Rectifier and Inverter [#18468]

Yujia Cui and Lixiang Wei, *Rockwell Automation, United States*

8:55AM | Asymmetric Pulse Width Modulation for Improving the Reliability of Motor Drive Inverters [#18590]

Ui-Min Choi, Ionut Vernica and Frede Blaabjerg, *Seoul National University of Science and Tech., Korea (South); Aalborg University, Denmark*

9:20AM | Baseband Distortion Compensation for High-Precision Power Electronics Using Regularly Sampled Pulse-Width Modulators with Triangular Carrier [#18533]

Bas Vermulst, *Eindhoven University of Technology, Netherlands*

9:45AM | Optimization Platform to Find a Switching Pattern of Digital Active Gate Drive for Full-Bridge Inverter Circuit [#19553]

Yu Shan Cheng, Tomoyuki Mannen, Keiji Wada, Koutaro Miyazaki, Makoto Takamiya and Takayasu Sakurai, *Tokyo Metropolitan University, Japan; The University of Tokyo, Japan*

S164 | Machines for Transportation 2

Room B114

Chairs: Sara Roggia; Ronghai Qu

8:30AM | Contactless Rotor Excitation for Traction Motors [#19152]

Tsarafidy Raminosa and Randy Wiles, *Oak Ridge National Laboratory, United States*

8:55AM | Power-Hardware-in-the-Loop-Based Emulation of a Variable Flux Machine [#18081]

K. S. Amitkumar, Rajendra Thike and Pragasen Pillay, *Concordia University, Canada*

9:20AM | Design of Switched Reluctance Generator for Competitive Energy Efficiency in the Latest Hybrid Electric Vehicle [#18477]

Akira Chiba and Nanaho Kawata, *Tokyo Institute of Technology, Japan*

9:45AM | Modelling and Operating Characteristics of Air-cored Resonant Induction Machines [#18398]

Matteo Felice Iacchetti, Alexander Smith, Rajesh Deodhar and Keisuke Mishima, *University of Manchester, school of EEE, United Kingdom; IMRA Europe SAS, United Kingdom*

S165 | Flux Switching Machines

Room B118

Chairs: Rukmi Dutta; Rajib Mikail

8:30AM | Modelling of Inter-Turn and Inter-Phase Short-Circuit of Flux-Switching Permanent Magnet Motors [#18131]

Guang-Jin Li, Griffo Antonio, Zi-Qiang Zhu, Javier Ojeda and Gabsi Mohamed, *The University of Sheffield, United Kingdom; Ecole Normale Supérieure de Cachan, France*

8:55AM | Analysis of Novel Flux Reversal Permanent-Magnet Machine with Multi MMF Working Harmonics [#18361]

Yuting Gao, Dawei Li, Ronghai Qu and Ziyi Liang, *Huazhong University of Science and Technology, China*

9:20AM | Novel Experimentation of a 10 kW Geared Medium-Speed Wound-Field Flux Switching Wind Generator Drive [#18321]

Udochukwu Bola Akuru and Maarten Jan Kamper, *Stellenbosch University, South Africa*

9:45AM | Investigation of Rotor Structure Influence on the Windage Loss and Efficiency of FSPM Machine [#19733]

Mingda Liu, William Sixel, Hao Ding and Bulent Sarlioglu, *University of Wisconsin-Madison, United States*

S166 | Thermal Modeling of Electric Machines 2

Room B112

Chairs: Zbigniew Gmyrek; Jose Antonino-Daviu

8:30AM | Design Considerations of Heat Guides Fabricated using Additive Manufacturing for Enhanced Dissipative Heat Transfer in Electrical Machines [#18196]

Wrobel Rafal and Hussein Ahmed, *Newcastle University, United Kingdom; HiETA Technologies Ltd., United Kingdom*

8:55AM | A Combined 2-D Analytical and Lumped-Parameter Thermal Model for High Power Density Permanent Magnet Machines with Concentrated Windings [#18880]

Xinggang Fan, Dawei Li, Ronghai Qu and Cong Wang, *Huazhong University of Science and Technology, China*

9:20AM | Lumped-Parameter and 3D Thermal Model of a PMASynRM Under Fault Conditions with Asymmetric Temperature Distribution [#18270]

Yanwen Shi, Jiabin Wang and Bo Wang, *University of Sheffield, United Kingdom*

9:45AM | Estimation of Equivalent Thermal Conductivity for Electrical Windings with High Conductor Fill Factor [#18044]

Sabrina Ayat, Haipeng Liu, Rafal Wrobel and Mehmet Kulan, *Safran Tech, France; University of Bristol, United Kingdom; Newcastle University, United Kingdom*

S167 | Direct Torque Control of Electric Drives

Room B115

Chairs: Radu Bojoi; Kyo-Beum Lee

8:30AM | Robust Direct Torque Control for Six-Phase Symmetrical Winding Permanent Magnet Synchronous Motor [#18129]

Xiaogang Lin, Wenxin Huang, Wen Jiang and Yong Zhao, *Nanjing University of Aeronautics and Astronautics, China*

8:55AM | Low Switching Frequency Deadbeat-Direct Torque and Flux Control of Wound Field Synchronous Machines [#18807]

Yue Nie, Daniel C. Ludois and Ian P. Brown, *Illinois Institute of Technology, United States; University of Wisconsin-Madison, United States*

9:20AM | Extending High Speed Operating Range of Induction Machine Drives using Deadbeat-Direct Torque and Flux Control with Precise Flux Weakening [#19451]

Yang Xu, Chikara Morito and Robert Lorenz, *University of Wisconsin-Madison, United States; Toshiba Mitsubishi-Electric Industrial Sys. Corp, United States*

9:45AM | Maximum Torque per Ampere Control Based on Active Flux Concept for DTC of IPMSMs [#18649]

Saide Liu, Wenxin Huang, Xiaogang Lin, Yong Zhao, Wen Jiang and Yang Jufeng, *Nanjing Univ. of Aeronaut. and Astronaut., China*

S168 | Control Issues in Electric Drives 2

Room B113

Chairs: Jul-Ki Seok; Jesus Doval Gandoy

8:30AM | Control of Variable Frequency Drive PWM to Mitigate Motor Overvoltage Due to Double Pulsing in Reflected Wave Phenomenon [#19440]

Han Xiong, Julia Zhang and Annette von Jouanne, *The Ohio State University, United States; Baylor University, United States*

8:55AM | Stator-Flux-Oriented Control of Synchronous Motors: Design and Implementation [#18981]

Hafiz Asad Ali Awan, Marko Hinkkanen, Radu Bojoi and Gianmario Pellegrino, *Aalto University, Finland; Politecnico di Torino, Italy*

9:20AM | A Frequency-Modulated Space Vector Pulse-Width Modulation for Ripple Current Control of Permanent-Magnet Motor Drives [#19535]

Yue Zhao, Tyler Adamson, Juan Carlos Balda and Yuzhi Zhang, *University of Arkansas, United States; ABB Inc., United States*

9:45AM | Control System for Open-End Winding Surface PM Synchronous Machines with a Floating Capacitor Bridge [#19783]

Albino Amerise, Michele Mengoni, Luca Zari, Andrea Formentini, Luca Rovere and Pericle Zanchetta, *University of Bologna, Italy; The University of Nottingham, United Kingdom; The University Of Nottingham, United Kingdom*

S169 | Magnetics for EMI

Room B110

Chairs: Nahla Khairiddine; Krishna Mainali

8:30AM | A Universal DM/CM Physical Model for Power Transformer EMI Analysis within both Conducted and Radiated Frequency Ranges [#19718]

Hui Zhao, Juntao Yao and Shuo Wang, *University of Florida, United States*

8:55AM | A Modeling Technique for Designing High-Frequency Three-Phase Common-Mode Inductors [#18832]

Shotaro Takahashi, Satoshi Ogasawara, Masatsugu Takemoto, Koji Orikawa and Michio Tamate, *Hokkaido University, Japan; Fuji Electric co.,Ltd., Japan*

9:20AM | Common-Mode Noise Elimination in Planar Transformers for LLC Resonant Converters [#19233]

Mohammad Ali Saket Tokaldani, Martin Ordóñez, Marian Craciun and Chris Botting, *University of British Columbia, Canada; Delta-Q Technologies, Canada*

9:45AM | Modeling and Reduction of Radiated Common Mode Current in Flyback Converters [#19556]

Juntao Yao, Yiming Li, Hui Zhao, Shuo Wang, Qinghai Wang, Yuliang Lu and Dianbo Fu, *University of Florida, United States; Huawei Technologies, China*

S170 | Medical Applications

Room A105

Chairs: Tsorng-Juu Liang; Ruoyu Hou

8:30AM | Control Area Expansion Using Null Space Vector Injection Under Current Limit in Magnetic Manipulation System [#18335]

Jin-Su Hong and Jung-Ik Ha, *Seoul National University, Korea (South)*

8:55AM | Magnetic-Vector Controlled Three-Phase Magnetic Guidance System [#18062]

Ray-Lee Lin, Jia-Chi Liu, Sheng-Fu Hsiao, Ching-Hsing Luo, Tsai-Wang Chang and Meng-Dar Shieh, *National Cheng Kung University, Taiwan*

9:20AM | Design of a Portable Pulsed Power System for Needle-free Jet Injection [#18442]

Nick N. L. Do, Andrew J. Taberner and Bryan P. Ruddy, *The University of Auckland, New Zealand*

9:45AM | Design Considerations and Performance Test for SiC MOSFET Based 1000V/1.5MHz Pulse Power Inverter [#18491]

Chunhui Liu and Qin Lei, *Arizona State University, United States*

Thursday, September 27

10:30AM – 12:10PM

S171 | Power Converters for Energy Storage Systems

Room A107

Chairs: Iftexhar Hasan; Nathan Weise

10:30AM | Optimization Method for the Integration of Hybrid Energy Storage Systems in Industrial Applications [#19282]

Irene Pelaez, Sarah Saeed, Geber Villa and Pablo Garcia, *University of Oviedo, Spain*

10:55AM | A New Quasi-Resonant Soft-Switched Bidirectional DC/DC Converter for Energy Storage Application [#19283]

Devina Aggarwal, Moury Sanjida and John Lam, *York University, Canada*

11:20AM | A Novel Soft-Switched Power Converter Architecture with an Integrated Energy Storage Interface Compatible with DC and AC Energy Sources [#19297]

Sanjida Moury and John Lam, *York University, Canada*

11:45AM | An Integrated Control Strategy for State of Charge Balancing with Output Voltage Control of Series Connected Battery Management System [#19685]

Sifat Chowdhury, Md Ehsanul Haque, Ali Elrayyah, Yilmaz Sozer and Alex De Abreu Garcia, *University of Akron, United States; Qatar Environment and Energy Research Institute, Qatar*

S172 | Renewable Energy Systems- II

Room B117

Chairs: Behrooz Mirafzal; Mohammad B Shadmand

10:30AM | Topologies of Switched-Inductor Switched-Capacitor Based Enhanced Boost Z-Source Inverters for Renewable Energy Applications [#18900]

Anish Ahmad and Rajeev Kumar Singh, *Indian Institute of Technology (B.H.U.), Varanasi, India*

10:55AM | Utility Scale Interface for Renewables and Storage Using a Power Electronic Transformer with Back-to-Back MMCs: A Novel Proposal and Control Scheme for Virtual Inertia [#19214]

Vishnu Narayan Vipin, Abhijit Kshirsagar and Ned Mohan, *University of Minnesota, United States*

11:20AM | Supervisory Control Architecture for Standalone Solar Photo-Voltaic Power Generation System [#18721]

Dev Venkatramanan and Vinod John, *Indian Institute of Science, Bangalore, India*

11:45AM | Cascaded Active Neutral Point Clamped and Flying Capacitor Inverter Topology for Induction Motor Drives Applications [#19667]

Viju Nair, Ritwik Chattopadhyay, Sanket Parashar, Subhashish Bhattacharya and Kumarakuttan Gopakumar, *NC State University, United States; Indian Institute of Science, India*

S173 | Power Converters for Transportation

Room B111

Chairs: Madhu Sudhan Chinthavali; Mehdi Ferdowsi

10:30AM | Current Control of Integrated Bi-directional Converter for V2G Based on Open Winding Interior PMSM [#18166]

Jialou Gao, Wei Sun, Dong Jiang, Ronghai Qu and Qiao Li, *Huazhong University of Science and Technology, China*

10:55AM | Comparison and Control of Voltage Balancers for Bipolar DC Aircraft Power Systems [#18337]

Luis Herrera, Mackenzie Lee, Murali Prasad and Bang-Hung Tsao, *University at Buffalo, United States; Rochester Institute of Technology, United States; University of Dayton Research Institute, United States*

11:20AM | A Reconstructed Circuit Parameters Estimation (RCPE) Strategy of Modular Multiple Dual Active Bridge DC-DC Converters for Power Sharing Control [#19221]

Nie Hou, Yunwei (Ryan) Li and Hao Tian, *ECE, University of Alberta, Canada*

11:45AM | Bi-directional Single-stage Interleaved Totem-Pole AC-DC Converter with High frequency isolation for On-Board EV Charger [#19312]

Hamza Belkamel, Hyungjin Kim, Byeongwoo Kim, Yangjin Shin and Sewan Choi, *Seoultech, Korea (South); SeoulTech, Korea (South); Seoultech, Malaysia*

S174 | DC-AC Single-Phase I

Room C122

Chairs: Xiaonan Lu; Regina Ramos Hortal

10:30AM | Single-Phase Bridge Inverter with Active Power Decoupling Based on Buck-Boost Converter [#18117]

Shuang Xu, Liuchen Chang, Riming Shao and Haider Mohomad AR, *University of New Brunswick, Canada*

10:55AM | A Soft-Switched PWM Technique for a Single Stage Isolated DC-AC Converter with Synchronous Rectification [#18134]

Parthasarathy Nayak, Sumit Kumar Pramanick and Kaushik Rajashekara, *University of Houston, United States*

11:20AM | Instantaneous Pulse Power Compensator for High-Power-Density Single-Phase Inverter [#18865]

Xiaofeng Lyu, Yanchao Li, Ze Ni, Dong Cao, Na Ren, Zheng Zuo and Ruigang Li, *Navitas Semiconductor, Inc, United States; North Dakota State University, United States; University of California, Los Angeles, United States; AZ Power Inc., United States*

11:45AM | Phase-Controlled Class-D ZVS Inverter With Clamp Diodes [#19218]

Yusuke Ishihara, Shohei Mita and Hiroo Sekiya, *Chiba university, Japan; Chiba University, Japan*

S175 | DC-AC Multi-Phase I

Room B119

Chairs: Luca Solero; Xuechao Wang

10:30AM | Digital-Based Soft-Switching Modulation for High-Frequency Three-Phase Inverters with Reactive Power Transfer Capability [#19443]

Zhengrong Huang, Qiang Li and Fred Lee, *CPES, Virginia Tech, United States*

10:55AM | Space Vector Modulation Technique for High Power Five-Level PCSI7 with DC Current Balance Control and Common-Mode Voltage Suppression [#19329]

Jae Sung Park and Wang Jiacheng, *Simon Fraser University, Canada*

11:20AM | Performance Evaluation of A Bidirectional Three-Phase DC-AC Converter with Embedded DC-DC Converter and Carrier-Based PWM Strategy [#18045]

Hongfei Wu, Jiangfeng Wang, Tingting Liu, Yan Xing and Peng Xu, *Nanjing University of Aeronautics Astronautics, China*

11:45AM | Reduction of DC-Link Current Harmonics Over Wide Power-Factor Range for Three-Phase VSI Using Single-Carrier-Comparison Continuous PWM [#18716]

Koroku Nishizawa, Jun-ichi Itoh, Satoru Fujita, Akihiro Odaka, Akio Toba and Hidetoshi Umida, *Nagaoka University of Technology, Japan; Fuji Electric Co., Ltd., Japan*

S176 | AC-DC Single-Phase I

Room C120

Chairs: Minjie Chen; Pahlevani Majid

10:30AM | A More Accurate Variable On-Time Control for CRM Flyback PFC Converters [#19011]

Zhou Yuting, Ren Xiaoyong, Guo Zhehui, Zhang Zhiliang, Chen Qianhong and Yao Kai, *Nanjing Univ. of Aeronautics and Astronautics, China; Nanjing Univ. of Science and Technology, China*

10:55AM | Adaptive Harmonic Injection Mechanism for Single-Switch Three-Phase DCM Boost Rectifier [#18042]

Ray-Lee Lin and Hung-I Cheng, *National Cheng Kung University, Taiwan*

11:20AM | A Single-Stage ZVS AC-DC Boost Converter with Interleaving [#18621]

Adel Abosnina, Javad Khodabakhsh and Gerry Moschopoulos, *Western University, Canada*

11:45AM | A Series-Pass Modules for Shaping Input Current of Flyback PFC [#18356]

Tung Chung-Pui, Wang Ke-Wei, Ho Ka-Wai, Chow Jeff Po-Wa, Fan John Wing-To, Chan Wan-Tim and Chung Henry Shu-Hung, *City University of Hong Kong, Hong Kong; Mosway Semiconductor Limited, Hong Kong*

S177 | Modeling and Control of Resonant Converters

Room A108

Chairs: Luca Solero; Juan Rivas Davila

10:30AM | Constant Burst Frequency Control for LLC Converters with Trajectory Control [#18824]

Wei Jiang, Shuai Shao, Junjun Zhang, Xinke Wu and Junming Zhang, *Zhejiang University, China; Fudan University, China*

10:55AM | Accurate Small-signal Modeling of Resonant Converter Based on Perturbation on the State Plane [#19017]

Yi-Hsun Hsieh and Fred C. Lee, *CPES, Virginia Tech, United States*

11:20AM | A Wide Output LLC Converter Based on Full Bridge and Half Bridge Topology Morphing Method Using Trajectory Transition [#18699]

Jianwei Wen, Kuang Sheng, Wei Jiang, Junming Zhang and Shu Yang, *Zhejiang University, China*

11:45AM | Input Impedance Analyses of Charge Controlled and Frequency Controlled LLC Resonant Converter [#19571]

Suyash Sushilkumar Shah, Utkarsh Raheja and Subhashish Bhattacharya, *North Carolina State University, United States*

S178 | Reliability, Diagnostic and Faults Analysis in Power Converters 1

Room C121

Chairs: Markus Andresen; Dong Dong

10:30AM | Simplified Estimation of the Junction Temperature Fluctuation at the Output Frequency for IGBT Modules in Modular Multilevel Converters [#19057]

Yi Zhang, Huai Wang, Zhongxu Wang and Frede Blaabjerg, *Aalborg University, Denmark*

10:55AM | An Enhanced Fault-Tolerant DC-DC Converter with Redundant Circuit and Topology Reconstruction [#18021]

Guipeng Chen, Luan Chen, Zhufeng Jin, Yan Deng, Xinlin Qing and Huang Lantao, *Xiamen University, China; Zhejiang University, China*

11:20AM | Non-Intrusive Online Stator Temperature Estimation for Open-End Winding PMSM [#19767]

Nick Hunter, Tom Cox, Pericle Zanchetta, Shafiq Ahmed Odhano and Luca Rovere, *The University Of Nottingham, United Kingdom; The University of Nottingham, United Kingdom*

11:45AM | Active Ageing Control of Winding Insulation in High Frequency Electric Drives [#19620]

Riccardo Leuzzi, Vito Giuseppe Monopoli, Francesco Cupertino and Pericle Zanchetta, *Politecnico di Bari, Italy; University of Nottingham, England*

S179 | Model Predictive Control of Power Converters

Room B116

Chairs: Jose Rodriguez; Pericle Zanchetta

10:30AM | Modulated Optimal Model Predictive Control for Variable Speed Gen-Set [#19739]

Luca Bigarelli, Shafiq Odhano, Alessandro Lidozzi, Fabio Crescimbin, Luca Solero and Pericle Zanchetta, *C-PED, Roma Tre University, Italy; University of Nottingham, United Kingdom*

10:55AM | MPC Using Modulated Optimal Voltage Vector for Voltage Source Inverter with LC Output Filter [#19228]

Shafiq Ahmed Odhano, Pericle Zanchetta, Mi Tang and Cesar A. Silva, *The University Of Nottingham, United Kingdom; The University of Nottingham, United Kingdom; Universidad Tecnica Federico Santa Maria, Chile*

11:20AM | An Output-Bounded Model Predictive Control with Equivalently Variable Sampling Interval for Current-Source Converter [#18535]

Hang Gao, Wu Bin, Dewei Xu and Navid Zargari, *Dept. of ELCE, Ryerson University, Canada; Medium Voltage Drive, Rockwell Automation, Canada*

11:45AM | Lyapunov-Based Model Predictive Control of Three-Phase Four-Leg Inverter with LC filter [#18925]

Kazi Saiful Alam, Md. Parvez Akter, S M Showybul Islam Shakib, Dan Xiao, Daming Zhang and M.F. Rahman, *University of New South Wales (UNSW), Australia*

S180 | High Speed and Bearingless Motors 1

Room B118

Chairs: Junichi Asama; Wei Xu

10:30AM | Effects of Electrical Ageing on Winding Insulation in High-Speed Motors: Analysis and Modelling [#19619]

Riccardo Leuzzi, Vito Giuseppe Monopoli, Luca Rovere, Francesco Cupertino and Pericle Zanchetta, *Politecnico di Bari, Italy; University of Nottingham, England*

10:55AM | Influence of Rotor Pole Thickness on Optimal Combination of Stator Slot and Rotor Pole Numbers in Integrated Flux-Switching Motor-Compressor [#19589]

Hao Ding, William Sixel, Mingda Liu, Yingjie Li and Bulent Sarioglu, *University of Wisconsin – Madison, WEMPEC, United States*

11:20AM | Asymmetrical Combined Winding Arrangement for a Four-Phase Bearingless Motor [#19430]

Junichi Asama, Tomotaka Shibata and Akira Chiba, *Shizuoka University, Japan; Tokyo Institute of Technology, Japan*

11:45AM | Torque Density Improvement of a One Axis Actively Positioned Single-Drive Bearingless Motor [#18861]

Theeraphong Srichiangsa, Hiroya Sugimoto and Akira Chiba, *Tokyo Institute of Technology, Japan*

S181 | IPM Motors 2

Room B114

Chairs: Takashi Kato; Rajesh Deodhar

10:30AM | Design Optimization of a Spoke-Type FSCW IPM Machine to Achieve High Torque Density and Low Torque Ripple Under a Wide Constant Power Speed Range [#19541]

Alireza Pouramin, Rukmi Dutta and M. Fuzlar Rahman, *University of New South Wales, Australia*

10:55AM | Torque Ripple Minimization in Interior Permanent Magnet Machines Using Axial Pole Shaping [#18251]

Zhentao Stephen Du and Thomas Anthony Lipo, *University of Wisconsin – Madison, United States*

11:20AM | Performance Optimization of PMSM with Torque Ripple Reduction [#19045]

Cristian A. Lopez and Elias G. Strangas, *Michigan State University, United States*

11:45AM | General Magnetic Model for the Analysis and Optimization of Multiple Barrier Rotors [#19062]

Giorgio Pietrini, Alessandro Soldati, Nicola Bianchi and Carlo Concari, *University of Parma, Italy; University of Padova, Italy*

S182 | Control Issues in PM Machines

Room B115

Chairs: Lei Hao; Fabio Giulii Capponi

10:30AM | Torque Ripple Minimization in Six-Step Modulated PMSM Drives via Fast DC Bus Dynamics [#18656]

Hung-Yen Ou Yang and Robert Lorenz, *WEMPEC Program, University of Wisconsin-Madison, United States*

10:55AM | Current Control of Saturated Synchronous Motors [#18995]

Hafiz Asad Ali Awan, Seppo E. Saarakkala and Marko Hinkkanen, *Aalto University, Finland*

11:20AM | Single-Phase Inverter Scheme for Permanent Magnet Synchronous Motor Drive with Resonant Capacitor [#19477]

Kahyun Lee and Jung-ik Ha, *Seoul National University, Korea (South)*

11:45AM | Analysis and Design of Position and Velocity Estimation Scheme for PM servo motor drive with Binary Hall Sensors [#18241]

Qinan Ni, Ming Yang, Shafiq Odhano, Pericle Zanchetta, Xiaosheng Liu and Dianguo Xu, *Harbin Institute of Technology, China; University of Nottingham, United Kingdom*

S183 | Control Issues in Electric Drives 1

Room B113

Chairs: Marcello Pucci; Francesco Cupertino

10:30AM | 5-Level PWM Scheme for a Dual Inverter Drive Using an Open Winding Machine [#19358]

Chatumal Perera, Gregory J. Kish and John Salmon, *University of Alberta, Canada*

10:55AM | Three-Phase Inverter Control for AC Motor Drives with Small DC-Link Capacitor Fed by Single-phase Diode Rectifier [#18072]

Kwak Byung-Gil and Jul-Ki Seok, *Yeungnam University, Korea, Republic of*

11:20AM | Harmonics Mitigation of Standalone Brushless Doubly-Fed Induction Generator Feeding Nonlinear Loads Considering Power Converter Voltage Rating [#18642]

Kailiang Yu, Wei Xu, Yi Liu and Jianping Gao, *State Key Laboratory of Advanced Electromagnetic, China*

11:45AM | Fourth Harmonic Current Injection based Neutral Point Voltage Control Method for Three-Level Diode-Clamped Converter In Aircraft Starter Generator Systems [#18662]

Chen Li, Tao Yang, Serhiy Bozhko, Patrick Wheeler and Empty Empty, *PEMC group, Nottingham University, United Kingdom; Empty, United Kingdom*

S184 | SiC Characterization and Modeling

Room B112

Chairs: Tanya Gachovska; Muhammad Nawaz

10:30AM | Characterization and Modeling of a SiC MOSFET's Turn-On Overvoltage [#18140]

Wen Zhang, Zheyu Zhang, Fred Wang, Daniel Costinett, Leon Tolbert and Benjamin Blalock, *University of Tennessee, United States*

10:55AM | Characterization of 1.2 kV SiC Power MOSFETs at Cryogenic Temperatures [#18190]

Handong Gui, Ren Ren, Zheyu Zhang, Ruirui Chen, Jiahao Niu, Fred Wang, Leon M. Tolbert, Benjamin J. Blalock, Daniel Jes Costinett and Benjamin B. Choi, *University of Tennessee, Knoxville, United States; NASA Glenn Research Center, United States*

11:20AM | Comparison of Impedance Measurement Techniques for Extracting Parasitic Inductance of SiC MOSFETs [#18195]

Tianjiao Liu, Yanjun Feng, Yuanfeng Zhou, Runtao Ning, Thomas T. Y. Wong and Z. John Shen, *Illinois Institute of Technology, United States*

11:45AM | Experimental and Modeling Comparison of Different Damping Techniques to Suppress Switching Oscillations of SiC MOSFETs [#18198]

Tianjiao Liu, Yuanfeng Zhou, Yanjun Feng, Thomas T. Y. Wong and Z. John Shen, *Illinois Institute of Technology, United States*

S185 | Novel Passive Components

Room B110

Chairs: Debrup Das; Huai Wang

10:30AM | A Passive Integrated Unit for Multi-Channel SRC LED Driver [#18353]

Cheng Deng, Qiwen Jiang, Andres Escobar Mejia and Yuzhi Zhang, *Xiangtan University, China; Perira University, Colombia; Corporate Research Center, ABB Inc., United States*

10:55AM | Planar Nonlinear Coupled Inductors for Improving Light Load Efficiency of DC/DC Converters [#18519]

Laili Wang, Fei Li and Kangping Wang, *Xi'an Jiaotong University, China*

11:20AM | Reliability Assessment of 3D-Printed Pot-Core Constant-Flux Inductors [#18757]

Chao Ding, Lanbing Liu, Jim Moss, Joyce Mullenix, Khai D.T. Ngo and Guo-Quan Lu, *Virginia Tech, United States; Texas Instrument, United States*

11:45AM | A Voltage-Controlled Capacitor with Wide Capacitance Range [#18830]

Lujie Zhang and Khai Ngo, *CPES, Virginia Tech, United States*

S186 | Portable Applications

Room A105

Chairs: Sanjib Kumar Panda; Ching-Jan Chen

10:30AM | Lithium Ion Battery/ Lithium Ion Super Capacitor Hybrid Portable Power Energy Storage Device for Pulsed Power Applications [#19120]

Raymond Sepe, Jr, Kyle Waterman, Joseph Tudino and Patricia Smith, *Electro Standards Laboratories, United States; Naval Surface Warfare Center, United States*

10:55AM | A Flying Capacitor Multilevel Flyback Converter for Pulsed Power Applications [#18138]

Santino Graziani, Ansel Barchowsky and Brandon Grainger, *University of Pittsburgh, United States*

11:20AM | A Temperature-Suppression Charging Strategy for Supercapacitors of Portable Applications [#19378]

Yongjie Liu, Zhiwu Huang, Hongtao Liao, Yanhui Zhou, Yun Jiao, Heng Li, Chao Hu and Jun Peng, *Central South University, China*

11:45AM | Energy Harvesting from Magnetic Fields of the Overhead Transmission Lines [#19756]

Syed Najafi, Awab Ali, Yilmaz Sozer and Alex De Abreu-Garcia, *University of Akron, United States*

Thursday, September 27

2:10PM – 3:50PM

S187 | Solar PV Converters II

Room A107

Chairs: Mohamed Badawy; Nuh Erdogan

2:10PM | Start-up Scheme for Dual-active-bridge Based 10kV Power Electronics Transformer in PV Application [#18091]

Tao Liu, Yang Xuan, Li Yang, Lang Huang, Xu Yang, Wenjie Chen and Xiang Hao, *Xian Jiaotong University, China; TBEA Sunoasis. Co. LTD, China*

2:35PM | Small-Signal Modelling and Stability Study of a Single Stage Buck-Boost Inverter for PV Application [#18446]

Ken King Man Siu and Carl Ngai Man Ho, *University of Manitoba, Canada*

3:00PM | Unfolding PV Microinverter Current Control: Rectified Sinusoidal vs Sinusoidal Reference Waveform [#19224]

Diana Lopez, Samir Kouro, Freddy Flores and Ricardo Hernandez, *Universidad Tecnica Federico Santa Maria, Ecuador; Universidad Tecnica Federico Santa Maria, Chile*

3:25PM | Review and Comparison of Single-Phase Grid-Tied Photovoltaic Microinverters [#19130]

Khalil Alluhaybi and Issa Batarseh, *University of Central Florida, United States*

S188 | Grid Connected Converters- III

Room B117

Chairs: Tanya Gachovska; Siavash Pakdelian

2:10PM | A Unified Control Approach with Inherent Islanding and Synchronizing Capabilities for Grid Interfaced Inverters Operating in Autonomous Mode [#18169]

Shan Shine, Umanand Loganathan and Nakul Narayanan K, *IISc, Bangalore, India*

2:35PM | Remote Power Control Strategy Based on Virtual Flux Approach for the Grid Tied Power Converters [#18404]

Nurul Fazlin Roslan, Alvaro Luna, Joan Rocabert, Jose Ignacio Candela and Pedro Rodriguez, *Technical University of Catalonia, Spain; Loyola University of Andalusia, Spain*

3:00PM | Self-Tuning of Triple-Loop Controlled Grid-Connected Inverters [#18755]

Tommaso Caldognetto, Qing Liu and Simone Buso, *University of Padova, Italy*

3:25PM | Study of Phase-Locked-Loop-Based Synchronization of Grid Inverter During Large Phase Jump [#18764]

Zhi-Xiang Zou and Marco Liserre, *University of Kiel, Germany*

S189 | DC Circuit Breakers

Room B111

Chairs: Maryam Saeedifard; Qin Lei

2:10PM | Improving dc Circuit Breaker Performance Through an Alternate Commutating Circuit [#19568]

Sudipta Sen, Shahab Mehraeen and Farzad Ferdowsi, *Louisiana State University, United States*

2:35PM | A Coupled Inductor based Hybrid Circuit Breaker Topology for Subsea HVDC Transmission Systems [#19043]

Anindya Ray, Satish Naik Banavath, Sumit Kumar Pramanick and Kaushik Rajashekara, *University of Houston, United States*

3:00PM | Progressive Switching of Hybrid DC Circuit Breakers for Faster Fault Isolation [#19404]

Landon Mackey, Chang Peng and Iqbal Husain, *NC State University, United States*

3:25PM | A Modular Hybrid Circuit Breaker for Medium and High Voltage DC Networks [#18961]

Jaganath Krishnan, Stefan Wettengel and Henry Gueldner, *TU Dresden, Germany*

S190 | DC-AC Single-Phase 2

Room B119

Chairs: Mohammad B Shadmand; Ha Pham

2:10PM | A High Frequency Inverter for Variable Load Operation [#19531]

Weston Braun and David Perreault, *Massachusetts Institute of Technology, United States*

2:35PM | Variable Duty Cycle approach to Improve CCM Boundary Range of Current-fed Switched Inverter with the Modified PWM Scheme [#19694]

Anil Gambhir and Santanu Mishra, *IIT Kanpur, India*

3:00PM | Pulse Current Generator with Improved Waveform Fidelity for High Voltage Capacitively Coupled Plasma System [#19607]

Beomseok Chae, Juhwa Min, Yongsug Suh, Hyejun Kim and Hyunbae Kim, *Chonbuk National University, Korea (South); Samsung Electronics, Korea (South)*

3:25PM | Soft-Switching Techniques for Transformerless Photovoltaic Grid-Connected Inverters [#18070]

Huafeng Xiao, Zheng Wang and Ming Cheng, *Southeast University, China*

S191 | DC-AC Multi-Phase 2

Room C122

Chairs: Giacomo Scelba; Xuechao Wan

2:10PM | A New Three-Level Three-Phase Boost PWM Inverter for PV Applications [#18932]

Aswin Palanisamy, Yam Siwakoti, Akshay Mahajan, Stephan Liese, Teng Long, Omid Forati Kashani and Frede Blaabjerg, *Fraunhofer Institute of Solar Energy System, Germany; University of Technology Sydney, Australia; University of Cambridge, United Kingdom; Coburg University of Applied Sciences, Germany; Aalborg University, Denmark*

2:35PM | Study of the Interaction Between the AC and DC Side in the Quasi-Z-Source Converter [#18258]

Zipeng Liang, Jie Dang, Sideng Hu, Mufeng Xiong and Xiangning He, *Zhejiang University, China; Zhejiang University, China*

3:00PM | Bidirectional Transformerless EV Charging System with Low Device Cost and Leakage Current [#19542]

Liwei Zhou and Matthias Preindl, *Columbia University, United States*

3:25PM | Capacitive-Link Universal Converters with Low Voltage Stress and High Switching Frequency [#18675]

Masih Khodabنده and Mahshid Amirabadi, *Northeastern University, United States*

S192 | AC-DC Single-Phase 2

Room C120

Chairs: Grant Pitel; Antonio J. Marques Cardoso

2:10PM | A Two-Stage AC-DC Converter with Delta-Sigma Configuration for Wide Output Voltage Range Applications [#18354]

Xun Gao, Hongfei Wu, Mengxi Li and Yan Xing, *Nanjing University of Aeronautics and Astronautics, China*

2:35PM | A Single-Step Bidirectional Switch Commutation Strategy for PWM Controlled AC/DC Resonant Converters [#19097]

Kenny George and Simon Ang, *University of Arkansas, United States*

3:00PM | A High Power Density Power Factor Correction Converter With a Multilevel Boost Front-End and a Series-Stacked Energy Decoupling Buffer [#19412]

Zitao Liao, Nathan C Brooks, Zichao Ye and Robert C.N. Pilawa-Podgurski, *University of California, Berkeley, United States*

3:25PM | Analysis and Design of a Single-Stage ZVS AC-DC Stacked Flyback Converter [#18606]

Yuntong Li and Gerry Moschopoulos, *University of Western Ontario, Canada*

S193 | Modeling and Control of Multilevel Converters 2

Room B116

Chairs: Mark Scott; Daniel Costinett

2:10PM | Zero Sequences Optimizing Different Criteria for Three-phase Multilevel Inverters [#18917]

Bernardo Cougo, Thierry Meynard, Guillaume Gateau and Lenin Morais, *IRT Saint-Exupery, France; LAPLACE, France; UFGM, Brazil*

2:35PM | Current Ripple Analysis and Prediction for Three-Level T-type Converters [#19532]

Zhongjing Wang, Zhe Zhao, Muhammad Hammad Uddin and Yue Zhao, *University of Arkansas, United States*

3:00PM | Feed-forward Control for Active Voltage Balancing in Electric Drives with Five-Level NPC Converters [#19244]

Georgios Mademlis and Yujing Liu, *Chalmers University of Technology, Sweden*

3:25PM | FPGA Control of a Three-Phase Three-Level T-Type NPC Grid-Connected Inverter with LCL Filter [#18731]

Chin-Chang Kuo and Ying-Yu Tzou, *National Chiao Tung University, Taiwan*

S194 | Reliability, Diagnostic and Faults Analysis in Power Converters 2

Room A108

Chairs: Huai Wang; Lee Empringham

2:10PM | Scalable Reliability Monitoring of GaN Power Converter through Recurrent Neural Networks [#19529]

Mehrdad Biglarbegian, Mohammadreza Baharani, Namwon Kim, Hamed Tabkhi and Babak Parkhideh, *University of North Carolina at Charlotte, United States; University of North Carolina, Charlotte, United States*

2:35PM | Control of a Three-Phase Boost Rectifier for Operation Under Single Failure of the AC Line For Avionic Application [#18818]

Uros Borovic, Sisi Zhao, Pedro Alou, Jesus Angel Oliver and Jose Antonio Cobos, *Universidad Politecnica de Madrid, Spain*

3:00PM | Reliability Assessment of PV Inverters with Battery Systems Considering PV Self-Consumption and Battery Sizing [#18377]

Ariya Sangwongwanich, Sebastian Zurmuehlen, Georg Angenendt, Yongheng Yang, Dezso Sera, Dirk Uwe Sauer and Frede Blaabjerg, *Aalborg University, Denmark; RWTH Aachen University, Germany*

3:25PM | Fault Prognostics of Multilevel Inverters Using On-State Resistance Evolution [#19720]

Weiqiang Chen and Ali Bazzi, *University of Connecticut, United States*

S195 | Modelling and Analysis Methods 2

Room B114

Chairs: Katsumi Yamazaki; Mohammad Rasouli

2:10PM | Fast Solution of Rotor Losses in Inverter-Fed Cage Induction Motors with Skewed Slots [#18069]

Yang Zhan, Libo Ma, Haisen Zhao, Guorui Xu and Dongdong Zhang, *North China Electric Power University, China; Xi'an Jiaotong University, China*

2:35PM | Analysis of Airgap Field Modulation Principle of Flux Guides [#18071]

Honghui Wen, Ming Cheng, Yunlei Jiang and Minghao Tong, *Southeast University, China*

3:00PM | An Efficient Approach for Measurement-Based Composite Load Modeling [#19380]

Mohammad Rasouli, Reza Sabzehgar and Hamid Reza Teymour, *Penn State Behrend, United States; San Diego State University, United States; Jabil Circuit, United States*

3:25PM | Analytical Modeling of a Segmented-Pole Synchronous Reluctance Machine with CRGO Laminations [#18082]

Seyede Sara Maroufian and Pragasen Pillay, *Concordia University, Canada*

S196 | Axial Flux and Special Machines

Room B118

Chairs: Giulio De Donato; Tausif Husain

2:10PM | Influences of Manufacturing Tolerance on Performance of Axial Flux-Switching Permanent Magnet Machine [#19087]

Ju Hyung Kim and Bulent Sarlioglu, *University of Wisconsin-Madison, United States*

2:35PM | Effect of Pole Shaping on Cogging Torque, Torque Ripple and Vibrational Performance in Consequent Pole TFM [#19682]

Iftekhhar Hasan, Anik Chowdhury and Yilmaz Sozer, *University of Akron, United States*

3:00PM | Torque Production Capability of Axial Flux Machines with Single and Double Rotor Configurations [#19583]

Narges Taran, Greg Heins, Vandana Rallabandi, Dean Patterson and Dan M. Ionel, *University of Kentucky, United States; Regal Beloit Corporation, Australia*

3:25PM | Basic Characteristics of an Ultra-lightweight Magnetic Resonance Coupling Motor with Various Numbers of Poles [#18375]

Kazuto Sakai and Kenta Takishima, *Toyo University, Japan*

S197 | Control of Electric Generators

Room B113

Chairs: Sara Roggia; Shafiq Ahmed Odhano

2:10PM | Harmonic Voltage and Current Elimination of Stand-Alone Brushless Doubly-Fed Induction Generator with Nonlinear Loads for Ship Shaft Power Generation Applications [#19025]

Yi Liu, Wei Xu, Frede Blaabjerg and Dong Hu, *Huazhong University of Science and Technology, China; Aalborg University, Denmark*

2:35PM | Parametric Study for the Design of the End Region of Large Synchronous Generators Based on Three-Dimensional Transient Finite Element Analysis [#19512]

Sufei Li, Cheng Gong, Liang Du, J. Rhett Mayor, Ronald G. Harley and Thomas G. Habetler, *Georgia Institute of Technology, United States; Temple University, United States*

3:00PM | Full-Size Converter Operation of Large Hydro Power Generators: Generator Design Aspects [#18390]

Thomas Holzer and Annette Muetze, *Graz University of Technology, Austria*

3:25PM | Control Design of Standalone Brushless Doubly-fed Induction Generator for Supplying Unbalanced Loads [#18273]

Omer Mohammed Elbabo Mohammed, Wei Xu and Yi Liu, *Huazhong University of Science and Technology, China*

S198 | Modeling & Optimization In Power Converters

Room B110

Chairs: Dehong Mark Xu; Martin Ordonez

2:10PM | Equivalent Parameters of Round And Litz Wire Conductors to Obtain an Equivalent Layer to Accelerate Finite Element Simulations of Wireless Power Transfer Systems [#18970]

Alberto Delgado, Guillermo Salinas, Jesus A. Oliver, Jose A. Cobos, Miroslav Vasic and Jorge Rodriguez, *Universidad Politecnica de Madrid, Spain; PREMO S.L., Spain*

2:35PM | Fast FEA Thermal Simulation of Magnetic Components by Winding Equivalent Layers [#19054]

Guillermo Salinas, Alberto Delgado, Jesus A. Oliver and Roberto Prieto, *Universidad Politecnica de Madrid, Spain*

3:00PM | Reliability Evaluation and Optimization of Capacitor Bank [#19086]

Haoran Wang and Huai Wang, *Aalborg University, Denmark*

3:25PM | Experimentally Extracting Multiple Spatial Thermal Models that Accurately Capture Slow and Fast Properties of Assembled Power Semiconductor Converter Systems [#19179]

Timothy Polom, Markus Andresen, Marco Liserre and Robert Lorenz, *University of Wisconsin-Madison, United States; University of Kiel, Germany, Germany*



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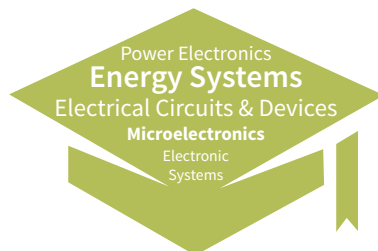
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Monday, September 24

5:00PM – 7:30PM

S31 | Wind Energy Systems

Room: Exhibit Hall A

Chairs: Omer Gundogmus; Iftekhar Hasan

P101 | Frequency Coupling Characteristic Modeling of DFIG System Based on Type-1 Frequency-locked Loop [#18020]

Yunyang Xu, Heng Nian, Liang Chen, Junchao Ma, Hongyang Huang and Boliang Lou, *College of Electrical Engineering Zhejiang Univ, China; State Grid Zhejiang EPRI, China*

P102 | Harmonic Impedance Modeling of DFIG Considering Dead Time Effect of Rotor Side Converter [#18075]

Chao Wu, Heng Nian, Qi Zhou, Peng Cheng, Bo Pang and Dan Sun, *College of Electrical Engineering, Zhejiang Univ, China; China Electric Power Research Institute, China*

P103 | A Prototype 3.2 MW Flux-Switching Permanent Magnet Drive for Large Wind Turbines [#18301]

Chester Ditmanson, Nils Larsen, Ronny Hein, Peter Hein, Stefan Kolb and Steffen Bernet, *Venpower GmbH, Germany; Enasys GmbH, Germany; TU Dresden, Germany*

P104 | Multi-winding Flyback Type Snubber for 10kV IGCT with Reduced Voltage Stress on Recovery Diodes [#18813]

Siamak Shirmohammadi and Yongsug Suh, *Chonbuk National University, Korea (South)*

P105 | Probability Forecasting of Wind Power Ramp Events Using a Time Series Similarity Search Algorithm [#18952]

Bo Cao, Liuchen Chang, Xun Gong and Julian Luciano Cardenas Barrera, *University of New Brunswick, Canada*

P107 | Wind Turbine Drivetrains: A Glimpse of Existing Technologies [#19523]

Elaheh Taherian-Fard, Ramin Sahebi, Taher Niknam, Afshin Izadian and Mokhtar Shasadeghi, *Shiraz University of Technology, Iran; Purdue School of Engineering and Technology, United States*

S32 | Renewable Energy Applications

Room: Exhibit Hall A

Chairs: Suman Debnath; Madhu Sudhan Chinthavali

P301 | Cascaded Paralleled-Buck Converter with Leakage Current Elimination for Transformerless Photovoltaic Applications [#19351]

Vagner Fonseca Nobrega and Montie Alves Vitorino, *Federal Institute of Paraiba – IFPB, Brazil; Federal University of Campina Grande – UFCG, Brazil*

P302 | Modeling and Control for a Photovoltaic Inverter with Power Decoupling on the AC Side [#19151]

Jianwu Zeng, Junhui Zhao and Taesic Kim, *Minnesota State University, Mankato, United States; University of New Haven, United States; Texas AM University-Kingsville, United States*

P303 | Active Power Limiter for Static Synchronous Generators in Renewable Applications [#19098]

Mostafa Abdollahi, Jose Ignacio Candela, Joan Rocabert and Raul Santiago Munoz Aguilar, *Technical University of Catalonia UPC SEER, Spain*

P304 | Analysis and Control of a Parallel DC Collection System for Wind Turbines with Single Active Bridge Converters [#19026]

Yu Sang, Adria Junyent-Ferre, Xin Xiang and Tim C Green, *Imperial College London, United Kingdom*

P305 | Analysis of Impact on Small Signal Stability of Onshore Wind Integrated VSC HVDC Systems [#18980]

Nsofwa Kangwa and David Dorrell, *University of KwaZulu-Natal, South Africa*

P306 | MOSFET-Clamped Three-Level DC-DC Converters for Renewable Energy Resources [#18753]

Zhilei Yao and Jing Xu, *Yancheng Institute of Technology, China*

P307 | An Enhanced Damping Control Strategy for Circulating Current Suppression in Modular Multilevel Converters [#18039]

Rafael Oliveira and Amirnaser Yazdani, *Ryerson University, Canada*

P308 | Fast and Secure Operation of Voltage Source Inverter Based DERs using Model Predictive Droop Control [#19525]

Waleed Alhosaini, Mohammad Hazzaz Mahmud and Yue Zhao, *University of Arkansas, United States*

S33 | EV-Grid Interconnection

Room: Exhibit Hall A

Chairs: Jiangchao Qin; Li Qi

P501 | Energy Management Strategy of Solar PV- Battery and Diesel Generator Based Electric Vehicle Charging Station [#18145]

Anjeet Verma and Bhim Singh, *Indian Institute of Technology, New Delhi, India*

P502 | Grid Power-Smoothing Performance Improvement for PV and Electric Vehicle (EV) Systems [#18413]

Wenping Zhang, Katelin Spence, Riming Shao and Liuchen Chang, *University of New Brunswick, Canada*

P503 | Optima Scheduling of Spinning Reserve and User Cost in Vehicle-to-Grid (V2G) Systems [#18414]

Wenping Zhang, Katelin Spence, Riming Shao and Liuchen Chang, *University of New Brunswick, Canada*

P504 | An Integrated Electrolytic Capacitorless Onboard Charger for Electric Vehicles [#18549]

Shuai You, Zheng Wang, Yang Xu, Huaifeng Xiao and Ming Cheng, *Southeast University, China*

P505 | Parameter Optimization Design of MMC-EVIS [#18935]

Meiqin Mao, Xitao Chen, Yong Ding, Qiang Chen, Liuchen Chang and Nikos Hatzigiorgiouris, *Hefei University of Technology, China; National Technical University Of Athens, Greece*

P506 | Flexibility Scheduling for Microgrids with EV Penetration [#19166]

Qiyun Dang and Yuchong Huo, *McGill University, Canada*

S34 | Smart Grid Systems

Room: Exhibit Hall A

Chairs: Martin Ordóñez; Karthik Kandasamy

P701 | Discontinuous Modulation based Power Routing for Modular Smart Transformers [#18722]

Youngjong Ko, Vivek Raveendran, Markus Andresen and Marco Liserre, *Kiel University, Germany*

P702 | Integrated Series Compensation Devices Implementation in a Power Converter Based Transmission Line Emulator [#18781]

Shuoting Zhang, Jingxin Wang, Fred Wang and Leon Tolbert, *The University of Tennessee, United States; the University of Tennessee, United States*

P703 | Saving energy by Changing the Tariff Structure and Applying Flag Fees in Brazil [#19253]

Daniela Wolter Ferreira Touma and Agnelo Marotta Cassula, *University of South Alabama, United States; Universidade Estadual Paulista, Brazil*

P704 | SOC Estimation in Li-ion Batteries Exploiting High-Frequency Model Properties [#19288]

Pablo Garcia, Angel Navarro-Rodriguez, Sarah Saeed and Jorge Garcia, *University of Oviedo, Spain*

P705 | Virtual Inertia Emulation using Commercial Off-The-Shelf Inverters [#19395]

Ujjwol Tamrakar, Fernando Bereta dos Reis, Andre Luna, Dipesh Shrestha, Robert Fournay and Reinaldo Tonkoski, *South Dakota State University, United States; Primus Power, United States*

P706 | An Adaptive Framework for Mitigating the Current Harmonics Produced by Distributed Energy Resources Using an AC-Stacked Architecture [#19674]

John Troxler and Robert Cox, *UNC Charlotte, United States*

P707 | Impact of Transformer Leakage Inductance on the Soft-Switching Solid-State Transformer [#19714]

Liran Zheng, Karthik Kandasamy, Rajendra Kandula and Deepak Divan, *Georgia Institute of Technology, United States*

P708 | Augmenting the Traditional Bus-Branch Model for Seismic Resilience Analysis [#19389]

Vishvas Chalisahar, Brandon Johnson, Ted Brekken and Eduardo Cotilla-Sanchez, *Oregon state university, United States; Oregon State university, United States; Oregon State University, United States*

P709 | Reliability Analysis of Small Scale DC Microgrid using Stochastic Hybrid System Modeling [#19647]

Shaheed Mohammad Noor and Choi Seungdeog, *University of Akron, United States; Mississippi State University, United States*

P710 | The Steady-State and Fault Ride-Through Strategies of Soft Normally Open Point in Distribution Network [#18973]

Yuze Li, Xuejun Pei, Zhi Chen, Min Yang, Zhibi Lyu and Chaoliang Wang, *Huazhong University of Science and Technology, China; State Grid Zhejiang Electric Power Research Inst, China*

P711 | A Low-Pass Filter Method to Suppress the Voltage Variations Caused by Introducing Droop Control in DC Microgrids [#18416]

Fulong Li, Zhengyu Lin, Alian Chen, Jiande Wu and Cao Wenping, *Aston University, United Kingdom; Aston University, United Kingdom; Shandong University, China; Zhejiang University, China*

P712 | Cooperative Control in a Hybrid DC/AC Microgrid Based on Hybrid DC/AC Virtual Generators [#19664]

Angel Navarro-Rodriguez, Pablo Garcia, Cristian Blanco, Ramy Georgious and Jorge Garcia, *University of Oviedo, Spain*

P701 | Power System Design Considerations for a Seafloor Mining Vehicle [#19 018]

Razieh Nejati Fard, Elisabetta Tedeschi, *Norwegian University of Science and Technology, Norway*

S35 | Inductive Power Transfer & Charging Techniques

Room: Exhibit Hall A

Chairs: Mohammad Anwar; Shamala Chickamenahalli

P901 | Coupling- and Load-Independents Output Voltage and ZPA Operation in LCC-Series Compensated IPT System [#18123]

Jiang-Hua Lu, Guo-Rong Zhu, Yatao Shou and Fei Liu, *Wuhan University of Technology, China; Wuhan University, China*

P902 | Design and Experimental Validation of a 50kW IPT for Railway Traction Applications [#18150]

Irma Villar, Asier Garcia-Bediaga, Ugaitz Iruretagoyena, Ruth Arregi and Pedro Estevez, *IK4-ikerlan, Spain; CAF I+D, Spain*

P903 | Design of an IPT Battery Charger with Double-Sided LCC Compensation [#18577]

Haijun Chu, Xiaohui Qu, Siu chung Wong and Chi kong Tse, *Southeast University, China; The Hong Kong Polytechnic University, Hong Kong*

P904 | Near Field Wireless Power Transfer for Multiple Receivers by Using a Novel Magnetic Core Structure [#18742]

Manxin Chen, Ka Wai Eric Cheng and Jiefeng Hu, *Dept. of EE, The Hong Kong Polytechnic University, Hong Kong*

P905 | Coil Power Density Optimization and Trade-off Study for a 100kW Electric Vehicle IPT Wireless Charging System [#19392]

Jason Pries, Veda Prakash Galigeke, Omer Onar, Gui-jia Su, Randy Wiles, Larry Seiber, Jonathan Wilkins, Saeed Anwar and Shenli Zou, *Oak Ridge National Laboratory, United States; University of Tennessee, United States; University of Maryland, United States*

P906 | A Novel Grid-Integration Technique for IPT based EV Chargers [#18916]

Gaurav Kalra, Duleepa Thrimawithana and Martin Neuburger, *University of Auckland, New Zealand; Hochschule Esslingen, Germany*

P907 | Partial-Power Converter without High Frequency Transformer for Electric Vehicle Fast Charging Stations [#19349]

Sebastian Rivera, Daniel Pesantez, Samir Kouro and Peter Lehn, *Universidad Tecnica Federico Santa Maria, Chile; University of Toronto, Canada*

P908 | A Current Controller Based on SPACE for Parallel Charging Systems of Energy-Storage Urban Rails [#19399]

Xiaoyong Zhang, Hang Zhang, Heng Li, Yun Jiao, Yanhui Zhou, Hongtao Liao and Zhiwu Huang, *Central South University, China*

P909 | Leakage Current Issue of Non-Isolated Integrated Chargers for Electric Vehicles [#19462]

Yue Zhang, Ge Yang, Xiaoteng He, Mohamed Elshaer, William Perdikakis, Chengcheng Yao, He Li, Jin Wang, Ke Zou, Zhuxian Xu and Chingchi Chen, *The Ohio State University, United States; Ford Motor Company, United States; Ford Motor Company, United States*

P910 | Next Generation Integrated Drive, NGID: A Novel Approach to Thermal and Electrical Integration of High Power Density Drives in Automotive Applications [#19768]

Liliana de Lillo, Behzad Ahmadi, Jorge Espina, Robert Abebe, Lee Empringham and Mark Johnson, *University of Nottingham, United Kingdom*

P911 | Comparison of Si, SiC, and GaN Based Isolation Converters for Onboard Charger Applications [#19660]

Gui-Jia Su, *Oak Ridge National Lab, United States*

S36 | DC-DC Converters I

Room: Exhibit Hall A

Chairs: Pradeep Shenoy; Aleksandar Prodic

P1101 | Common Mode Noise Analysis for a High Step-Up Converter with GaN Devices [#18918]

Bilal Ahmad, Wilmar Martinez and Jorma Kyra, *Aalto University, Finland; KU Leuven, Belgium*

P1102 | Nonisolated High Step-Up Soft-Switching DC-DC Converter Integrating Dickson Switched-Capacitor Techniques [#18317]

Haodong Lei, Ruixiang Hao, Xiaojie You, Fang Li and Minglei Zhou, *Beijing Jiaotong University, China*

P1103 | A High Step-Up Dual Switches DC-DC Converter with Three-Winding Coupled Inductor and Charge Pump [#18837]

Koki Takahashi, Atsushi Matsuda, Yuya Nakagawa and Hiroataka Koizumi, *Tokyo University of Science, Japan*

P1104 | An Optimized, Multiphase Switched-Capacitor DC-DC Converter with Variable-Gain [#18860]

Marko Krstic and Praveen Jain, *Queen's University, Canada*

P1105 | A 120V-to-1.8V 91.5%-Efficient 36-W Dual-Inductor Hybrid Converter with Natural Soft-charging Operations for Direct Extreme Conversion Ratios [#19559]

Ratul Das, Gab-Su Seo and Hanh-Phuc Le, *University of Colorado, Boulder, United States*

P1106 | A Non-Isolated Bidirectional Modular DC-DC Converter with Unipolar and Bipolar Structure for dc Networks Interconnection [#18274]

Lejia Sun, Fang Zhuo, Feng Wang, Hao Yi and Yanlin Zhu, *Xi'an Jiaotong University, China*

S37 | DC-AC Single-Phase Converters

Room: Exhibit Hall A

Chairs: Peter Barbosa; Leon M Tolbert

P1301 | Investigation of Secondary Winding Structure in Multi-Core Transformer in MHz Inverter using Frequency Multiplying [#19454]

Koji Orikawa, Satoshi Ogasawara, Masatsugu Takemoto and Jun-ichi Itoh, *Hokkaido University, Japan; Nagaoka University of Technology, Japan*

P1302 | A Novel Calculus Based Unipolar Double Reference Single Carrier PWM for Single Phase T-Multilevel Inverter with Under Modulation (<1) for Renewable Energy Applications: Hardware Implementation [#18033]

Mahajan Sagar Bhaskar, Sanjeevikumar Padmanaban, Frede Blaabjerg, Dan M. Ionel and Muhammad H. Rashid, *Qatar University, Qatar; Aalborg University, Denmark; University of Kentucky, United States; Florida Polytechnic Univ, Denmark*

P1303 | ZVS Transitions in Multi-Mode Single Stage Inverter [#19201]

Diego Serrano, Regina Ramos, Pedro Alou, Jesus A. Oliver and Jose A. Cobos, *Universidad Politecnica de Madrid, Spain*

P1304 | Cascaded Transformer Symmetric Single-Phase Converters with Two DC Sources [#19197]

Nayara Brandao de Freitas, Cursino Brandao Jacobina, Maxsuel Ferreira Cunha and Joao Paulo Ramos Agra Mello, *Federal University of Campina Grande, Brazil*

P1305 | A Very High Efficiency Circuit Topology for a Few kW Inverter Based on Partial Power Conversion Principle [#19644]

Atsuo Kawamura, Sakahisa Nagai, Satoshi Nakazaki, Shogo Ito and Hidemine Obara, *Yokohama National University, Japan*

P1306 | Single-Phase Cascaded H-Bridge Inverters Without Power Regeneration [#19147]

Amanda Monteiro, Cursino Jacobina, Nayara De Freitas and Joao Mello, *Federal University of Campina Grande, Brazil*

P1307 | Designing A 40.68 Mhz Power-Combining Resonant Inverter with Egan Fets for Plasma Generation [#19484]

Jungwon Choi, Yasuyuki Ooue, Naoki Furukawa and Juan Rivas-Davila, *Stanford University, United States; Daihen Corporation, Japan*

S38 | Multi-Level Power Converters I

Room: Exhibit Hall A

Chairs: Zach Pan; Fred Wang

P1501 | Multi-Commutation Loop Induced Over-voltage Issue on Non-Active Switches in Fast Switching Speed Three-Level Active Neutral Point Clamped Phase Leg [#19005]

Ren Ren, Zhang Zheyu, Liu Bo, Gui Handong, Chen Ruirui, Niu Jiahao, Wang Fred, M. Tolbert Leon, Jes Costinett Daniel, J. Blalock Benjamin and B. Choi Benjamin, *University of Tennessee, United States; NASA Glenn Research Center, United States*

P1502 | High-Efficiency Weight-Optimized Fault-Tolerant Modular Multi-Cell Three-Phase GaN Inverter for Next Generation Aerospace Applications [#19132]

Mattia Guacci, Dominik Bortis and Johann Walter Kolar, *Power Electronic Systems Laboratory – ETH Zurich, Switzerland*

P1503 | Zero-Current Switching for the Alternate Arm Converter through On-Load Tap Changers [#18330]

Harith Roshana Wickramasinghe, Georgios Konstantinou and Josep Pou, *UNSW Sydney, Australia; Nanyang Technological University, Singapore*

P1504 | High-Frequency Pulsating DC-Link Three-Phase Multilevel NPC Inverter Without Electrolytic Capacitor [#19629]

Ailton Dutra, Montie Vitorino, Sousa Reuben, Mauricio Correa and Gutemberg Goncalves, *Montie Vitorino, Sousa Reuben, Mauricio Correa and Gutemberg Goncalves, Federal University of Campina Grande, Brazil*

P1505 | An Enhanced Efficiency MMC Submodule with DC-side Fault Handling Capability and Reduced Voltage Stress for HVDC Transmission Systems [#18038]

Rafael Oliveira and Amirnaser Yazdani, *Ryerson University, Canada*

P1506 | Explore the Operating Limit of Cascaded H-Bridge Converters with Uneven Power Distribution [#18465]

Ding Kai, Yang Zezhou, Hu Yuchuan, Sun Jianjun, Tang Yi and Qian Yimin, *State Grid Hubei Electric Power Research Inst., China; Wuhan University, China; Nanyang Technological University, Singapore*

P1507 | A Mapping-Based SVM Method for Balancing DC Input Voltage of a NPC Five-Level Inverter [#18542]

Toshiji Kato, Kaoru Inoue, Takumi Sono and Kaname Tominaga, *Doshisha University, Japan*

P1508 | Eight-Switch Five-Level Current Source Inverter [#18776]

Weiqi Wang, Feng Gao, Yongheng Yang, Frede Blaabjerg and Lei Zhang, *Shandong University, China; Aalborg University, Denmark; Aalborg University, Denmark; State Grid Shandong Electric Power Research Inst, China*

P1509 | Investigation of Optimal Excitation Waveforms for Medium Frequency Transformers [#18819]

Zhengda Zhang, Lei Zhang, Jiangchao Qin, Qing Duan and Wanxing Sheng, *Arizona State University, United States; China Electric Power Research Institute, China*

S39 | Modeling and Control of DC-DC Converters

Room: Exhibit Hall A

Chairs: Stefano Bifaretti; Koji Orikawa

P1701 | Improving the Transient Response of Voltage-Mode Controller with the Ripple-Based Circuit for an On-Chip Buck Converter [#18136]

Wen-Wei Chen and Jih-Sheng Lai, *Virginia Tech, United States*

P1702 | A Novel High Resolution DPWM Circuit for High Frequency Digitally Controlled DC-DC Converter [#19368]

Yudai Furukawa, Hirokazu Nakamura, Haruhi Eto and Fujio Kurokawa, *Nagasaki University, Japan; Nagasaki Institute of Applied Science, Japan*

P1703 | A Review of Compensator Design for Digital Controller Implementation for DC-DC Converters [#19679]

Rajat Channappanavar and Santanu Mishra, *Indian Institute of Technology Kanpur, India*

P1704 | Minimizing Reactive Current of a High Gain Dual Active Bridge Converter for Supercapacitor Based Energy Storage System Integration [#19668]

Samir Hazra and Subhashish Bhattacharya, *EPC Power Corp, United States; North Carolina State University, United States*

P1705 | Trajectory-Prediction-Based Fast Bidirectional Power Transient Control for Series Resonant Dual-Active-Bridge Converter [#18310]

Renzhi Duan, Liqiang Yuan, Qing Gu, Jintong Nie and Zhengming Zhao, *Tsinghua University, China*

P1706 | Current-Mode Digital Control Method for High Frequency DC-DC Converter with Reduced Number of Sampling in One Switching Cycle [#18712]

Atsushi Mishima, Reo Takiguchi, Jun Imaoka, Masahito Shoyama, Akihiro Yamaguchi and Tomonori Kimura, *Kyushu University, Japan; Nagoya University, Japan; DENSO Corporation, Japan*

P1707 | Design Approach to Achieve Fast Transient Response for Current-Mode Adaptive On-Time Control Circuit of an On-Chip Buck Converter [#18137]

Wen-Wei Chen, Jih-Sheng Lai and Chin-Chiang Yah, *Virginia Tech, United States; uPI Semiconductor Corporation, Taiwan*

P1708 | High Efficiency Wide Input Voltage Range LCLC Resonant Converter Using Nonlinear Frequency Controller [#19467]

Bo Sheng, Yang Chen, Hongliang Wang, Yanfei Liu and Paresh C. Sen, *Queen's University, Canada*

P1709 | Analytical Small-Signal Transfer Functions for Phase Shift Modulated Dual Active Bridge Converters Using Phasor Transformation [#19030]

Weijian Han and Luca Corradini, *Northwestern Polytechnical University, China; University of Padova, Italy*

P1710 | A Novel Reduced Voltage Sensor-Count Control of a DC/DC Converter [#19243]

Zakariya Dalala and Osama Saadeh, *German Jordanian University, Jordan*

P1711 | An Enhanced Multi-frequency Small-signal Model for the Close-loop Design in Buck Converters [#18871]

Xiangpeng Cheng, Jinjun Liu, Zeng Liu, Danhong Xue and Zipeng Liu, *Xi'an Jiaotong University, China*

P1712 | A New Maximum Efficiency Point Tracking Technique for Digital Power Converter with Dual Parameters Control [#19406]

Xi Chen, Anirudh Pise, John Elmes and Issa Batarseh, *University of Central Florida, United States; Advanced Power Electronics Corporation, United States*

S40 | Modeling and Control of DC-AC Converters

Room: Exhibit Hall A

Chairs: Mark Scott; Dong Dong

P1901 | Master-Slave Control of Parallel-Operated Interfacing Inverters Based on Digital Wireless Communication [#18449]

Dong Li and Carl Ngai Man Ho, *University of Manitoba, Canada*

P1902 | Pade'-Based-Repetitive Learning Current-Control for Voltage Source Inverters [#19193]

Valerio Salis, Alessandro Costabeber, Tardelli Francesco, Cox Stephen, Zanchetta Pericle, Bifaretti Stefano and Verrelli Cristiano Maria, *The University of Nottingham, United Kingdom; Universita' di Roma Tor Vergata, Italy*

P1903 | Voltage Sensorless Control of a Three-Phase Standalone Inverter Based on Internal Model Principle [#18829]

Sara Yazdani and Mehdi Ferdowsi, *Missouri University of Science and Technology, United States*

P1904 | DC-link Ripple Reduction in a DPWM-Based Two-Level VSI [#18147]

Tcai Anatolii, Alsofyani Ibrahim and Kyo-Beum Lee, *Ajou University, Russia; Ajou University, Korea (South)*

P1905 | Hardware Co-Simulation of Voltage Sensorless Current Control Based on Internal Model Principle [#18326]

Sara Yazdani and Mehdi Ferdowsi, *Missouri University of Science and Technology, United States*

P1906 | Evaluation of Voltage Controllers Based on Active Damping for the CVCF Power Converter under Nonlinear Load Condition [#18048]

Jianxin Zhu, Li Zhang, Rui Zhao, Fan Wu and Yan Xing, *Nanjing University of Aeronautics Astronautics, China; Hohai University, China*

P1908 | Influence of DC Link Capacitance on Power Efficiency of Single-Phase Inverter [#18798]

Yi Liu, Huai Wang, Meng Huang, Xiaoming Zha and Yushuang Liu, *Energy Department, Denmark; School of Electrical Engineering, China*

P1909 | High Temperature Design Optimization of DC/AC Power Converters Using SiC BJTs [#19422]

Ian Laird, Xibo Yuan, Bosen Jin and Neville McNeill, *University of Bristol, United Kingdom; University of Strathclyde, United Kingdom*

S41 | Modeling and Control of AC-DC Converters

Room: Exhibit Hall A

Chairs: Luca Solero; Andrea Formentini

P2101 | Small-Signal Modeling and Controller Design Considerations for Dyna-C AC-DC Converter [#19066]

Adrian Wiemer, Vishnu Mahadeva Iyer, Arne Hinz, Subhashish Bhattacharya and Rik W. De Doncker, RWTH Aachen University, Germany; North Carolina State University, United States

P2102 | Control of a Three Phase Boost Rectifier Under Unbalanced Grid Conditions without Grid Voltage Sensors [#19173]

Subhajyoti Mukherjee, Vikram Roy Chowdhury and Jonathan Kimball, Missouri University of Science and Technology, United States

P2103 | Synchronous Rectifier Control Algorithm to Improve Efficiency of Full-Bridge Converter with Asymmetric PWM Control [#18154]

Tae-Ho Bang, Sun-Ho Lee and Jung-Wook Park, Yonsei University, Korea (South)

P2104 | A New Hybrid Switching Frequency Control for Resonant Converter with Fast Dynamic Response [#18554]

Yen-Shin Lai and Min-Hsiang Yu, National Taipei University of Technology, Taiwan

P2105 | A New Relative Droop-Gain Based Current Sharing and Voltage Regulation Method of DC Side Parallel Connected Rectifiers [#18102]

Jlan Zhang, Wenshan Li and Xuhui Wen, Institute of Electrical Engineering, CAS, China

P2106 | Multi-modes Hybrid Power Control Strategy for LCC Resonant Capacitor Charging Power Supply [#18878]

Yun Xu, Chao Lu, Kaiwen He, Siqi Huang, Peichen Li and Hongfa Ding, Huazhong University of Science and Technology, China

P2107 | Analysis of Voltage Stress Auto-Balance Characteristic for Half-Bridge Three-Level LLC Resonant Converter with Clamped Diodes and Flying-Capacitor [#18996]

Lin Shi, Bangyin Liu, Shanxu Duan, Jian He, Tao Cai, JieYi Sun and Wanxing Sheng, HuaZhong University of Science and Technology, China; Huazhong University of Science and Technology, China; China Electric Power Research Institute Beijing, China

S42 | General Topics and Induction Machines

Room: Exhibit Hall A

Chairs: Andrea Cavagnino; Rashmi Prasad

P2301 | Method to Minimize Space Harmonics of Fractional Slot Concentrated Windings in AC Machines [#19331]

Md Sariful Islam, Md Ashfanor Kabir, Rajib Mikail and Iqbal Husain, North Carolina State University, United States; ABB Inc., United States

P2302 | Accurate Joule Loss Estimation for Rotating Machines: An Engineering Approach [#19646]

Adeeb Ahmed and Iqbal Husain, North Carolina State University, United States

P2303 | Technical Arrangement of High-Performance Techniques Achieved by Multi-Phase Permanent Magnet Synchronous Motor Systems [#18344]

Yoshihiro Miyama and Kan Akatsu, Mitsubishi Electric Corporation, Japan; Shibaura Institute of Technology, Japan

P2304 | Comparison of AC Motors to an Ideal Machine Part I-Conventional AC Machines [#18435]

Thomas Lipo and Wenbo Liu, University of Wisconsin, United States

P2305 | Design Optimization and Performance Investigation of Novel Double-slit Secondaries for Linear Induction Motors [#18685]

Jiawen Zhan and Qinfen Lu, Zhejiang University, China

P2306 | A Simple and Efficient State-Space Model of Induction Machines with Interconnected Windings Including Space Harmonics [#19169]

Julien Cordier and Ralph Kennel, Technische Universitaet Muenchen, Germany

P2307 | Small-Signal Finite Element Simulation of an Induction Machine [#19000]

Omar Bottesi and Luigi Alberti, Free University of Bozen-Bolzano, Italy; University of Padova, Italy

P2308 | Twelve-Phase Induction Machine Analysis with Harmonic Injection [#19633]

Isaac Soares de Freitas, Italo Roger Ferreira Moreno Pinheiro da Silva, Marcos Lazaro de Andrade Quirino, Zariif Meira Gomes, Elvies Sousa e Silva, Geovani B Vanderley, Joaquim N. Lima Junior and Fabiano Salvadori, Federal University of Paraiba, Brazil; Federal Rural University of Pernambuco, Brazil

P2309 | Shaping Induction Machine Rotor Slots for Reduced Losses during Torque Transients [#19070]

Yuying Shi, Apoorva Athavale and Robert Lorenz, University of Wisconsin-Madison, WEMPEC, United States

S43 | IPMSM and Synchronous Reluctance Machines

Room: Exhibit Hall A

Chairs: Marcello Pucci; Lei Hao

P2501 | Investigation of PMASynRM with Dy-free Bonded Magnets for Traction Applications Considering Irreversible Demagnetization [#18571]

Marika Kobayashi, Shigeo Morimoto, Masayuki Sanada and Yukinori Inoue, Osaka Prefecture University, Japan

P2502 | Comparative Analysis of Six-Step and Vector Controlled IPMSM under Inter-Turn Fault [#19105]

Zia Ullah and Jin Hur, Incheon university, korea, Korea (South)

P2503 | Synchronous Reluctance Motor Iron Losses: Analytical Model and Optimization [#18909]

Hanafy Mahmoud, Michele Degano, Giacomo Bacco, Nicola Bianchi and Chris Gerada, University of Nottingham, United Kingdom; Padova University, Italy

P2504 | Comparison Between Assisted and Dual Phase Synchronous Reluctance Machines for High Speed Applications [#18869]

Iman Kleilat, Leila Nguimpi Langue, Guy Friedrich, Stephane Vivier and Khadija El Kadri, Universite de technologie Compiègne, France

P2505 | The Emergence of Dual Pole Line Start Synchronous Motors [#18536]

Ebrahim Amiri, Bikrant Poudel, Aliakbar Damaki Aliabad, Fakhrossadat Ghoroghchian and Oleksandr Dobzhanskyi, University of New Orleans, United States; Yazd University, Iran; Oregon Institute of Technology, United States

P2506 | Transient Demagnetization Characteristics of Interior Permanent Magnet Synchronous Machines with Stator Inter-Turn Short Circuit Faults for Automotive Applications [#18054]

Shen Zhang and Thomas G. Habetler, Georgia Institute of Technology, United States

P2507 | Wireless Torque Pulsations Measurement System for PMSMs [#19216]

María Martínez, Daniel Fernández, David Reigosa, Juan Manuel Guerrero and Fernando Briz, University of Oviedo, Spain

P2508 | On PMSM Model Fidelity and its Implementation in Simulation [#18510]

Haiwei Cai and Dakai Hu, *ANSYS, Inc., United States; MathWorks, Inc., United States*

P2509 | Performance Review of Permanent Magnet Assisted Synchronous Reluctance Traction Motor Designs [#19628]

Sai Sudheer Reddy Bonthu, Zakirul Islam and Choi Seungdeog, *Cincinnati Incorporated, United States; University of Akron, United States; Mississippi State University, United States*

S44 | Sensorless Drives and High Speed Drives

Room: Exhibit Hall A

Chairs: Michael Harke; Jul-Ki Seok

P2701 | Decoupled Control for Parallel Drive No-Voltage Bearingless Motors [#19200]

Renato Amorim Torres and Eric Severson, *University of Wisconsin-Madison, United States*

P2702 | Nonlinear Adaptive Backstepping Control-Based Dynamic Recurrent RBFN Uncertainty Observer for High-Speed Micro Permanent-Magnet Synchronous Motor Drive System [#18666]

Fayez El-Sousy and Khaled Abuhasel, *Prince Sattam bin Abdulaziz University, Saudi Arabia; University of Bisha, Saudi Arabia*

P2703 | Rotor Dynamic Analysis of Ultra-high Speed Switched Reluctance Machines over 1 Million rpm [#19180]

Cheng Gong, Sufei Li and Thomas Habetler, *Georgia Institute of Technology, United States*

P2704 | Simple and Effective Position Estimation Error Compensation Method for Sensorless SPMSM Drives [#18499]

Hechao Wang, Kaiyuan Lu, Dong Wang and Frede Blaabjerg, *Aalborg University, Denmark*

P2705 | A Sensorless V/f Control Technique based on MTPA Operation for PMSMs [#18628]

Won-Jae Kim and Sang-Hoon Kim, *Kangwon National University, Korea, Republic of*

P2706 | SiC MOSFET Based Power Module Design and Analysis for EV Traction Systems [#19357]

Emre Gurpinar, Randy Wiles, Tsarafidy Raminosa, Burak Ozpineci, Feng Zhou, Yanghae Liu and Ercan Dede, *Oak Ridge National Laboratory, United States; Toyota Research Institute of North America, United States*

P2707 | Sensorless Harmonic Estimation for Servo Drive System with Vibrational Load [#18697]

Ching-Lon Huang, Shih-Chin Yang and Yu-Liang Hsu, *National Taiwan University, Taiwan; Feng Chia University, Taiwan*

P2708 | Position Sensorless Drive of High Speed Permanent Magnet Synchronous Motor [#18982]

Yu Yao, Yunkai Huang and Fei Peng, *Southeast University, China*

P2709 | FPGA Implementation of an Arbitrary Injection-Based Sensorless Control for PMSM [#18879]

Zhe Chen, Hang Zhang, Wencong Tu, Bo Tan and Guangzhao Luo, *Northwestern Polytechnical University, China*

P2710 | Discrete-Time Current Control of Modular Multilevel Converter for Medium Voltage High Power High-Speed PMSM [#18941]

Tianqi Xia, Yunkai Huang, Fei Peng and Yu Yao, *Southeast University, China*

P2711 | Position Sensorless Control of Switched Reluctance Motor Drives Without Pre-stored Magnetic Characteristics [#19387]

Jongwan Kim, Jung-Muk Choe, Seungryul Moon and Jih-Sheng Lai, *Virginia Polytechnic Institute and State Univ., United States*

P2712 | Self-Sensing via Flux Injection with Servo Dynamics Including a Smooth Transition to Back-EMF Tracking [#18990]

Huthaifa Flieh, Timothy Slininger, Eigo Totoki and Robert D. Lorenz, *University of Wisconsin Madison, WEMPEC, United States; Mitsubishi Electric Corporation, Japan*

S45 | Efficiency Issues and Faults in Electric Drives

Room: Exhibit Hall A

Chairs: Michael Harke; Jul-Ki Seok

P2901 | Open Circuit Fault Diagnosis of Rotating Rectifier Based on the Polarity and Symmetry of Armature Current [#18287]

Zhihuang Wei, Weiguo Liu, Ji Pang, Ningfei Jiao and Chenghao Sun, *Northwestern Polytechnical University, China*

P2902 | Performance Comparison of Stator Winding Connections in Multiphase Drives Under Open Converter Leg [#18164]

Alejandro Yepes, Jesus Doval-Gandoy, Fernando Baneira and Hamid Toliyat, *University of Vigo, Spain; Texas AM University, United States*

P2903 | Efficient Calculation of the Strand Eddy Current Loss Distributions in the End Stepped-Stator Region of Large Synchronous Generators [#19472]

Sufei Li, Cheng Gong, J. Rhett Mayor, Ronald G. Harley and Thomas G. Habetler, *Georgia Institute of Technology, United States*

P2904 | Common Mode Voltage Reduction Method for H7 Inverter Using DPWM Offset Based Modulation Technique [#18688]

Seung-Hwan Lee, Jun-Hyung Jung, Seon-Ik Hwang, Hyeonjin Cho and Jang-Mok Kim, *LG Electronic, Korea, Republic of; Pusan National University, Korea, Republic of; Agency for Defense Development, Korea, Republic of*

P2905 | Application of Active Gate Driver in Variable Frequency Drives [#19448]

Sam Mahmodicherati, Nandini Ganesan, Lakshmi Ravi and Rangarajan Tallam, *Rockwell Automation/Allen-Bradley, Mequon, WI, U, United States*

P2906 | Common-mode EMI Noise Modeling and Reduction using Balance Technique for AC-DC-AC Traction Systems with Paralleled Power Modules [#19670]

Le Yang, Hui Zhao, Shuo Wang and Yongjian Zhi, *University of Florida, United States; CRRC Zhuzhou Institute Co., Ltd., China*

P2907 | Development of High-Frequency WBG Power Modules with Reverse-Voltage-Blocking Capability for an Integrated Motor Drive using a Current-Source Inverter [#19588]

Hang Dai, Thomas Jahns, Renato Torres, Mingda Liu, Bulent Sarlioglu and Steven Chang, *University of Wisconsin-Madison, United States*

P2908 | Bus Conditioner Discharge Circuit in Floating Ground System Applications [#18041]

Ripunjay Phukan, Jiangang Hu, Jim Ulrich and Lixiang Wei, *Rockwell Automation, United States*

P2909 | A Design Investigation of A 1 MVA SiC MOSFET Medium Voltage Variable Frequency Drive With Various Filtering Options [#19356]

Hanning Tang and Alex Huang, *The University of Texas at Austin, United States*

P2910 | Study of a Silicon Carbide MOSFET Power Module to Establish the Benefits of Adding Anti-parallel Schottky Diodes [#19705]

Andrew Trentin, David Hind, Marco Degano, Christopher Tighe, Saul Lopez Arevalo, Yang Li, Mark Johnson, Pat Wheeler, Christopher Gerada, Anne Harris and Matthew Packwood, *University of Nottingham, United Kingdom; Dynex Semiconductor Ltd, United Kingdom*

S46 | WBG Devices and Applications 1

Room: Exhibit Hall A

Chairs: Juan Rivas Davila; Dong Dong

P3101 | New Boundary Condition for Decoupling Capacitance Selection in SiC Phase Legs Considering Short-Circuit Events [#18192]

Craig Timms, Liang Qiao, Fred Wang, Zheyu Zhang and Dong Dong, *University of Tennessee, United States; GE Global Research, United States*

P3102 | A Passive Component Based Gate Drive Scheme for Negative Gate Voltage Spike Mitigation in a SiC-Based Dual-Active Bridge [#18288]

Yidong Tian, Xu Yang, Ruiliang Xie, Xiang Hao, Lang Huang, Tao Liu, Jianpeng Wang and Wenjie Chen, *Xi'an Jiaotong University, China; New Energy Research Institute of TBEA, China*

P3103 | Effects of the Device Parameters and Circuit Mismatches on the Static and Dynamic Behavior of Parallel Connections of Silicon Carbide MOSFETs [#18391]

Maurizio Melito, Massimo Nania, Gionatan Montoro and Angelo Raciti, *STMicroelectronics, Italy; University of Catania, Italy*

P3104 | Impact of SiC MOSFET on PV Inverter [#18412]

Junxiong Wu, Yuying Wu, Ning He, Wenxing Zhong, Seiki Igarashi, Tatsuhiko Fujihira and Dehong Xu, *Zhejiang University, China; Fuji Electric Co., Ltd., Japan*

P3105 | SiC MOSFET Based LCL Grid-Connected Inverter with Double Closed-Loop Control [#18513]

Liu Yitao, Jin Dianheng, Wang Huaizhi, Wang Guibin, Peng Jianchun and Zhang Xinan, *Shenzhen University, China; Nanyang Technological University, Singapore*

P3106 | Accurate Analytical Switching Loss Model for High Voltage SiC MOSFETs Includes Parasitics and Body Diode Reverse Recovery Effects [#18598]

Soheila Eskandari, Kang Peng, Bo Tian and Enrico Santi, *University of South Carolina, United States; Infineon, United States*

P3107 | Safe-Operating-Area of Snubberless Series Connected Silicon and SiC Power Devices [#18804]

Zarina Davletzhanova, Olayiwola Alatise, Jose Ortiz-Gonzalez, Roozbeh Bonyadi, Tianxiang Dai, Chun Wa Chan and Phil Mawby, *University of Warwick, United Kingdom; Jaguar Land Rover, United Kingdom*

P3108 | Optimization of Delay Time between Gate Signals for Si/SiC Hybrid Switch [#18805]

Zhengda Zhang, Lei Zhang and Jiangchao Qin, *Arizona State University, United States*

P3109 | Impact of Body Diode and Anti-parallel JBS Diode on Switching Performance of 3rd Generation 10 kV SiC MOSFET [#18831]

Xingxuan Huang, Shiqi Ji, Sheng Zheng, Jingjing Sun, Leon Tolbert, Fred Wang, Marko Laitinen and William Giewont, *University of Tennessee, Knoxville, United States; Oak Ridge National Laboratory, United States; Danfoss Drives, United States*

P3110 | Analysis of Transient Gate-Source Over Voltages in Silicon Carbide MOSFET Power Devices [#18899]

Mario Pulvirenti, Gionatan Montoro, Massimo Nania, Rosario Scollo, Giacomo Scelba, Mario Cacciato, Giuseppe Scarcella and Luciano Salvo, *STMicroelectronics, Italy; STMicroelectronics, Italy; University of Catania, Italy*

P3111 | Comparison of SiC Synchronous Rectification and Schottky Diode in Voltage Source Inverters [#19263]

Cheng Zeng, Zongjian Li, Fanxin Yuan, Xi Jiang, Zhizhi He, Z. John Shen and Jun Wang, *Hunan University, China*

S47 | WBG Devices and Applications 2

Room: Exhibit Hall A

Chairs: Daniel Ludois; Wang Feng

P3301 | Coordinated Online Junction Temperature Estimation and Prognostics of SiC Power Modules [#19617]

Fausto Stella, Gianmario Pellegrino and Eric Armando, *Politecnico di Torino, Italy*

P3302 | Paralleled GaN HEMTs Loss Distribution Analysis for High-power Applications [#18664]

Juncheng(Lucas) Lu, Ruoyu Hou and Di Chen, *GaN Systems, Inc, Canada*

P3303 | An Ultrafast Discrete Short-Circuit Protection Circuit for GaN HEMTs [#18828]

Ruoyu Hou, Juncheng Lu and Di Chen, *GaN Systems Inc., Canada*

P3304 | GaN Power Switches: A Comprehensive Approach to Power Loss Estimation [#19435]

Matthieu Amyotte, Ettore Scabeni Glitz, Celeste Garcia Perez and Martin Ordonez, *University of British Columbia, Canada*

P3305 | Analysis of Optimal Operation Conditions for GaN-Based Power Converters [#19591]

Ander Avila, Asier Garcia-Bediaga, Alberto Rodriguez, Luis Mir and Alejandro Rujas, *IK4-Ikerlan Technology Research Centre, Spain; IK4-IKERLAN Technology Research Centre, Spain; Universidad de Oviedo, Spain*

P3306 | Using the Case Temperature Cooling Curves to Monitor the Thermal Impedance of IGBT Module and TIM [#18725]

Jun Zhang, Xiong Du, Yaoyi Yu, Shuai Zheng, Pengju Sun and Heng-Ming Tai, *Chongqing University, China; University of Tulsa, United States*

P3307 | A High Power Density and High Efficiency Three Phase Inverter Based on a Hybrid 3D SiC Packaging Power Module [#19439]

Teng Liu, Zhizhao Huang, Yifan Tan, Cai Chen, Kaifeng Zou, Han Peng, Yong Kang and Fang Luo, *Huazhong University of Science and Technology, China; Naval Aeronautical Engineering University Qingda, China; University of Arkansas, United States*

P3308 | Continuous Heat Run Test of Latest Generation Power Modules for 10kV 4H-SiC MOSFETs in Medium Voltage Power Converters [#19691]

Ashish Kumar, Sanket Parashar and Subhashish Bhattacharya, *North Carolina State University, United States*

P3309 | Diamond Schottky Barrier Diodes for Power Electronics Applications [#19108]

Gaetan Perez, Aurelien Marechal, Nicolas Rouger, Juliette Letellier, David Eon, Gauthier Chicot and Jean-Luc Schanen, *Universite Grenoble Alpes, CNRS, G2Elab, F-38000, France; Universite de Toulouse, LAPLACE, CNRS, INPT, UPS, France; Universite Grenoble Alpes, CNRS, Institut Neel, France*

P3310 | Investigation of a Parasitic-Inductance Reduction Technique for Through-Hole Packaged Power Devices [#19354]

Harry Dymond and Bernard Stark, *University of Bristol, United Kingdom*

P3311 | Emerging GaN Power Devices for Efficient and Compact Power Conversion [#19605]

Ahmed Elasser, Mohammed Agamy, Ramanujam Ramabhadran, Kum-Kang Huh, Han Peng and Jeffrey Nasadoski, *GE Global Research Center, United States; GE global research center, United States; Huazhong University of Science and Technology, China*

S48 | Emerging Technologies and Applications (I)

Room: Exhibit Hall A

Chairs: Yaow-Ming Chen; Joseph Vitale

P3501 | Phase Synchronization of Control Signals Based on Perturbation and Observation for Bidirectional Wireless Power Transfer System [#18825]

Fang Liu, Kainan Chen, Kai Li and Zhengming Zhao, *Sichuan Power Economic Research Institute, China; Tsinghua University, China*

P3502 | Modeling of Mutual Inductance for Hexagonal Coils with Horizontal Misalignment in Wireless Power Transfer [#18498]

Ping-an Tan, Fu Yi and Chunxia Liu, *Xiangtan University, China*

P3503 | Modeling and Implementation of Switching Control for Multi-transmitter Wireless Power Transfer [#18526]

Pingan Tan, Tao Peng and Saiqi Cao, *Xiangtan University, China; Hunan CRRC Times Electric Vehicle Co., Ltd, China*

P3504 | Maximum Efficiency Tracking for Dynamic Wireless Power Transfer System Using LCC Compensation Topology [#18280]

Xiufang Hu, Yue Wang, Yongbin Jiang, Wanjun Lei and Xiaoshuai Dong, *Xi'an Jiaotong University, China; Xi'an jiaotong University, China; XJ Group Corporation, China*

P3505 | First Order Frequency-Domain Analytical Model for Resonant Converters in CCM [#18096]

Hulong Zeng, Fang Z. Peng and Ujjwal Karki, *Michigan State University, United States*

P3506 | A Dual-Shielding Method for Magnetic Field-based Current Sensing [#19689]

Mohammad Nari, *Aptiv, United States*

P3507 | Soft-Start Control Method for In-motion Charging of Electric Vehicles Based on Transient Analysis of Wireless Power Transfer System [#18161]

Katsuhiro Hata, Takehiro Imura, Hiroshi Fujimoto and Yoichi Hori, *The University of Tokyo, Japan*

P3508 | Implementation of Domino Wireless Power Transfer Technology for Power Grid Online Monitoring System [#19593]

Jia Long Qu, Sitthisak Kiratipongvoot, Chi Kwan Lee and Tang Niang, *The University of Hong Kong, Hong Kong; Guangdong Power Grid Corporation Electric Power, China*

P3509 | An Integrated Printed-Circuit-Board Resonator Design for Inductive Power Transfer System [#19594]

Jia Long Qu, Sitthisak Kiratipongvoot, Chi Kwan Lee and Tang Niang, *The University of Hong Kong, Hong Kong; Guangdong Power Grid Corporation Electric Power, China*

Tuesday, September 25

10:30AM – 1:00PM

S65 | Energy Storage Systems

Room: Exhibit Hall A

Chairs: Ke Ma; Rakesh Mitra

P3701 | A Revisit to Supercapacitor Capacitance Measurement Method 1A of IEC 62391-1 [#18114]

Hengzhao Yang, *California State University, Long Beach, United States*

P3702 | A Dual-Source DHB-NPC Power Converter for Grid Connected Split Battery Energy Storage System [#18600]

Umberto Abronzini, Ciro Attaianesi, Mauro Di Monaco, Giuseppe Tomasso, Alfonso Damiano, Mario Porru and Alessandro Serpi, *University of Cassino and Southern Lazio, Italy; University of Cagliari, Italy*

P3703 | Inrush Current Estimation for Hot Swap of the Parallel Connected Large Capacity Battery Pack [#18763]

Seongjun Lee, Jonghoon Kim, Mirim Ha and Hyunchul Song, *Chosun University, Korea, Republic of; Chungnam National University, Korea, Republic of; Hanwha Land Systems, Korea, Republic of*

P3704 | Parameter Extraction of Ultracapacitor's Equivalent Circuit Model Using A Genetic Algorithm Approach [#19185]

Xi Chen, Ala Hussein and Issa Batarseh, *University of Central Florida, United States; Yarmouk University, Jordan*

P3705 | Net Zero Energy Houses with Dispatchable Solar PV Power Supported by Electric Water Heater and Battery Energy Storage [#19498]

Huangjie Gong, Vandana Rallabandi, Dan Ionel, Donald Colliver, Shaun Duerr and Cristinel Ababei, *University of Kentucky, United States; Marquette University, United States*

P3706 | Improving the Capacity Factor and Stability of Multi-MW Grid Connected PV Systems with Results from a 1MW/2MWh Battery Demonstrator [#19572]

Oluwaseun Akeyo, Vandana Rallabandi, Nicholas Jewell and Dan Ionel, *University of Kentucky, United States; LGE and KU, Louisville, KY, United States*

P3707 | A Novel Single Stage AC-DC Converter Used in Battery Charger Applications [#19750]

Iman Askarianabyaneh, Nick Dohmeier, Chris Botting, Majid Pahlevani and Andy Knight, *University of Calgary, Canada; Delta-Q Technologies, Canada*

S66 | Solar PV Systems

Room: Exhibit Hall A

Chairs: Wasi Uddin; Afshin Izadian

P3901 | Evaluation of 2.5 kV Silicon Carbide MOSFET for 1500V Solar Inverter Application [#19366]

Xu She, Peter Losee, Huan Hu, William Earls and Rajib Datta, *GE Global Research, United States*

P3902 | A Control Scheme for Panel Level Maximum Power Extraction of Solar Panel Companion Inverters [#19704]

Prasanth Sahu and Madhav Manjrekar, *University of North Carolina at Charlotte, United States*

P3903 | Implementation of BAT Algorithm as Maximum Power Point Tracking Technique for Photovoltaic System Under Partial Shading Conditions [#18255]

Kok Soon Tey, Saad Mekhilef and Seyedmehmoudian Mehdi, *University of Malaya, Malaysia; Swinburne University of Technology, Australia*

P3905 | Measuring Method for Solar Irradiance at Multi-Points with Different Color Based on Image Analysis [#18940]

Kento Kawakami, Akiko Takahashi, Jun Imai and Shigeyuki Funabiki, *Okayama University, Japan*

P3906 | Improvement of Ventilation Drive System with Solar Power and a Voltage Level Based Control Structure [#19182]

Simon Staal Nielsen, Tamas Kerekes, Dezso Sera and Peter Omand Rasmussen, *Aalborg University, Denmark*

P3907 | Resonant Multilevel Modular Boost Inverters for Single-Phase Transformerless Photovoltaic Systems [#19452]

Ze Ni, Yanchao Li, Jalen Johnson and Dong Cao, *North Dakota State University, United States*

P3908 | Three-Phase AC-Stacked PV Inverter Architecture and Output Balancing Control Strategy with Battery under Asymmetrical Irradiance Conditions [#19552]

Namwon Kim, Mehrdad Biglarbegian and Babak Parkhideh, *University of North Carolina at Charlotte, United States*

S67 | Converters for Power Systems

Room: Exhibit Hall A

Chairs: Alessandro Lidozzi; Giovanna Oriti

P4101 | Doubly Fed Induction Generator with Cascade Converter for Improving Dynamic Performances [#18120]

Zakiud Din, Jiangzhong Zhang, Jin Zhao and Yongjiang Jiang, *Southeast University, China*

P4102 | Improving the Stability of Electrolytic Capacitorless Single Phase Two Stage AC/DC Rectifier by Shaping the Input Impedance of Second Harmonic Current Compensator [#18453]

Xinze Huang, Xinbo Ruan, Haoling Wu, Jie Fang and Yazhou Wang, *Nanjing University of Aeronautics and Astron., China*

P4103 | A Unified Power Flow Controller With Nine-Arm Modular Multilevel Converter [#18545]

Futian Qin, Feng Gao, Tao Xu, Decun Niu and Zhan Ma, *Shandong University, China*

P4104 | Series Active Compensator Based on Single-Phase Current-Source Converters with Minimum DC Link Current Operation [#18611]

Pedro Melin, Jaime Rothen, Munoz Javier, Baier Carlos, Hernandez Franco, Guzman Johan and Espinoza Jose, *Universidad del Bio-Bio, Chile; Universidad de Talca, Chile; Universidad de Concepcion, Chile*

P4105 | Active-Switched-Capacitor Based Diode Assisted and Capacitor Assisted Extended Switched Boost Z- Source Inverters [#18898]

Anish Ahmad and Rajeev Kumar Singh, *Indian Institute of Technology (B.H.U.), Varanasi, India*

P4106 | A Single Source Cascaded Multilevel Inverter Based on Switched-capacitor with Series and Parallel Connectivity [#18904]

Yat Chi Fong, Ka Wai Eric Cheng, Sekhar Raghu Raman and Jiefeng Hu, *Dept of EE, The Hong Kong Polytechnic University, Hong Kong*

P4107 | A PLL-Less Vector Current Control of VSC-HVDC for Ultra Weak Grid Interconnection [#19047]

Dongsheng Yang, Xiongfei Wang and Blaabjerg Frede, *Aalborg University, Denmark*

P4108 | Analysis and Suppressing Method of Magnetizing Bias on High Frequency Transformer in Electric Energy Router [#18334]

Jianning Sun, Liqiang Yuan, Kai Li, Qing Gu and Zhengming Zhao, *Tsinghua University, China*

P4109 | Submodule Test Circuit for MMC-based Voltage Sourced HVDC System [#18726]

Kwon-Sik Park, Byuong-Jun Seo, Kyoung-Suk Kang, Kwang-Rae Jo, Hee-Chang Choi and Eui-Cheol Nho, *Pukyong National University, Republic of Korea*

S68 | Grid Operation and Stability

Room: Exhibit Hall A

Chairs: Pericle Zanchetta; Xiongfei Wang

P4301 | CLLC-Type DC Transformer in Hybrid AC/DC Microgrid with Maximum Power Transmission Ability and Robust Voltage Conversion Gain [#18121]

Jingjing Huang and Xin Zhang, *Nanyang Technological University, Singapore*

P4302 | Integrated Multi-Horizon Power and Energy Forecast for Aggregated Electric Water Heaters [#18229]

Xun Gong, Julian Luciano Cardenas Barrera, Liuchen Chang, Eduardo Castillo Guerra, Bo Cao and Saleh Saleh, *University of New Brunswick, Canada*

P4303 | Single Domestic Electric Water Heater Control with State Forecast [#18233]

Sheng Xiang, Liuchen Chang, Julian Luciano Cardenas Barrera, Yigang He, Kehan Wu and Jinping Wang, *Hefei University of Technology, China; University of New Brunswick, Canada; Hefei University of Technology, Canada; Anhui Provincial Electric Power Company Training, China*

P4304 | Frequency-division Impedance Shaping Control Method for Grid-connected Inverters in a Weak Grid [#18281]

KunLong Zhu, Lin Gong, Pengju Sun, Luowei Zhou, Qingqing He and Yuqi Wei, *Chongqing University, China; State Grid Chongqing Electric Power Company, China*

P4305 | Design and Performance Evaluation of the Modular Multilevel Converter (MMC)-Based Grid-tied PV-Battery Conversion System [#18329]

Lei Zhang, Zhengda Zhang, Jiangchao Qin, Yuntao Zou, Di Shi and Zhiwei Wang, *Arizona State University, United States; GEIRI North America, United States*

P4306 | Modeling and Stability Analysis of Three-Phase Paralleled Grid-Connected Inverters with LCL Filter [#18380]

Jin Xia, Bo Que, Guangdi Li, Chao Chen and Yan Deng, *Zhejiang University, China; State Grid Zhejiang Electric Power Company, LTD., China*

P4307 | Reducing Generation Cost by Optimum Load Scheduling in Smart Grid Considering System Loss [#18523]

Shuvangkar Chandra Das, Partha Protim Saha, Md. Forkan Uddin and Hossain Eklas, *BUET, Bangladesh, Bangladesh; Oregon Tech, USA, United States*

P4308 | Electric Hot Water Heater Primary Frequency Control [#18802]

Ali Shahbaz Haider, William Daigle Stark and Ted K.A. Brekken, *Oregon State University, Corvallis, United States*

P4309 | A Novel PQ Control Strategy for Non-Phase-Locked Loop based on Hilbert Transform [#18896]

Hongbin Pan, Tianyang Wei, Cheng Deng, Haihong Long and Yuzhi Zhang, *Xiangtan University, China; Corporate Research Center ABB Inc., United States*

P4310 | Reducing HVDC Network Oscillations Considering Wind Intermittency Through Optimized Grid Expansion Decision [#19088]
Atousa Elahidoost, Luca Furieri, Elisabetta Tedeschi and Maryam Kamgarpour, *Norwegian University of Science and Technology, Norway; Swiss Federal Institute of Technology (ETH), Switzerland*

P4311 | A Novel Phase-Lock Loop with Feed-back Repetitive Controller for Robustness to Periodic Disturbance in Three-Phase Systems [#19621]
Mi Tang, Stefano Bifaretti, Shafiq Odhano, Sabino Pipolo and Pericle Zanchetta, *The University of Nottingham, United Kingdom; University of Rome, Italy*

P4312 | A General Approach to Select Location and Ratings of Energy Storage Systems in Local Area Energy Networks [#18945]
Paolo Tenti and Tommaso Caldognetto, *University of Padova, Italy*

S69 | Batteries Management and Infrastructures

Room: Exhibit Hall A

Chairs: Stephan Rees; Mircea Popescu

P4501 | Online Identification of Internal Impedance of Li-ion Battery Cell Using Ternary-Sequence Injection [#18122]
Jussi Sihvo, Tuomas Messo, Tomi Roinila, Roni Luhtala and Daniel I. Stroe, *Tampere University of Technology, Finland; Aalborg University, Finland*

P4502 | Design and Implementation of Bidirectional DC-DC CLLC Resonant Converter [#18357]
Chang Hao-Tang, Liang Tsong-Juu and Yang Wei-Chin, *National Cheng Kung University, Taiwan, Taiwan*

P4503 | SOH Estimation of LMO/NMC-based Electric Vehicle Lithium-Ion Batteries using the Incremental Capacity Analysis Technique [#18500]
Daniel Stroe and Erik Schaltz, *Aalborg University, Denmark*

P4504 | Interleaved Phase-Shift Control of a Single Input Multi Output Cell Balancing Circuit using a Dual Active Bridge Configuration [#19518]
Ramesh P. and Amit Patra, *Indian Institute of Technology Kharagpur, India*

P4505 | Thermal Monitoring of Lifepo4 Batteries Using Switching Harmonics [#19222]
Cristina Gonzalez-Moral, Daniel Fernandez, Juan Manuel Guerrero, David Diaz and Fernando Briz, *University of Oviedo, Spain; University of Oviedo, Spain*

P4506 | A Neural Network Energy Management Controller Applied to a Hybrid Energy Storage System using Multi-Source Inverter [#19350]
John Ramoul, Ephrem Chemali, Lea Dorn-Gomba and Ali Emadi, *McMaster University, Canada*

P4507 | Impact of Low-Frequency Current Ripple on Lifetime of Battery in MMC-based Battery Storage System [#19187]
Ishaan Puranik, Lei Zhang and Jiangchao Qin, *Arizona State University, United States*

P4508 | A Novel Active Equalization Topology for Series-Connected Lithium-ion Battery Packs [#19417]
Xiaofeng Ding and Donghuai Zhang, *Beihang University, China*

P4509 | Fast and Precise Detection of Internal Short Circuit on Li-Ion Battery [#19599]
Amirhossein Moeini and Shuo Wang, *University of Florida, United States*

P4510 | Active Levitation and Propulsion System: Design, Analysis, Control and Prototyping [#18201]
Jawwad Sayeed, Ahmed Abdelrahman and Mohamed Youssef, *UOIT, Canada*

P4511 | Modeling Harmonic Impacts of Electric Vehicle Chargers on Distribution Networks [#18782]
Nicole Woodman, Mike Donnelly and Robert Bass, *Intel Corporation, United States; Mentor, A Siemens Business, United States; Portland State University, United States*

P4512 | Cost Optimization of an Opportunity Charging Transportation Bus Network [#19708]
Mehmet Gormez, Ali Topcu and Yilmaz Sozer, *University of Akron, United States*

P4513 | Control of Delta-Connected Cascaded Converter in the Railway Power Conditioner Application [#19382]
Ping-heng Wu and Tai-Cheng Po, *National Tsing Hua University, Taiwan*

P4514 | Design of a Medium Voltage DC Fast Charging Station with Grid Voltage Regulation and Central Modular Multilevel Converter [#18950]
Luis Camurca, Costa Ferreira, Xiang Gao and Marco Liserre, *Universitat zu Kiel, Germany*

P4515 | A High Voltage Gain Quasi-Switched Boost Impedance Network for Renewable Energy Applications [#19558]
Amit Kumar, Behnam Koushki, Omid Salari, Abhishek Awasthi and Praveen Jain, *Queen's University, Canada*

S70 | DC-DC Converters

Room: Exhibit Hall A

Chairs: Martin Ordonez; Daniel Costinett

P4701 | Comparison of GaN and Si based Dual Active Bridge Converters for Energy Storage Systems [#19737]
Hassan Hassan, Egor Iuravin, Haiwei Cai and Mark Scott, *Miami University, United States; Ansys Inc, United States*

P4702 | A Single-Switch Self-Driving High Frequency Converter Based on Optimal Feedback Network [#18307]
Yueshi Guan, Xihong Hu, Yijie Wang, Dianguo Xu and Wei Wang, *Harbin Institute of Technology, China*

P4703 | Investigation of Peak Voltage Suppression Method at Startup in Isolated DC-DC Converter with Class Phi-2 Inverter [#18709]
Yuta Yanagisawa, Yushi Miura, Hiroyuki Handa, Tetsuzo Ueda and Toshifumi Ise, *Osaka University, Japan; Panasonic Corporation, Japan*

P4704 | Adaptive Control Technique for High Power Efficiency Dual Active Bridge DC-DC Converter with Wide Load Range [#18308]
Takaaki Soejima, Yoichi Ishizuka, Kazuhide Domoto and Toshiro Hirose, *Nagasaki University, Japan; Nishimu Electronics Industries Company, Japan*

P4705 | Operation-Oriented Design Procedure of a Three-Phase Dual-Active Bridge Converter for a Wide Operation Range [#18761]
Zhiqing Yang, Jingxin Hu, Goutham Chakravarthi Pasupuleti and Rik W. De Doncker, *PGS, E.ON Energy Research Center, RWTH Aachen, Germany*

P4706 | New No-isolated Interleaved Bidirectional Soft-Switching DC-DC Converter with a Novel Auxiliary ZVT Cell [#18286]
Lejia Sun, Fang Zhuo, Feng Wang, Hao Yi and Yanlin Zhu, *Xi'an Jiaotong University, China*

S71 | AC-DC Single-Phase

Room: Exhibit Hall A

Chairs: Francisco Canales; Luis Arnedo

P4901 | A Bridgeless Three-Level Integrated AC-DC Resonant Converter with Self-Balanced Bus Capacitor Voltage [#19494]

Shangzhi Pan, Cong Wang and Praveen Jain, *Wuhan University, China; Queen's University, Canada*

P4902 | A Single Phase Hybrid Interleaved Parallel Boost PFC Converter [#18608]

Jianyu Hu, Wenxun Xiao, Dongyuan Qiu, Bo Zhang and Carl Ngai Man Ho, *South China University of Technology, China; University of Manitoba, Canada*

P4903 | Optimal Control Scheme for Single-Stage Dual-Active-Bridge AC-DC Converter [#19175]

Tianxiang Chen, Ruiyang Yu, Qingxuan Ma, Xin Zhao and Alex Q. Huang, *The University of Texas at Austin, United States*

P4904 | Symmetric Multicell Single-Phase Rectifiers with Reduced Switches and Cascaded Transformers [#19401]

Joao Paulo Mello, Cursino Jacobina and Nayara De Freitas, *Federal University of Campina Grande, Brazil*

P4905 | Power Losses Estimation on a Semi-Bridgeless PFC Using Response Surface Methodology [#19586]

Maria Celeste Garcia Perez, Mohammad Mahdavi, Matthieu Amyotte, Ettore Scabeni Glitz and Martin Ordonez, *University of British Columbia, Canada*

P4906 | Resonant Control based Frequency Domain Compensation for Single-Phase PFC Converter [#18011]

Zhi Geng, Tianqi Hong and Dazhong Gu, *Unique Technical Service, LLC, United States*

P4907 | Single-Phase AC-DC Buck PFC Converter Based on Flying-Capacitor Topology with Active Power Decoupling Control [#18183]

Kaicheng Ding, Yan Zhang, Jinjun Liu, Xiangpeng Cheng, Pengxiang Zeng and Yanfei Huang, *Xi'an Jiaotong University, China*

S72 | Multi-Phase Converters I

Room: Exhibit Hall A

Chairs: Petar Grbovic; Roberto Petrella

P5101 | SiC MOSFETs Based Bi-Directional 3-Phase AC/DC Converters [#18521]

Jianwen Shao, Adam Barkley, Yuequan Hu, Teik Ong and Binod Agrawal, *Wolfspeed, United States; Wolfspeed, India*

P5102 | Power Factor Operation of a Boost Integrated Three-Phase Solar Inverter using Current Unfolding and Active Damping Methods [#19740]

Ha Pham, Tomoyuki Mannen and Wada Keiji, *University of Technology, Sydney, Australia; Tokyo University of Science, Japan; Tokyo Metropolitan University, Japan*

P5103 | A Modular Two-Stage DC-Three Phase Converter [#19394]

Giri Venkataramanan and Maithreyee Marathe, *University of Wisconsin-Madison, United States; National Institute of Technology-Suratkal, India*

P5104 | An Efficient Snubber Circuit for Soft-Switched Capacitive-Link Universal Converters [#18682]

Masih Khodabandeh and Mahshid Amirabadi, *Northeastern University, United States*

P5105 | Analysis and Design of Four-Switch Three-Phase AC-DC Converter with Galvanic Isolation [#18612]

Javad Khodabakhsh and Gerry Moschopoulos, *Western University, Canada*

S73 | Multi-Level Power Converters II

Room: Exhibit Hall A

Chairs: Bob Guenther; Subhashish Bhattacharya

P5301 | Impact of Modulation Methods on the Trade-Off between Investment and Operation Costs of a Medium-Voltage MMC-Based STATCOM [#19159]

Frederik Hahn, Remus Teodorescu, Giampaolo Buticchi, Marco Liserre and Cristian Lascu, *Christian-Albrechts-University of Kiel, Germany; Aalborg University, Denmark; The University of Nottingham Ningbo China, China*

P5302 | A Unidirectional Flying-Chainlink Modular Multilevel Rectifier (FCL-MMR) with Reduced Energy Storage for Offshore Wind Integration [#19391]

Francesco Tardelli, Alessandro Costabeber, Marija Jankovic, Jon Clare and Pericle Zanchetta, *University of Nottingham, United Kingdom*

P5303 | Accurate Circulating Current Estimation of Modular Multilevel Converters with Coupled Inductors [#18758]

Wang Shaozhe, Shen Ke, Zhao Dan and Zhao Guodong, *Northwestern Polytechnical University, China*

P5304 | Improved Modulation Strategy for Semi-Full-Bridge Submodule in Modular Multilevel Converter [#19276]

Rong Xu, Xiangjun Quan, Yang Lei, Soumik Sen and Alex Q Huang, *SPEC, The University of Texas at Austin, United States; Electrical Engineering Department, Southeast Uni, China*

P5305 | Improved Current Control of a Quasi-Two-Level PWM-Operated Modular Multilevel Converter [#18106]

Jakub Kucka and Axel Mertens, *Leibniz University Hannover, Germany*

P5306 | Assessment of Modular Multilevel Converter with Partly Integrated Battery Energy Storage System [#18736]

Zuyao Ze, Hua Lin, Yajun Ma and Zhe Wang, *Huazhong University of Science and Technology, China*

P5307 | Analysis on Circulating Current Frequency of Chain-link Modular Multilevel DC-DC Converters for Low Step-Ratio High-Power MVDC Applications [#19008]

Xin Xiang, Xiaotian Zhang, Yunjie Gu, Geraint Chaffey, Yu Sang and Tim Green, *Imperial College London, United Kingdom*

P5308 | Modular-Concatenated-Cell (MCC) Multilevel Converter: A Novel Circuit Topology and Innovative Logic-Equations-Based Control Technique [#19396]

Vahid Dargahi, Keith Corzine, Johan Enslin, Arash Khoshkbar Sadigh, Jose Rodriguez and Frede Blaabjerg, *University of California, Santa Cruz, United States; Clemson University, United States; Pennsylvania State University, United States; Universidad Andres Bello, Chile; Aalborg University, Denmark*

P5309 | A Novel Least Component Count Single DC-link Fed Generalized Multilevel Inverter Configuration for Three-phase High Power Isolated Grid Connected Systems [#18073]

Satish Naik Banavath, Ravi Prakash Reddy Siddavatam, Umanand Loganathan, Subba Reddy Basappa, Gopakumar Kumarkutti and Shine Shan, *Indian Institute of Science, India*

S74 | Modeling and Control of Multilevel Converters

Room: Exhibit Hall A

Chairs: Feng Gao, John Salmon

P5501 | Analysis and Design of a Quasi-Proportional-Resonant Based Voltage Balancing Control for Grid-Connected Nested Neutral Point Clamped Converter [#18708]

Akinola Ayodeji Ajayi-Obe and Mohamed Azeem Khan, *University of Cape Town, South Africa*

P5502 | A Deep Neural Network Based Predictive Control Strategy for High Frequency Multilevel Converters [#18711]

Daming Wang, Xin Yin, Sai Tang, Chao Zhang, Z. John Shen, Jun Wang and Zhikang Shuai, *Hunan University, China*

P5503 | PWM Strategy for 3Phase Active Front End Cascaded 5 Level NPC H-Bridge [#18691]

Hyun-Sam Jung, Hwigoon Kim and Seung-Ki Sul, *Seoul National University, Korea (South)*

P5504 | A Partial Energy Input Based Three-Port Cascade Multi-level Hexverter and Its Loop Current Control [#19318]

Fei Liu, Haiyou Gao, Wenjun Liu, Pan Wang and Xiaoming Zha, *Wuhan University, China*

P5505 | Logic-Equations-Based Modulation Technique for Natural Balance Control of an Improved Active-Neutral-Point-Clamped (I-ANPC) Multilevel Converter [#19447]

Vahid Dargahi, Keith Corzine, Johan Enslin, Arash Khoshkbar Sadigh, Jose Rodriguez and Frede Blaabjerg, *University of California, Santa Cruz, United States; Clemson University, United States; Pennsylvania State University, United States; Universidad Andres Bello, Chile; Aalborg University, Denmark*

P5506 | Modulation Methods for 3L-NPC Converter Power Loss Management in STATCOM Application [#19554]

Jiuyang Zhou and Po-tai Cheng, *National Tsing Hua University, Taiwan*

P5507 | Balancing Control of Neutral-Point Voltage for MVPWM-Controlled Three-Level T-Type Inverter [#18636]

Tzung-Lin Lee, Yue-Ting Tsai and Ting-Lien Wu, *National Sun Yat-sen University, Taiwan*

P5508 | Zero Sequence Circulating Current Analysis and Reduction in Paralleled Three-level Active Neutral Point Clamped Inverters [#19281]

Ruirui Chen, Jiahao Niu, Zheyu Zhang, Handong Gui, Ren Ren, Fred Wang, Leon Tolbert, Benjamin Blalock, Daniel Costinett and Benjamin Choi, *University of Tennessee, United States; NASA Glenn Research Center, United States*

P5509 | DC Link Voltage Balancing Technique Utilizing Space Vector Control in SiC-based Five-Level Back-to-Back-Connected NPC Converters [#19249]

Georgios Mademlis and Yujing Liu, *Chalmers University of Technology, Sweden*

P5510 | Analysis and Reduction Method of MMC Capacitor Voltage Ripple Operation Boundary based on Circulating-Current Control [#19355]

Xiaoqian Li, Jingwei Meng, Qiang Song, Wenhua Liu, Shukai Xu, Zhe Zhu and Xiaolin Li, *Tsinghua University, China; EPRI of China South Power Grid, China*

P5511 | Novel Control Approach for Modular Multilevel Converter Based on AlphaBeta0 Reference Frame Without PLL [#18508]

Yuntao Zou, Jiangchao Qin, Lei Zhang and Zhengda Zhang, *Arizona State University, United States*

P5512 | Quasi Square Wave Modulation With Voltage Transformation Ability Applied to Modular Multilevel DC-DC Converter [#18858]

Yanlin Zhu, Shuhuai Shi, Feng Wang, Fang Zhuo, Sheng Cheng and Hao Yi, *Xi'an Jiaotong University, China*

S75 | Modeling and Control of Grid Connected Converter

Room: Exhibit Hall A

Chairs: Kai Sun, Keiji Wada

P5701 | Weak Grid Impacts on Stability of Voltage Source Inverters – Asymmetrical Grid [#19164]

Aswad Adib, Fariba Fateh, Mohammad Shadmand and Behrooz Mirafzal, *Kansas State University, United States*

P5702 | Dead-Beat Current Controller for Voltage Source Inverter with LCL Grid-Tied Filter [#19116]

Haider Mohomad, Saleh Saleh, Riming Shao, Liuchen Chang and Shuang Xu, *University of New Brunswick, Canada*

P5703 | Discrete Diagonal State Estimator Based Current Control for Grid Connected PWM Converter with an LCL filter [#19423]

Byeong-Heon Kim, Heonyoung Kim and Subhashish Bhattacharya, *North Carolina State University, United States*

P5704 | More Generalized Resonant Controllers for the Current Regulation of Power Electronics Converters in Stationary Reference Frame [#18944]

Sizhan Zhou, Jinjun Liu, Yan Zhang and Xiangpeng Cheng, *Xi'an Jiaotong University, China*

P5705 | A Novel Pre-Charge Circuit using Virtual Miller Capacitor in a Single Phase Rectifier [#18454]

Lei Wang, Mehran Mirjafari and Padmanabh Gharpure, *Dell EMC, United States*

P5706 | Rotational Control Method with Transformer Loss Savings in Solid-State Transformer-based Converter System [#19424]

Dong Dong, Ravi Raju, Govardhan Ganireddy and Mohammed Agamy, *GE global research center, United States; GE renewable energy, United States*

P5707 | Comparison of Discretization Methods on the Second Order Generalized Integrator Frequency-Locked Loop [#18223]

Yang Caiwei, Wang Jian, You Xiaojie, Wang Chenchen and Zhou Minglei, *Beijing Jiaotong University, China*

P5708 | Modeling and Stability Analysis of the Phase-Locked Loop or Single Phase Grid-Tied Inverter [#19079]

Qiang Qian, Jinming Xu, Shengyiyang Bian, Ni Zhaohui and Shaojun Xie, *Nanjing University of Aero. and Astronautics, China*

P5709 | Phase-Locked Loop Small-Signal Disturbance Compensation Control for Three-Phase LCL-Type Grid-Connected Converter Under Weak Grid [#18291]

Donghai Zhu, Shiyong Zhou, Xudong Zou, Yong Kang and Kaifeng Zou, *Huazhong University of Science and Technology, China; Wuhan Second Ship Design and Research Institute, China; Naval Aeronautical Engineering University Qingda, China*

P5710 | A Three-Port Three-Phase DC-AC Topology Based Multi-Functional Grid-Connected Inverter with Enhanced Conversion Efficiency [#18294]

Tianyu Yang, Jiangfeng Wang, Yan Xing, Xun Gao and Hongfei Wu, *Nanjing University of Aeronautics and Astronautics, China*

P5711 | Fuzzy Gain Scheduling based Grid Synchronization System Responsive to the Electrical Network Conditions [#19634]

Rouzbehi Kumars, Luna Alvaro, Catalan Pedro, Rocabert Joan and Rodriguez Pedro, *Universidad Loyola Andalucia, Spain; Universitat Politecnica de Catalunya, Spain; Ingeteam, Spain*

P5712 | Fast Dynamic Control of Stacked Low Inertia Converters [#19662]

Liran Zheng, Rajendra Kandula, Karthik Kandasamy and Deepak Divan, *Georgia Institute of Technology, United States*

P5713 | Multiple PR Current Regulator based Dead-time Effects Compensation for Grid-forming Single-Phase Inverter [#19521]

Siyuan Chen, Zibo Chen and Wensong Yu, *NC State University, United States*

P5714 | Realizable-Reference Anti-Windup Implementation for Parallel Controllers in Multiple Reference Frames [#19606]

Juan Manuel Guerrero, Cristina Gonzalez-Moral, Daniel Fernandez, David Diaz-Reigosa, Carlos Rivas and Fernando Briz, *Universidad de Oviedo, Spain; Elinsa, Spain*

P5715 | Enhancing the Harmonic Current Sharing Performance of Low-Switching-Frequency Inverters through Dynamic Impedance Shaping [#18250]

Yang Qi and Yi Tang, *Nanyang Technological University, Singapore*

S76 | Power Quality

Room: Exhibit Hall A

Chairs: Qin Lei; Xuechao Wang

P5901 | Voltage Sag Compensation Under Distorted Grid Voltage Condition [#19210]

Joao Martins, Darlan Fernandes, Mauricio Correa, Fabiano Costa, Montie Vitorino and Edison Silva, *Federal University of Campina Grande, Brazil; Federal University of Paraiba, Brazil; Federal University of Bahia, Brazil*

P5902 | Analysis and Comparison of Two Harmonics Control Alternatives for the Jacking System VFD of a Liftboat: Pseudo 24 Pulse Configuration and Active Power Filters [#18352]

Fabian Pineda Monsalve, *Zentech Incorporated, United States*

P5903 | Four-leg Inverter with Reduced Order Generalized Controller for Unbalanced Load Detection and Compensation [#18605]

Shilei Jiao, Sumit Kumar Pramanick, Kaushik Rajashekara and Nitesh Satheesh, *University of Houston, United States; Agileswitch LLC, United States*

P5904 | Single-Phase Six-Switch Universal Active Power Filter [#19290]

Phelipe Leal Serafim Rodrigues and Cursino Brandao Jacobina, *Federal University of Campina Grande, Brazil*

S77 | Motor Noise, Vibration, Reliability, Diagnostics and Protection

Room: Exhibit Hall A

Chairs: Shafiq Ahmed Odhano; Silvio Vaschetto

P6101 | State Space-Vector Model of Linear Induction Motors Including Iron Losses Part I: Theoretical Analysis [#18514]

Angelo Accetta, Maurizio Cirrincione, Marcello Pucci and Antonino Sferlazza, *INM-CNR, Italy; University of the South Pacific (USP), Fiji; University of Palermo, Italy*

P6102 | State Space-Vector Model of Linear Induction Motors Including Iron Losses: Part II: Model Identification and Results [#18515]

Angelo Acetta, Maurizio Cirrincione, Marcello Pucci and Antonino Sferlazza, *INM-CNR, Italy; University of the South Pacific (USP), Fiji; University of Palermo, Italy*

P6103 | Design Methodology of a Line-frequency Zig-Zag Transformer to Utilize its Winding Leakage Inductances as Integrated Boost-Inductances in a Unified AC-DC System [#19082]

Annoy Kumar Das, Akshatha Shetty and Baylon G. Fernandes, *Indian Institute of Technology, Bombay, India, India*

P6104 | A Dynamic Solenoid Model for Fuel Injectors [#18175]

Shifang Li, Thomas Nehl, Suresh Gopalakrishnan, Avoki Omekanda, Chandra Namuduri and Rashmi Prasad, *General Motors, United States*

P6105 | Deep Neural Network Based Bearing Fault Diagnosis of Induction Motor using Fast Fourier Transform Analysis [#18847]

Shrinathan Esakimuthu Pandarakone, Makoto Masuko, Yukio Mizuno and Hisahide Nakamura, *Nagoya Institute of Technology, Japan; Toenec Corporation, Japan*

P6106 | Vibration Suppression of FSCW-IPM with Auxiliary Slots [#19332]

Zhanchuan Wu, Ying Fan, Honghui Wen and Dawei Gao, *Southeast University, China; Tsinghua University, China*

P6107 | Diagnosis and Remediation of Single-Turn Short Circuit in a Multiphase FSCW PM Machine Based on T-type Equivalent Circuit [#18538]

Fan Wu and Ayman EL-Refai, *Marquette University, United States*

P6108 | A Novel Fault Detection and Identification Technique for IPMSM using Voltage Angle [#18894]

Zia Ullah, Seung-Tae Lee and Jin Hur, *Incheon university, korea, Korea (South)*

P6109 | Vibration analysis of a Double-Stator Switched Reluctance Machine [#19692]

Arash Hassanpour Isfahani and Babak Fahimi, *Dynsity Technology Holdings Inc., United States; University of Texas t Dallas, United States*

P6110 | Classification and Detection of Demagnetization and Inter-Turn Short Circuit Faults in IPMSMs by using Convolutional Neural Networks [#19096]

Hyeyun Jeong, Hojin Lee and Sang Woo Kim, *POSTECH, Korea (South)*

P6111 | Frame-to-Shaft Voltage and End-to-End Shaft Voltage Analysis According to Eccentricity in IPMSMs [#19289]

Jun-Kyu Park, Chae-Lim Jeong, Nicola Bianchi and Jin Hur, *University of Padova, Italy; Incheon National University, Korea (South)*

P6112 | Accelerated Life Test of Bearing under Electrical Stress [#18997]

JunHyuk Im, JunKyu Park and Jin Hur, *Incheon National University, Korea (South); University of padova, Korea (South)*

P6113 | Online Monitoring of Capacitance and Dissipation Factor of Motor Stator Winding Insulation during Accelerated Life Testing [#19124]

Pinjia Zhang, Prabhakar Neti and Karim Younsi, *Tsinghua University, China; General Electric, United States*

S78 | Low-speed, Special Machines and Machines in Renewable

Room: Exhibit Hall A

Chairs: Daniel Ludois; Mazharul Chowdhury

P6301 | Exploring the Efficiency and Cost Limits of Fractional hp Axial Flux PM Machine Designs [#19652]

Narges Taran, Vandana Rallabandi, Greg Heins and Dan M. Ionel, *University of Kentucky, United States; Regal Beloit Corporation, Australia*

P6302 | Methods for the Construction of Single-Sided Axial Flux Machines Using Soft Magnetic Composites [#18532]

Jamie Washington, Steven Jordan and Lars Sjoberg, *Hoganas Great Britain Ltd, United Kingdom; Hoganas AB, Sweden*

P6303 | Torque Performance of Pseudo Direct-Drive Machine with Halbach Consequent Pole [#18359]

Hailin Huang, Dawei Li, Ronghai Qu and Wubing Kong, *Huazhong University of Science and Technology, China; Huazhong University of Science and Technology, United States*

P6304 | On the Scaling of Consequent Pole Vernier Machines with Spoke Type Magnets [#18509]

Wenbo Liu, Lizhi Sun and Thomas Lipo, *University of Wisconsin Madison, United States; Harbin Institute of Technology, China*

P6305 | Design and Analysis of a Dual-Rotor Field Modulation Machine With Triple PM Excitation [#19743]

Wang Haitao, Fang Shuhua, Jahns Thomas, Yang Hui and Lin Heyun, *Southeast University, China; University of Wisconsin, Madison, United States*

P6306 | A Novel Magnetic Multiple Spur Gear for High Speed Motor System [#19615]

Aiso Kohei, Akatsu Kan and Aoyama Yasuaki, *Shibaura Institute of Technology, Japan; Hitachi, Ltd., Japan*

P6307 | Active Damping of Oscillations in the Trans-Rotary Magnetic Gear [#19250]

Amin Abolhasani and Siavash Pakdelian, *University of Massachusetts Lowell, United States*

P6308 | Comparison of Control Strategies for the Backpack Energy Harvesting System [#19334]

Amin Abolhasani and Siavash Pakdelian, *University of Massachusetts Lowell, United States*

P6309 | Modeling and Investigation of Self-Excited Reluctance Generators for Wind Applications [#19031]

Yawei Wang and Bianchi Nicola, *University of Padova, Italy*

P6310 | Ironless Dual-Rotor Permanent Magnet Machine for Flywheel Batteries [#18582]

Danilo David, Claudio Bianchini, Ambra Torreggiani and Alberto Bellini, *Raw Power Group, Italy; University of Modena and Reggio Emilia, Italy; DEI, University of Bologna, Italy*

S79 | Control of Electric Drives

Room: Exhibit Hall A

Chairs: Fernando Briz; Mahesh Swamy

P6501 | Analysis of System Interharmonics of VSI-Fed Small DC-Link Drive with Varying Power Load [#19101]

Dong Wang and Kaiyuan Lu, *Aalborg University, Denmark*

P6502 | Decoupled dq-Axis Current Control for PMLSM based on Variable-Gain Adaptive Internal Model [#18064]

Yang Rui, Wang Mingyi, Jiang Jialin, Niu Yujie and Li Liyi, *Harbin Institute of Technology, China*

P6503 | Real-time Implementation of Selective Harmonic Elimination with Seamless Dynamic Performance [#19063]

Ameer Janabi and Bingsen Wang, *Michigan State University, United States*

P6504 | Duty-ratio-based Direct Torque Control for Dual Three-phase Permanent Magnet Synchronous Machine Drives [#18874]

Yuan Ren, Ziqiang Zhu, James E. Green, Yun Li, Shiwu Zhu and Zijian Li, *The University of Sheffield, United Kingdom; Dynex Semiconductor Ltd., United Kingdom*

P6505 | Implementation of SVM-DTC on the Integration System with Hybrid Energy Storage and Dual Three-Phase PMSM [#19464]

Mufeng Xiong, Zipeng Liang, Sideng Hu, Feilang Li and Xiangning He, *Zhejiang University, China; Zhejiang University, China*

P6506 | Postfault Strategy for Dual Three-Phase Machines With Minimum Loss in the Full Torque Operation Range Under Two Open Phases [#18165]

Alejandro Yepes, Jesus Doval-Gandoy, Fernando Baneira and Hamid Toliyat, *University of Vigo, Spain; Texas AM University, United States*

P6507 | On the Effects of Position Sensor Resolution in Variable Speed Drives [#19239]

Giacomo Scelba, Giulio De Donato, Giuseppe Scarcella and Fabio Giulii Capponi, *University of Catania, Italy; Sapienza – University of Rome, Italy*

P6508 | Improved Over-Modulation Strategy in DTC with Constant Frequency Torque Controller of PMSM for Quick Torque Control at Different Dynamic Conditions [#18693]

Ibrahim Mohd Alsofyani and Kyo-Beum Lee, *Ajou University, Korea (South)*

P6509 | A PV-Grid Fed DTC Based Induction Motor Drive for Water Pumping [#18610]

Saurabh Shukla and Bhim Singh, *IIT Delhi, India*

S80 | PM Motor Drive

Room: Exhibit Hall A

Chairs: Fernando Briz; Mahesh Swamy

P6701 | Performance Improvement of Model Predictive Current Control of Fault-Tolerant Five-Phase Flux-Switching Permanent Magnet Motor Drive [#18057]

Wentao Huang, Wei Hua, Fuyang Chen, Ji Qi and Jianguo Zhu, *Southeast University, China; University of Sydney, Australia*

P6702 | An Integrated Permanent-Magnet-Synchronous-Generator-Rectifier Architecture for Limited-Speed-Range Applications [#19284]

Phuc Huynh, Patrick Wang and Arijit Banerjee, *University of Illinois Urbana-Champaign, United States*

P6703 | Phase-shift Decoupled SVPWM Control Strategy for Open Winding Permanent Magnet Synchronous Motor with Common DC Bus [#18978]

Xiaoyong Zhu, Yuan Yuan, Yuefei Zuo, Xiaoxiao Bu and Bing Shi, *Jiangsu University, China*

P6704 | Guidelines for Optimum Bandwidth Selection in the Observers and Performance Investigation of DB-DTFC using Back-EMF Self-Sensing for SPM [#19339]

Shang Chuan Lee, Robert D. Lorenz and Kevin Lee, *University of Wisconsin Madison, United States; Eaton Corporation, United States*

P6705 | Effects of Position Sensing Dynamics on Feedback Current Control of Permanent Magnet Synchronous Machines [#18436]

Prerit Pramod, Zhang Zhe, Namburi Krishna MPK, Mitra Rakesh and Qu Darren, *Nexteer Automotive Corporation, United States*

P6706 | Systematic Current Measurement Error due to Back EMF in PMSM Drives Adopting Synchronous Sampling [#19776]

Jose Jacob, Sandro Calligaro and Roberto Petrella, *Free University of Bolzano, Italy; University of Udine, Italy*

P6707 | Online Compensation of Periodic Error in Resolver Signals for PMSM Drives [#18530]

Dongdong Chen, Jian Li, Junhua Chen and Ronghai Qu, *State Key Laboratory of Advanced Electromagnetic, China*

P6708 | Reference Flux Calculation Suitable for Inverter Over-Modulation in Direct Torque Controlled PMSM Drive System [#19273]

Yukinori Inoue, Ran Fujii, Shigeo Morimoto and Masayuki Sanada, *Osaka Prefecture University, Japan*

P6709 | Back-EMF Based Sensorless Control of IPMSM with Enhanced Torque Accuracy against Parameter Variation [#18637]

Jiwon Yoo, Younggi Lee and Seung-Ki Sul, *Seoul National University, Korea (South)*

P6710 | Fault Tolerant Control for Open Winding PMSM System with Common DC Bus Based on 120 degree Decoupled Modulation Strategy [#19002]

Xiaoyong Zhu, Xiaoxiao Bu, Yuefei Zuo, Yuan Yuan and Bing Shi, *Jiangsu University, China*

P6711 | Current Predictive Control for the Semi-Controlled Open-Winding PMSM Generation System [#19706]

Xiaoguang Zhang, Yi Li and Keqin Wang, *North China University of Technology, China; Jing-Jin Electric, China*

S81 | Converter Design I

Room: Exhibit Hall A

Chairs: Yu Du; Yongheng Yang

P6901 | Analysis of Trade-Off between Noise and Wide Band-Gap (WBG) Device Switching Speed [#18450]

Pengkun Liu, Suxuan Guo, Ruiyang Yu, Alex Huang and Liqi Zhang, *The University of Texas at Austin, United States; Texas Instruments, United States*

P6902 | GaN based Switched Capacitor Three Level Buck Converter with Cascaded Synchronous Bootstrap Gate-Drive Scheme [#18615]

Suvankar Biswas and David Reusch, *Efficient Power Conversion Corporation, United States*

P6903 | Stretching in Time of GaN Active Gate Driving Profiles to Adapt to Changing Load Current [#18967]

Jeremy J. O. Dalton, Harry C. P. Dymond, Jianjing Wang, Dawei Liu, Mohammad H. Hedayati, David Drury and Bernard H. Stark, *University of Bristol, United Kingdom*

P6904 | Desaturation Detection for Paralleled GaN E-HEMT Phase Leg [#19344]

Yingying Gui, Bingyao Sun, Rolando Burgos, Sandeep Bala and Jing Xu, *Center for Power Electronics Systems, United States; ABB Corporate Research, United States*

P6905 | Passive Resonant Level Shifter for Suppression of Crosstalk Effect and Reduction of Body-Diode Loss in SiC-Based Bridge Leg [#19469]

Blue Ho-Tin Tang, Henry Shu-Hung Chung, John Wing-To Fan and Ryan Shun-Cheung Yeung, *City University of Hong Kong, Hong Kong*

P6906 | Coordinated Switching with SiC MOSFET for Increasing Turn-off dV/dt of Si IGBT [#19560]

Patrick Palmer, Xueqiang Zhang, Jin Zhang, Emma Findlay, Tianqi Zhang and Edward Shelton, *University of Cambridge, United Kingdom*

P6907 | Hetero-Magnetic Swinging Inductor (HMSI) and Its Application for Power Factor Correction Converters [#19073]

Shengchang Lu, Chao Ding, Lanbing Liu, Yunhui Mei, Khai Ngo and Guoquan Lu, *Virginia Tech, United States; Tianjin University, China*

P6908 | Thermal Coupling and Network Modeling for Planar Transformers [#19626]

Zhan Shen, Yanfeng Shen, Bochen Liu and Huai Wang, *Aalborg University, Denmark*

P6909 | The Parasitic Capacitance of Magnetic Components with Ferrite Cores Due to Time-Varying Electromagnetic (EM) Field [#19775]

Hui Zhao, Yiming Li, Qiang Lin and Shuo Wang, *University of Florida, United States; Kyushu University, Japan*

P6910 | High Speed dV/dt Control Technology for a SiC Power Module for EV/HEV Inverters using a Multistage Drive Circuit [#18458]

Taku Shimomura, Keiichiro Numakura, Daiki Sato and Tetsuya Hayashi, *Nissan Motor Co., Ltd, Japan*

P6911 | Development of Simulink Based Modeling Platform for 3.3 kV/400 A SiC MOSFET Module [#18037]

Muhammad Nawaz, Nikolaos Bezenes, Kalle Ilves and Francesco Iannuzzo, *ABB Corporate Research, Vaasteras, Sweden; Institut for Energiteknik, Aalborg University, Denmark*

S82 | Emerging Technologies and Applications (II)

Room: Exhibit Hall A

Chairs: Shih-Chin Yang; Xiu Yao

P7102 | An Adaptive Sensorless Measurement Technique for Internal Temperature of Li-ion Batteries Using Impedance Phase Spectroscopy [#18839]

Ala Hussein and Abbas Fardoun, *Yarmouk University, Jordan; Al Marref University, Lebanon*

P7103 | A Sensorless Surface Temperature Measurement Method for Batteries using Artificial Neural Networks [#18835]

Ala Hussein, *Yarmouk University, Jordan*

P7104 | Development of a Wideband High-Precision Current Sensor for Next Generation Power Electronics Applications [#18160]

Masayuki Harano, Hajime Yoda, Kenichi Seki, Kazunobu Hayashi, Tetsuya Komiyama and Shuhei Yamada, *HIOKI E.E. Corporation, Japan*

P7105 | Power Electronics Testbed for Converting Methane to Liquid Fuels via Electrical Corona [#18225]

Annette von Jouanne, Ryan Collin, Yu Miao, Alex Yokochi, Scott Harpool and Adam Shareghi, *Baylor University, United States; Oregon State University, United States*

P7106 | Comparison of Overload Protection Methods for LLC Resonant Converters in MVDC Applications [#18320]

Hemant Bishnoi, Silverio Alvarez, Gabriel Ortiz and Francisco Canales, *ABB Schweiz AG, Switzerland*

P7107 | Design and Implementation of an Optimized 100 Kw Stationary Wireless Charging System for EV Battery Recharging [#19238]

Veda Prakash Galigekere, Jason Pries, Omer Onar, Gui-jia Su, Anwar Saeed, Wiles Randy, Seiber Larry and Wilkins Johnathan, *Oak Ridge National Laboratory, United States; University of Tennessee, United States*

P7108 | A Flexible Load-Independent Multi-Output Wireless Power Transfer System Based on Double-T Resonant Circuit Technique [#18220]

Yong Li, Jiefeng Hu, Kevin K. W. Chan, Eric K. W. Cheng and Ming Liu, *Department of Electrical Engineering, The Hong Kong, Hong Kong*

P7109 | A GUI-Based Automatic Tester with a Novel Heating Method for Power Semiconductor Device Dynamic Measurement [#19274]

Qingxuan Ma, Liqi Zhang, Alex Huang and Meng-Chia Lee, *University of Texas at Austin, United States; ON Semiconductor, United States*

P7110 | New IH Coils for Small-Foreign-Metal Particle Detection Using 400 kHz SiC-MOSFETs Inverter [#19766]

Takuya Shijo, Yuki Uchino, Yujiro Noda, Hiroaki Yamada and Toshihiko Tanaka, *Yamaguchi University, Japan*

Tuesday, September 25

2:30PM – 5:00PM

S83 | Renewable Energy Systems

Room: Exhibit Hall A

Chairs: Ke Ma; Ali Topcu

P7301 | Effect of Anode and Cathode Relative Humidity Variance and Pressure Gradient on Polymer Electrolyte Membrane Fuel Cell (PEMFC) Performance [#18008]

Emmanuel Balogun, Paul Barendse and Jessica Chamier, *University of Cape Town, South Africa*

P7302 | Active Adaptive Fault-Tolerant Control Design for PEM Fuel Cells [#19042]

Alireza Abbaspour, Kang Yen, Parisa Forouzannezhad and Arman Sargolzaei, *Florida international university, United States; Florida Polytechnic University, United States*

P7303 | Current Ripple Reduction Control for ZVS Operation of a Fuel Cell System [#19370]

Yong Dae Kwon, Jin-Hyuk Park and Kyo-Beum Lee, *Ajou University, Korea (South)*

P7304 | Power Electronics Based MW SOFC System Design for Integrated Gasification Fuel Cell (IGFC) [#19569]

Shujun Mu, George You Zhou and Wenqiang Yang, *National Institute of Clean and Low Carbon Energy, China*

P7305 | Realization of a 10 kW MES Power to Methane Plant-Based on Unified AC/DC Converter [#18645]

Mahdi Shahparasti, Alvaro Luna, Joan Rocabert, Pau Bosch and Pedro Rodriguez, *Technical University of Catalonia, Spain; Leitat Technological Center, Spain*

P7306 | A Double-Input Photovoltaic Inverter System with a Soft-Switched Magnetically Coupled AC/DC Bi-Directional Circuit for Energy Storage Application [#19204]

Joanne Hui and Praveen K. Jain, *Queen's University, Canada*

P7307 | An Isolated DC-AC Converter Module Integrating Renewable Energy Source and Energy Storage for Cascaded Inverter [#19240]

Ritwik Chattopadhyay, Subhashish Bhattacharya and Viju Nair, *North Carolina State University, United States*

P7308 | Magnetic Field Energy Harvester and Management Algorithm for Power Tower Sensors [#19744]

Awab Ali, Syed Ahmed Ali Najafi, Okan Boler, Yilmaz Sozer and Alex De Abreu Garcia, *University of Akron, United States*

P7309 | Advanced Model Predictive MPPT and Frequency Regulation in Interconnected Wind Turbine Drivetrains [#18562]

Mohsen Farbood, Mokhtar ShaSadeghi, Afshin Izadian and Taher Niknam, *Shiraz University of Technology, Iran; Purdue School of Engineering and Technology, United States*

S84 | Power Control and Protection

Room: Exhibit Hall A

Chairs: Behrooz Mirafzal; Mohammad B Shadmand

P7501 | Design and Analysis of the Compounded Control System of Hybrid Distribution Transformer [#18346]

Yibin Liu, Deliang Liang, Yang Liang, Mingkang Zhang and Qixu Chen, *Xi'an Jiaotong University, China*

P7502 | Sic Based Latching Current Limiter For High Voltage Space Power Distribution Systems [#18394]

David Marroqui, Ausias Garrigos, Jose Manuel Blanes, Roberto Gutierrez and Enrique Maset, *Miguel Hernandez University of Elche, Spain; University of Valencia, Spain*

P7503 | Snubber Circuit of Bidirectional Solid State DC Circuit Breaker Based on SiC MOSFET [#18575]

Dongho Shin, Seung-Ki Sul, Jungwook Sim and Young-Geun Kim, *Seoul National University, Korea (South); LSIS Co., Ltd, Korea (South)*

P7504 | A Hybrid Islanding Detection Method Combining VU/THD and BRPV [#18707]

Gongke Wang, Feng Gao and Jiaxin Liu, *Shandong University, China*

P7505 | Capacitor Voltage Balancing in Hybrid Cascaded Multilevel Inverter Using Genetic Algorithm at Higher Modulation Indices [#19048]

Abhinandan Routray, Rajeev Kumar Singh and Ranjit Mahanty, *Indian Institute of Technology (BHU), Varanasi, India*

P7506 | Ground Leakage Current Mitigation for Three-Phase Current Source Inverters [#19075]

Emilio Lorenzani, Giovanni Migliazza and Fabio Immovilli, *University of Modena and Reggio Emilia, Italy*

P7507 | Implementation of a Self-Balancing Control for Series IGBTs [#19089]

Lu Yue and Xiu Yao, *University at Buffalo, United States*

P7508 | Analysis of MTDC Inertia Emulation Impact on Connected AC Systems [#19245]

Shuyao Wang, Shuoting Zhang, Yiwei Ma, Fred Wang and Leon Tolbert, *University of Tennessee, United States; University of Tennessee, Oak Ridge National Lab, United States*

P7509 | Experimental Study of Series DC Arc in Distribution Systems with Constant Power Loads [#19304]

Xiu Yao, Luis Herrera, Lu Yue and Cai Haiwei, *University at Buffalo, United States; ANSYS, United States*

P7510 | Power Oscillation Damping by MMC-HVDC Based on Phase-Locked Loop Measurement [#19360]

Jiang Haihao and Boon-Teck Ooi, *McGill University, Canada*

P7511 | Utility-Scale PV Inverter Impedances in DQ Frame under Different Q Control Modes [#19460]

Ye Tang, Rolando Burgos, Chi Li and Dushan Boroyevich, *CPES, Virginia Tech, United States*

P7512 | Grounded Controllable Network Transformer for Cost-Effective Grid Control [#19475]

Mickael J. Mauger, Prasad Kandula, Frank Lambert and Deepak Divan, *Georgia Institute of Technology, United States*

S85 | Microgrid Systems

Room: Exhibit Hall A

Chairs: Adel Nasiri; Babak Parkhideh

P7701 | Event-based Distributed Power Sharing Control for Photovoltaic Generators in AC Microgrids [#18239]

Jingang Lai and Xiaoqing Lu, *Huazhong University of Science and Technology, China; Wuhan University, China*

P7702 | Stabilizing Droop Variation of Converter-Connected Generation in Autonomous Microgrids with Virtual Inertia Control [#18303]

Lalitha Subramanian and Hoay Beng Gooi, *Energy Research Institute at NTU, Singapore; School of EEE, Nanyang Technological University, Singapore*

P7703 | Cooperative Optimization of Electric Vehicles and Renewable Energy Sources in Regional Multi-Microgrid System [#18405]

Jin Chen, Changsong Chen, Shanxu Duan, Hua Cheng, JieYi Sun, Tao Cai and Jian He, *Huazhong University of Science and Technology, China; China Ship Development and Design Center, China*

P7704 | Dynamic-phasor Modeling and Transient Analysis of Inverter-based Microgrid under Unbalanced and Harmonic Condition [#18437]

Yelun Peng, Zhikang Shuai, Yang Li, Josep M. Guerrero and John Shen, *Hunan University, China; Aalborg University, Denmark; Illinois Institute of Technology, United States*

P7705 | An Alternative Realization of Droop Control and Virtual Impedance for Paralleled Converters in DC Microgrids [#18503]

Zheming Jin, Josep M. Guerrero and Mingshen Li, *Aalborg University, Denmark; Aalborg University, Denmark*

P7706 | Sizing of Energy Storage System for Power Restoration in Different Types of Islanded Microgrid Aided by Load-Characterization and Modeling [#18567]

Asif Anwar and Mohd Hasan Ali, *Schneider Electric, United States; University of Memphis, United States*

P7707 | Investigation of Grid-Connected and Islanded Direct Matrix Converter for the Renewable Microgrid Applications with Model Predictive Control [#18787]

Jianwei Zhang, Li Li, David Dorrell, Jose Rodriguez and Margarita Norambuena, *University of Technology Sydney, Australia; University of KwaZulu-Natal, South Africa; Universidad Andres Bello, Chile*

P7708 | High Performance Unified Control for Interlinking Converter in Hybrid AC/DC Microgrid [#19150]

Fanxiu Fang, Yun Wei Li and Xialin Li, *University of Alberta, Canada; Tianjin University, China*

P7709 | Efficient Power Flow Management and Peak Shaving in a Microgrid-PV System [#19527]

Sakshi Mishra and Praveen Palanisamy, *American Electric Power, United States; Alumni, Robotics Institute, Carnegie Mellon Univ, United States*

P7710 | Optimal DER Sizing Using Microgrid Design Tool Integrating Model Predictive Control Based Energy Management – A Case Study [#18569]

Asif Anwar, Patrick Beguery, Peter Pflaum, Jackie Huynh and Jacob Friedman, *Schneider Electric, United States; Schneider Electric, France*

P7711 | A Novel Multi-stage Economic Dispatch of Microgrid Based on Consensus Protocol of Multi-Agent System [#18720]

Zhiwen Yu, Yuquan Liu, Wen Xiong, Li Wang, Ying Cai, Renbo Wu, Huangsheng Hua and Shunqi Zeng, *Guangzhou Power Supply Co., Ltd, China*

P7712 | A Synthesized Control Scheme for Large Signal Stabilization of DC Microgrids [#18146]

Pengfeng Lin, Chuanlin Zhang, Peng Wang, Jianfang Xiao and Chi Jin, *Nanyang Technological University, Singapore; Shanghai University of Electric Power, China*

S86 | Datacenters and Telecommunication Applications

Room: Exhibit Hall A

Chairs: na ren; He Niu

P7901 | An Optimized Inductor Current Control for Intermediate Bus Converter With Hybrid-Switching Structure [#18402]

Ying Li and Xinbo Ruan, *Nanjing Univ. of Aero. and Astro., China*

P7902 | A 95%-Efficient 48V-to-1V/10A VRM Hybrid Converter Using Interleaved Dual Inductors [#18512]

Gab-Su Seo, Ratul Das and Hanh-Phuc Le, *University of Colorado, United States*

P7903 | An Isolated Composite Resonant Multilevel Converter with Partial Power Voltage Regulation for Telecom Application [#19168]

Yanchao Li, Xiaofeng Lyu, Ze Ni, Jalen Johnson and Dong Cao, *North Dakota State University, United States; Navitas Semiconductor .Inc, United States, United States*

P7904 | High-Performance Single-Stage Isolated 48V-to-1.8V Point-of-Load Converter Utilizing Impedance Control Network and Distributed Transformer [#19268]

Ashish Kumar, Saad Pervaiz and Khurram Afridi, *University of Colorado Boulder, United States*

P7905 | Loss Model and Optimization Method of Switched-Capacitor Divider for POL Application [#18327]

Owen Jong, Qiang Li, Fred C. Lee and Brian Carpenter, *Student, United States; Professor, United States; Sponsor, United States*

P7906 | Structure and Implementation of A Hybrid 48V/380V DC UPS for IT Datacenters [#19578]

Shangzhi Pan, Cong Wang and Praveen Jain, *Wuhan University, China; Queen's University, Canada*

P7907 | Accelerated Lifetime Testing of High Power Lithium Titanate Oxide Batteries [#19211]

Ana-Irina Stroe, Daniel-Ioan Stroe, Vaclav Knap, Maciej Swierczynski and Remus Teodorescu, *Aalborg University, Denmark; Lithium Balance, Denmark*

S87 | Electric Propulsion and Other E-Transportation Applications

Room: Exhibit Hall A

Chairs: Christopher Belcastro; Ean Amon

P8101 | Design and Test of a Planarized High Power Density 100 kW SiC Traction Inverter with 1kV DC-Link [#19162]

Li Yang, Yukun Luo, Radha Sree Krishna Moorthy, Dhruvo Rahman, Wensong Yu and Iqbal Husain, *North Carolina State Univ., United States*

P8102 | A Multi-Source Inverter for Electric Drive Vehicle Applications [#19251]

Salari Omid, Hashtrudi Zaad Keyvan, Bakhshai Alireza, Jain Praveen and Nouri Mahmoud, *Queen's university, Canada*

P8103 | A SiC-Based 100kW High-Power-Density (34 kW/L) Electric Vehicle Traction Inverter [#19375]

Chi Zhang, Srdjan Srdic, Srdjan Lukic, Yonghan Kang, Edward Choi and Ehsan Tafti, *FREEDM Systems Center, NC State University, United States; LG Electronics Vehicle Components USA LLC, United States*

P8104 | Optimal Design and Experimental Prototype Testing of a Low-Cost Machine for City Battery Electric Vehicle [#18423]

Tuan-Vu Tran, Edouard Negre, Karim Mikati, Pierre Pellerey and Bassel Assaad, *Renault, France; Nissan, Japan; Tesla, United States*

P8105 | Development of High Power 48V Powertrain Components for Mild Hybrid Light Duty Vehicle Applications [#19007]

Anthony Wearing, Ozge Taskin, Haybittle James, Bao Ran, Baxter James and Rouaud Cedric, *Ricardo Innovations Ltd, United Kingdom; Ricardo UK Ltd, Turkey; Ricardo UK Ltd, United Kingdom; Ricardo UK Ltd, China; Ricardo UK Ltd, France*

P8106 | Direct Drive Propeller System Modelling and Active Protection [#18103]

Jishnu Kambrath, Changwoo Yoon, Liu Xiong, Youyi Wang, Yong-jin Yoon, Chandhana Jayampathi Gajanayake and Amit Gupta, *Nanyang Technological University, Singapore; Rolls Royce NTU CORPORATE LAB, Singapore; Rolls Royce Singapore Pte Ltd, Singapore*

P8107 | Mitigation of DC-Link Voltage Oscillations Caused by Resolver Error in an Electric Vehicle Drivetrain [#18265]

Ayesha Sayed, Dionysios Aliprantis, Long Wu, Guozhen Zhou and Sumit Dutta, *Purdue University, United States; John Deere Electronic Solutions, United States*

P8108 | A Method to Minimize Current Ripple of DC Link Capacitor for 48V Inverter Integrated Starter/Generator [#18431]

Sang Min Kim and Taesuk Kwon, *Hyundai Mobis, Korea (South)*

P8109 | Bidirectional Transformerless EV Charging System via Reconfiguration of 4x4 Drivetrain [#19562]

Liwei Zhou and Matthias Preindl, *Columbia University, United States*

P8110 | Modeling and Simulation of Double-Train Macroscopic Representation Emulator in Urban Rail Transit [#18242]

Jingda Gu, Xiaofeng Yang, Trillion Q. Zheng and Miao Wang, *Beijing Jiaotong University, China*

P8111 | An Efficient Reference Modulation based Control Strategy for Active Hybrid Energy Management of EVs [#19400]

Yanhui Zhou, Zhiwu Huang, Hongtao Liao, Heng Li, Yun Jiao and Jun Peng, *Central South University, China*

S88 | AC-AC Converters II

Room: Exhibit Hall A

Chairs: Robert S. Balog; Patrick Wheeler

P8301 | A Single-Phase AC to Three-Phase AC Converter with a Small Link Capacitor [#18676]

Masih Khodabنده and Mahshid Amirabadi, *Northeastern University, United States*

P8302 | Low-Cost High-Efficiency Single-Stage Solid-State Transformer for Lighting Applications [#19547]

Danish Shahzad, Saad Pervaiz and Khurram Afridi, *University of Colorado Boulder, United States*

P8303 | Power Control Capabilities of the ROMatrix Converter [#19709]

Sabino Pipolo, Stefano Bifaretti, Fabio Crescimbin, Alessandro Lidozzi, Luca Solero and Pericle Zanchetta, *University of Nottingham, United Kingdom; University of Rome "Tor Vergata", Italy; Roma Tre University, Italy*

P8304 | Three-Leg Single-Phase Universal Active Power Filter [#19295]

Phelipe Leal Serafim Rodrigues and Cursino Brandao Jacobina, *Federal University of Campina Grande, Brazil*

P8305 | Over-modulation Operation of Multiple-Channel Indirect Matrix Converter System [#18576]

Xiuyun Huang, Zheng Wang, Xueqing Wang, Lei Guan and Ming Cheng, *Southeast University, China*

S89 | Multi-Level Power Converters II

Room: Exhibit Hall A

Chairs: Matthias Preindl; Navid Zargari

P8501 | An Increased-Levels Model Predictive Control (MPC) Method for Modular Multilevel Converter (MMC) [#19013]

Xingxing Chen, Jinjun Liu, Shaodi Ouyang, Shuguang Song, Hongda Wu and Xiufang Hu, *Xi'an Jiaotong University, China*

P8502 | Suitable Submodule Switch Rating for Medium Voltage Modular Multilevel Converter Design [#19118]

Aditya Shekhar, Thiago Batista Soeiro, Zian Qin, Laura Ramirez-Elizondo and Pavol Bauer, *Delft University of Technology, Netherlands*

P8503 | Reduction of Common Mode Voltage Reference Voltage Modulation in MMC system [#19565]

Chang-Hwan Park, In-Kyo Seo, Belete Belaynehn Negesse and Jang-Mok Kim, *Pusan National University, Republic of Korea*

P8504 | Comparison of Phase Shift and Submodule Tolerance Band Nearest Level Modulation for Medium Voltage Modular Multilevel Converter Design [#18773]

Andrey Dudin, Ara Bissal, Ilknur Colak and Waqas Ali, *Dr., Germany; MSc., Germany*

P8505 | Effect of Battery Power on Capacitor Voltage Ripple Characteristics in a Modular Multilevel Converter with Integrated Battery Energy Storage System [#18910]

Tao Wang, Hua Lin, Zhe Wang, Yajun Ma and Xingwei Wang, *State Key Laboratory of Advanced Electromagnetic, China*

P8506 | Current Source Modular Multilevel Converter with Reduced Number of Components [#19287]

Faleh Alskran and Marcelo Simoes, *Colorado School of Mines, United States*

S90 | Model Predictive Control of Power Converters

Room: Exhibit Hall A

Chairs: Ralph Kennel; Shafiq Ahmed Odhano

P8701 | Real-Time Implicit Model Predictive Control for 3-Phase VSI [#19609]

Valerio Sabatini, Andrea Formentini, Alessandro Lidozzi, Stefano Bifaretti, Luca Solero and Pericle Zanchetta, *C-PED, Roma Tre University, Italy; University of Nottingham, United Kingdom; C-PED, University of Roma Tor Vergata, Italy*

P8702 | Modularized Model Predictive Control Scheme with Capacitor Voltage Balance Control for Single-Phase Cascaded H-Bridge Rectifier [#18801]

Xiajie Wu, Chenglin Xiong, Fei Diao and Ying Zhang, *Southwest Jiaotong University, China*

P8703 | Carrier-Based Model Predictive Pulse Pattern Control [#18139]

Tobias Geyer and Vedrana Spudic, *ABB Corporate Research, Switzerland*

P8704 | Computationally Efficient Model Predictive Control for a Four-Leg Inverter with Common Mode Voltage Elimination [#18469]

Muslem Uddin, Galina Mirzaeva, Graham Goodwin and Marco Rivera, *The University of Newcastle, Australia; Universidad de Talca, Chile*

P8705 | Three-Vector-Based Model Predictive Direct Power Control Strategy for PWM Rectifier [#18531]

Hui Li, Mingyao Lin, Jian Ai, Gongde Yang, Xueqing Wang and Wei Le, *Southeast University, China*

P8706 | A MPC-Based Method for Single-Inductor Multiple-Input Single-Output Boost Converter [#18046]

Benfei Wang, Liang Xian, Xinan Zhang and Hoay Beng Gooi, *Nanyang Technological University, Singapore*

P8707 | A Novel Model Predictive Control Method with Discrete Space Vector Modulation for Neutral-point Voltage Balancing of Vienna-Type Rectifier [#18677]

Wenjie Zhu, Changsong Chen, Jian He, Shanxu Duan, JieYi Sun, Xinggang Fan and Ming Wu, *Huazhong University of Science and Technology, China; China Electric Power Research Institute, China*

S91 | Reliability, Diagnostic and Faults Analysis in Power Converters

Room: Exhibit Hall A

Chairs: Rongwu Zhu; Jun Wang

P8901 | Multiple Device Open Circuit Fault Diagnosis for T-Type Multilevel Inverters [#19690]

Ali Topcu and Yilmaz Sozer, *University of Akron, United States*

P8902 | EMI Diagnostics Of Three-Phase Inverters Using Machine Learning Algorithms [#19763]

Matthew Boubin, John Patrick Doran, Wilson Guo, Yamuna Rajasekhar and Mark Scott, *Miami University, United States*

P8903 | Active Thermal Control of Asynchronously-Connected Grids Considering Load Sensitivity to Voltage [#18730]

Markus Andresen, Giovanni De Carne, Mike Schloh and Marco Liserre, *University of Kiel, Germany*

P8904 | Impact of Long-term Mission Profile Sampling Rate on the Reliability Evaluation of Power Electronics in Photovoltaic Applications [#19213]

Ionut Vernica, Huai Wang and Frede Blaabjerg, *Aalborg University, Denmark*

P8905 | Selection of Observer Gains in an Observer Based Fault Detection System for a Digitally Controlled DC-DC Converter [#18459]

John Tsinetakes, *Lockheed Martin, United States*

P8906 | Reactive Power Impacts on LCL Filter Capacitor Lifetime and Reliability in DFIG Grid-Connected Inverter [#19721]

Dao Zhou, Huai Wang and Frede Blaabjerg, *Aalborg University, Denmark*

P8907 | Reliability Oriented Design of Dual Active Bridge Converter for Power Supply on Heavy-Vehicles [#19661]

Suyash Sushilkumar Shah and Subhashish Bhattacharya, *North Carolina State University, United States*

P8908 | Online Degradation Detection Method for Voltage Regulation and Efficiency in Digitally-Controlled Switching Mode Power Supply [#18263]

Hiroshi Nakao, Yu Yonezawa, Yoshiyasu Nakashima and Fujio Kurokawa, *Fujitsu Laboratories Ltd., Japan; The Nagasaki Institute of Applied Science, Japan*

P8909 | Online Condition Monitoring of Bond Wire Degradation in Inverter Operation [#18482]

Fernando Gonzalez-Hernando, Jon San-Sebastian, Asier Garcia-Bediaga, Manuel Arias, Francesco Iannuzzo and Frede Blaabjerg, *IK4-ikerlan Technology Research Centre, Spain; University of Oviedo, Spain; Aalborg University, Denmark*

P8910 | Mission Profile based Power Converter Reliability Analysis in a DC Power Electronic based Power System [#19146]

Saeed Peyghami, Huai Wang, Pooya Davari and Frede Blaabjerg, *Aalborg University, Denmark*

P8911 | Open-Switch Fault Diagnosis and Tolerant Control Methods for a Vienna Rectifier using Bi-Directional Switches [#19341]

June-Seok Lee and Kyo-Beum Lee, *Korea Railroad Research Institute, Korea (South); Ajou University, Korea (South)*

S92 | Stability in Power Converters

Room: Exhibit Hall A

Chairs: Brendan McGrath; Zheng Wang

P9101 | Positive Feed-Forward Control Design for DC Bus Stabilization of a Multi-Converter System Using a Pole Placement Approach [#18769]

Silvia Arrua, Hessamaldin Abdollahi and Enrico Santi, *University of South Carolina, United States*

P9102 | Stability Analysis for Two-Stage Cascaded DC-DC Converters System Based on Describing Function Method [#19601]

Hong Li, Chen Liu, Xiaochao Zhang, Zhongya Guo and Trillion Q. Zheng, *Beijing Jiaotong University, China*

P9103 | Eigenvalue Sensitivity of Stability Analysis for a Droop Controlled Inverter [#18343]

Yang Li, Zhikang Shuai, Yelun Peng, Yi Hong and John Shen, *Col. of Elec. and Info Eng, Hunan University, China; Dept. of Elec and Cmpt Eng, Institute of Illinois, United States*

P9104 | Parameters Sensitivity Analysis of Circulating Resonance in Islanded Microgrid with Aggregated Droop-Based Control Inverters [#18369]

Xiayun Feng, Fei Wang, Lijun Zhang, Yufei Li, Hui Guo and Jian Luo, *Shanghai University, China*

P9105 | Stability Analysis of a Droop-Controlled Grid-Connected VSC [#19188]

Leonardo Marin, Andres Tarraso, Jose Ignacio Candela and Pedro Rodriguez, *Technical University of Catalonia, Spain; Universidad de Loyola, Spain*

P9106 | Large Signal Modeling and Stability Analysis of Photovoltaic-Battery Hybrid Power System [#19035]

Dongxin Chen, Huizi Ji, Yushuang Liu and Xiaoming Zha, *State Grid Henan Electric Power Company, China; School of Electrical Engineering, Wuhan Univ., China*

P9107 | Impedance-Based Sensitivity-Criterion for Grid-Connected Three-Phase Inverter [#18162]

Tommi Reinikka, Roni Luhtala, Tuomas Messo and Tomi Roinila, *Tampere University of Technology, Finland*

P9108 | Aggregated Modeling and Power Hardware-in-the-Loop Emulation of Grid Impedance [#18152]

Henrik Alenius, Tommi Reinikka, Tuomas Messo and Tomi Roinila, *Tampere University of Technology, Finland*

S93 | Other Topics in Converter Design and Control

Room: Exhibit Hall A

Chairs: Vito Giuseppe Monopoli; Alessandro Lidozzi

P9301 | Modeling Common-Mode Circulating Currents in Paralleled Non-Isolated DC-DC Converter-Based Systems [#19602]

Aaron Brovont and Robert Cuzner, *University of Alabama, United States; University of Wisconsin-Milwaukee, United States*

P9302 | Conducted EMC Modelling for EV Drives Considering Switching Dynamics and Frequency Dispersion [#19055]

Yuxin Xia, Yunjie Gu and Jie Shen, *Leadrive Technology (Shanghai) Co., China; Imperial College London, United Kingdom*

P9303 | Radiated EMI Modeling of the Non-Isolated DC-DC Power Converters with Attached Cables [#19779]

Huan Zhang, Yingjie Zhang and Shuo Wang, *University of Florida, United States*

P9304 | Conducted EMI of Interleaved CCM Boost PFC Converter with Different Coupling Coefficients [#18750]

Fei Yang, Yong Cao, Chun hui Li, Jiao Yang, Han Hua and Fu ming Peng, *Nanjing University of Science and Technology, China*

P9305 | Core Characterization and Inductor Design Investigation at Low Temperature [#19275]

Ruirui Chen, Zhou Dong, Zheyu Zhang, Handong Gui, Jiahao Niu, Ren Ren, Fred Wang, Leon Tolbert, Benjamin Blalock, Daniel Costinett and Benjamin Choi, *University of Tennessee, United States*

P9306 | Impact of Non-Linear Commutation Delay on the Performance of Inductor Current Estimation Techniques [#18851]

Rajat Channappanavar and Santanu Mishra, *Indian Institute of Technology Kanpur, India*

P9307 | ITER NBI DC-1MV Ultrahigh Voltage Rectifier [#18083]

Akeshi Takahashi, Tanaka Toshiaki, Kohei Yamaguchi, Hiroyuki Fujita, Yuki Hiranuma, Satoshi Ichimura, Kazuhiro Watanabe, Mieko Kashiwagi, Tetsuya Maejima and Hiroyuki Tobarai, *Hitachi, Ltd., Japan; Quantum and Radiological Science and Technology, Japan*

P9308 | Probability Analysis Of of Events in Power Electronic Converters [#18252]

Shrivatsal Sharma, Jun Kikuchi, Alfredo Munoz, Elaine Yu and Mike Degner, *Mahindra Electric Mobility Limited, India; Ford Motor Company, United States*

P9309 | Analysis of Soft-Switching Performance for a DC-DC Dual Active Bridge Converter with Randomly Varying Loads [#18622]

Jacob Mueller and Jonathan Kimball, *Sandia National Laboratories, United States; Missouri University of Science and Technology, United States*

S94 | Switched Reluctance, Flux Switching, Axial Flux Machines

Room: Exhibit Hall A

Chairs: Hussain Hussain; Rakib Islam

P9501 | Torque Quality Improvement of an Open-End Winding PMSM [#19128]

Nick Hunter, Tom Cox, Pericle Zanchetta, Shafiq Ahmed Odhano and Luca Rovere, *The University Of Nottingham, United Kingdom; The University of Nottingham, United Kingdom*

P9502 | A Study on the Axial Leakage Magnetic Flux According to the Rotor Structure in Spoke Type Permanent Magnet Synchronous Motor [#19333]

Sung Gu Lee, Jaenam Bae and Won-ho Kim, *Busan University of Foreign Studies, Korea (South); Dongyang mirae University, Korea (South); Gachon University, Korea (South)*

P9503 | Hybrid Excitation Flux Switching Motor with Permanent Magnet Placed at Middle of Field Coil Slots Employing High Filling Factor Windings [#19465]

Takeshi Okada, Hiroaki Matsumori, Takashi Kosaka and Nobuyuki Matsui, *Nagoya Institute of Technology, Japan*

P9504 | Design of a Direct Drive Permanent Magnet Vernier Generator for a Wind Turbine System [#18640]

Byungtaek Kim, *Kunsan National University, Korea (South)*

P9505 | A Comparative Study on Nine- and Twelve-Phase Flux-Switching Permanent-Magnet Wind Generators [#18278]

Lingyun Shao, Wei Hua, Feng Li, Juliette Soulard, Z. Q. Zhu, Zhongze Wu and Ming Cheng, *EE, Southeast University, China; WMG, The University of Warwick, United Kingdom; EMD, The University of Sheffield, United Kingdom*

P9506 | An Efficient Multi-Objective Bayesian Optimization Approach for Automated Analytical Design of Switched Reluctance Machines [#19548]

Shen Zhang, Sufe Li, Ronald G. Harley and Thomas G. Habetler, *Georgia Institute of Technology, United States*

P9507 | Visualization and Data Mining of Multi-Objective Electric Machine Optimizations with Self-Organizing Maps: A Case Study on Switched Reluctance Machines [#19507]

Shen Zhang, Sufe Li, Ronald G. Harley and Thomas G. Habetler, *Georgia Institute of Technology, United States*

S95 | Materials, Losses, Thermal, Model and Analysis of Electrical Machine

Room: Exhibit Hall A

Chairs: Gerd Bramerdorfer; Xu Yang

P9701 | Additive Manufacturing of High Performance Ferromagnetic Materials [#19163]

Thang Pham, Truong Do, Patrick Kwon and Shanelle Foster, *Michigan State University, United States*

P9702 | An Accurate Iron Loss Analysis Method based on Finite Element Analysis considering Dynamic Anomalous Loss [#18674]

Katsuyuki Narita, Hiroyuki Sano, Takashi Yamada, Ryosuke Akaki and Masahiro Aoyama, *JSOL Corporation, Japan; SUZUKI Motor Corporation, Japan; Shizuoka University, Japan*

P9703 | Estimation of PM Machine Efficiency Maps From Limited Experimental Data [#18855]

Kahourzade Solmaz, Mahmoudi Amin, Soong Wen, Ertugrul Nesimi and Pellegrino Gianmario, *The University of Adelaide, Australia; Flinders University, Australia; Politecnico di Torino, Italy*

P9704 | A Combined Thermal Analysis of an Integrated Six-Phase Motor Drive System [#19410]

Cong Wang, Dawei Li, Ronghai Qu, Xinggang Fan, Wubin Kong, Haiyang Fang, Zihan Gao and Peng Yan, *Huazhong University of Science and Technology, China*

P9705 | Losses Analysis and Experiment of Fractional-Slot Concentrated-Winding Axial Flux PMSM for EV Applications [#18030]

Qixu Chen, Deliang Liang, Shaofeng Jia, Qiji Ze and Yibin Liu, *Xi'an Jiaotong University, China*

P9706 | Improved Analytical Calculation of High Frequency Winding Losses in Planar Inductors [#18415]

Xiaohui Wang, Li Wang, Ling Mao and Yaojia Zhang, *Nanjing University of Aeronautics and Astronautics, China*

P9707 | Iron Loss Measurements of Non-Oriented Electrical Steels at Elevated Magnetic Polarization Values: Comparison of Calorimetric and Field-Metric Methods [#18922]

Sigrid Jacobs, Lode Vandenbossche, Vinicius Araujo Rabello Landeira and Emmanuel Attrazic, *ArcelorMittal, Belgium; Arcelormittal, Belgium*

P9708 | Analytical Modelling of Helical Cooling Channels Embedded in Stator Laminations of Electric Machines [#18592]

Chenjie Lin, Colin Tschida and Rajib Mikail, *ABB, United States*

P9709 | Efficiency Improvement of a Double-Stator Permanent Magnet Vernier Machine for Direct-Drive Robotics [#18428]

Jincheng Yu, Chunhua Liu, Yixiao Luo, Xueqing Wang and Zheng Wang, *City University of Hong Kong, Hong Kong; Southeast University, China*

P9710 | Cogging Torque Suppression in Flux-Switching Permanent Magnet Machines by Superposition of Single Rotor Tooth [#18056]

Xiaofeng Zhu and Wei Hua, *Southeast University, China*

P9711 | Design Method of Homopolar Inductor Alternator Based on 2-D Equivalent Model [#18710]

Jiangtao Yang, Caiyong Ye, Yuan Zhou, Wei Xu, Yi Li and Fei Xiong, *Huazhong University of Science and Technology, China*

P9712 | Closed-Form Solution for the Slot Leakage Inductance of Tooth Coil Windings Permanent Magnet Machines [#18683]

Werner Jara, Carlos Madariaga, Juan Tapia, Pia Lindh, Juha Pyrhonen and Javier Riedemann, *Pontificia Universidad Catolica de Valparaiso, Chile; University of Concepcion, Chile; Lappeenranta University of Technology, Finland*

P9713 | Analytical Sizing of Radial Flux Hybrid Excitation Synchronous Machines [#19428]

Antonio Di Gioia, Ian P. Brown and Fabio Giulii Capponi, *Illinois Institute of Technology, United States; University of Rome "La Sapienza", Italy*

P9714 | Performance Evaluation of Electromagnetic and Circuit Co-Simulation for LLC DC-DC Converter [#18360]

Kumpei Yoshikawa and Tetsuya Oshikata, *Shindengen Electric Manufacturing Co., Ltd., Japan*

S96 | High Speed and Bearingless Machines, Transportation Machines

Room: Exhibit Hall A

Chairs: Alireza Fatemi; Athanasios Karlis

P9901 | Experimental Results Passing Through Critical Speeds of Radial and Tilting Motions in a One-Axis Actively Positioned Single-Drive Bearingless Motor [#18234]

Hiroya Sugimoto and Akira Chiba, *Tokyo Institute of Technology, Japan*

P9902 | Analytical Approach to Design Hairpin Windings in High Performance Electric Vehicle Motors [#19024]

Grazia Berardi and Nicola Bianchi, *University of Padova, Italy*

P9903 | Design and Control for Synchronous Permanent Magnet Motor Drive System with Series Capacitor [#18584]

Hyeon-gyu Choi and Jung-Ik Ha, *Seoul National University, Korea (South)*

P9904 | Optimal Design of 50kW Concentrated Winding Bearingless Motor [#19496]

Ye gu Kang and Eric Severson, *UW-Madison, WEMPEC, United States*

P9905 | Design of Five-phase Bearingless Permanent Magnet Assisted Synchronous Reluctance Motor for High Speed Applications [#19654]

Md Zakirul Islam, Arafat Akm and Seungdeog Choi, *University of Akron, United States; Cummins Inc, United States; Mississippi State University, United States*

P9906 | Modeling and Losses Analysis of 160 kW 30000 rpm Bearingless Surface Permanent Magnet Motor [#18891]

Daria Kepsu, Rafal Jastrzebski and Olli Pyrhonen, *Lappeenranta University of Technology, Finland*

P9907 | A Consequent-Pole Five-Phase Fault-Tolerant Permanent-Magnet Synchronous Machine for Electric Vehicles [#18339]

Yi Sui, Zuosheng Yin, Luming Cheng, Jiaqi Liu, Ping Zheng and Jie Zhao, *Harbin Institute of Technology, China*

P9908 | Scaling Study of High Frequency Machine for Electric Aircraft Propulsion [#19102]

Andy Yoon and Kiruba Haran, *University of Illinois at Urbana Champaign, United States*

P9909 | Saliency-enhanced Spoke-type Rotor Geometry for Permanent Magnet Volume Reduction in Hybrid and Electric Vehicle Motors [#19060]

Giorgio Pietrini, Alessandro Soldati, Carlo Concari and Nicola Bianchi, *University of Parma, Italy; University of Padova, Italy*

P9910 | DC-Link Voltage Design of High-Bandwidth Motor Emulator for Interior Permanent-Magnet Synchronous Motors [#19550]

Yoon-Ro Lee, Yong-Cheol Kwon and Seung-Ki Sul, *Seoul National University, Korea (South)*

S97 | Induction, Sync-Rel, and SR Machine Drives

Room: Exhibit Hall A

Chairs: David Diaz Reigosa; Luca Zarri

P10101 | A Saturation Model of the Synchronous Reluctance Motor and its Identification by Genetic Algorithms [#18478]

Angelo Accetta, Maurizio Cirrincione, Marcello Pucci and Antonino Sferlazza, *INM-CNR, Italy; University of the South Pacific (USP), Fiji; University of Palermo, Italy*

P10102 | A Space-Vector State Dynamic Model of the Synchronous Reluctance Motor Including Self and Cross-Saturation Effects and its Parameters Estimation [#18479]

Angelo Accetta, Maurizio Cirrincione, Marcello Pucci and Antonino Sferlazza, *INM-CNR, Italy; University of the South Pacific (USP), Fiji; University of Palermo, Italy*

P10103 | Switched Brushless Doubly-Fed Reluctance Machine Drive for Wide-Speed Range Applications [#18794]

Shivang Agrawal and Arijit Banerjee, *University of Illinois Urbana Champaign, United States*

P10104 | A Novel Converter Control Strategy For a DFIM-Based Pumped Storage System in an Islanded Microgrid Under Fault Conditions [#18525]

Zijun Chen, Pinjia Zhang and Weizhi Hu, *Tsinghua University, China; Northeast Electric Power University, China*

P10105 | Restart Strategy for Synchronous Reluctance Machine Driving a High Inertia Load [#18541]

Kibok Lee, Sara Ahmed and Srdjan Lukic, *Incheon National University, Korea (South); ABB, United States; North Carolina State University, United States*

P10106 | Small-Signal Modeling and Speed Controller design for Switched Reluctance Motor Drives [#18626]

Qingqing Ma, El-refaie Ayman and Jih-Sheng Lai, *Marquette University, United States; Virginia Tech, United States*

P10107 | Improved Control Scheme for Unbalanced Stand-alone BDFIG Using Dead Beat Control Method [#18705]

Jianping Gao, Wei Xu, Yi Liu and Kailliang Yu, *State Key Laboratory of Advanced Electromagnetic, China*

P10108 | A Novel Dual Output Buck-Boost DC-DC Converter for Solar PV Energized SRM Driven Irrigation Pump [#18440]

Anjaneer Kumar Mishra and Bhim Singh, *IIT DELHI, India*

P10109 | Anti-Disturbance Model Predictive Torque Control of High-Altitude Ventilator Induction Machine with Extend MTPA Operation [#18779]

Liming Yan, Manfeng Dou and Zhiguang Hua, *Northwestern Polytechnical University, China*

P10110 | DC-Link Current Sensor Extension for Dead-Beat Direct Torque and Flux Control of Non-Salient Electric Machines [#18796]

Tomas Sadilek and Robert Lorenz, *GE Global Research, United States; WEMPEC – University of Wisconsin, Madison, United States*

P10111 | A Multi-Pulse AC-DC Converter Fed Multi-Level Inverter for Power Quality Improvement in VCIMD [#18654]

Piyush Kant and Bhim Singh, *Indian Institute of Technology Delhi, India*

P10112 | Power Factor Improvement Control Strategy for Six-Phase DC-Biased Vernier Reluctance Machines Based on Three-Dimensional Current Distribution [#18159]

Zixiang Yu, Wubin Kong, Dawei Li and Ronghai Qu, *Huazhong university of science and technology, China; Huazhong University of Science and Technology, China*

P10113 | Wind Energy Conversion System Based on DFIG With Three-Phase Series Active Filter and Single DC-Link [#19231]

Italo Andre Cavalcanti de Oliveira, Cursino Brandao Jacobina, Nady Rocha and Phelipe Leal Serafim Rodrigues, *UFCG, Brazil; UFPB, Brazil*

P10114 | Improved Model Predictive Control Method for Two Induction Motor Fed by Five-leg Inverter System [#19337]

Young-Seol Lim, June-Seok Lee and Kyo-Beum Lee, *Ajou University, Korea (South); Korea Railroad Research Institute, Korea (South)*

P10115 | Extended Speed Current Profiling Algorithm for Low Torque Ripple SRM using Model Predictive Control [#19635]

Siddharth Mehta, Md Ashfanor Kabir and Iqbal Husain, *North Carolina State University, United States; ABB US Corporate Research Center, United States*

S98 | Assorted Issues In Electric Drives

Room: Exhibit Hall A

Chairs: David Diaz Reigosa; Luca Zarri

P10301 | Scaling Gain Compensation Method for Current Measurement of Motor Drive Applications Under Locked-Rotor Condition Considering Inequality of Each phase Resistances [#18641]

Min-Sik Yoo, Young-Doo Yoon, Byung-Moon Han, Eun-Jea Park and Yun-Young Choi, *Hanyang University, Korea, Republic of; Myongji University, Korea, Republic of; Hyundai Elevator Co., Republic of Korea*

P10302 | Electrostatic Machine Drive Using Complex Vector Voltage Regulation with a Current Source Inverter Platform [#18785]

Aditya Ghule, Peter Killeen and Daniel Ludois, *University of Wisconsin – Madison, United States; University of Wisconsin -Madison, United States*

P10303 | Interaction between Micro-Grid Generators and Active Front End Converters: Modeling, Analysis and Solutions [#19248]

Gary Skibinski, Zhijun Liu, Michael Loth, David Dahl, Dominic Sosnowski, Adam Davis and Benjamin Sykora, *Rockwell Automation, United States; Trane Commercial HVAC, United States*

P10304 | Dyne-Less Test Method for Adjustable Speed Drive [#18537]

Yogesh Patel and Lixiang Wei, *Rockwell Automation, United States*

P10305 | A Variable Power Factor High Power Testbed for Traction Inverter Using Back-to-Back Connection [#18358]

Yukun Luo, Li Yang, Juhamatti Korhonen, Wensong Yu and Iqbal Husain, *North Carolina State University, United States; Lappeenranta University of Technology, Finland*

P10306 | Deriving State Block Diagrams that Correctly Model Hand-Code Implementation – Correcting the Enhanced Luenberger Style Motion Observer as an Example [#18433]

Caleb Secrest, David Ochs and Brent Gagas, *General Motors, United States*

P10307 | Design Considerations of Fault-Tolerant Electro-mechanical Actuator Systems for More Electric Aircraft (MEA) [#18663]

Shaohong Zhu, Tom Cox, Xu Zeyuan, Chris Gerada and Li Chen, *University of Nottingham, United Kingdom*

P10308 | A Novel 4-IN-1 Variable Frequency Drive Topology [#18455]

Mahesh Swamy, *Yaskawa America, Inc., United States*

P10309 | Effect of Position Measurement Delay on the Performance of Electrical Machines [#19612]

Anant Singh, Tomy Sebastian, Ramakrishnan Raja and Abraham Gebregergis, *Halla Mechatronics, United States*

P10310 | Dynamic DC-Link Over-Voltage Mitigation Method in Electrolytic Capacitor-less Adjustable Speed Drive Systems [#18706]

Zhentian Qian, Wenxi Yao and Kevin Lee, *Zhejiang University, China; Eaton Corporation, United States*

S99 | Converter Design 2

Room: Exhibit Hall A

Chairs: Babak Parkhideh; Montie Vitorino

P10501 | Active Variable Gate Drive for Suppressing IGBT Collector Current Overshoot [#18384]

Yan Pan, Rui Wang, Lin Liang, Jinyuan Li, Lubin Han, Guoqiang Tan and Yu Chen, *Global Energy Interconnection Research Institute, China; Huazhong University of Science and Technology, China*

P10502 | Analysis on the Commutation Loop Inductance of Different Cathode Regions in GCT Wafer [#18456]

Jiapeng Liu, Wenpeng Zhou, Chaoqun Xu, Gang Lyu and Rong Zeng, *Tsinghua University, China*

P10503 | Determining the Minimal Decoupling Capacitor in a High-Speed Switching Cell Using Optimization [#18502]

Andressa Nakahata Medrado, Jean-Luc Schanen, Pierre-Olivier Jeannin, Jean-Michel Guichon, Guillaume Desportes and Emmanuel Batista, *G2ELab – Alstom, France; Univ. Grenoble Alpes, CNRS, Grenoble INP, G2ELab, France; Alstom, France*

P10504 | A Gate Driver-Based Approach to Improving the Current Density in a Power Module by Equalizing the Individual Die Temperatures [#18624]

Jeffrey Ewanchuk, Julio Brandelero and Stefan Mollov, *Mitsubishi Electric Research Centre Europe, France*

P10505 | Integrated Motor-Inverter Power Module for Electric Compressor (E-Compressor) in 48V Mild Hybrid Vehicles [#18856]

Jihwan Seong, Sang Won Yoon, Jangmuk Lim, Min-ki Kim, Jaejin Jeon, Semin Park, Hyunkyu Choi, Yuchoel Park, Pilkyoung Oh, Sang Min Kim and Taesuk Kwon, *Hanyang University, Korea, Republic of; Hyundai Mobis Co., Ltd., Korea, Republic of*

P10506 | Comparative Evaluation of Kelvin Connection for Current Sharing of Multi-Chip Power Modules [#19581]

Zheng Zeng, Xiaoling Li, Xin Zhang and Lin Cao, *Nanyang Technological University, Singapore; Chongqing University, China; CRRC Yongji Electric Co., Ltd., China*

P10507 | An Advanced Design of Power Module with EMI Reduction Method [#19672]

Xiliang Chen, Wenjie Chen, Yu Ren, Liang Qiao and Xu Yang, *Xi'an Jiaotong University, China*

P10508 | Analysis on Ultra-fast Switching of SiC MOSFETs for Megahertz Applications enabled by 3D Package and Embedded Components [#19698]

Xin Zhao, Liqi Zhang, Yang Lei and Alex Q. Huang, *University of Texas at Austin, United States*

P10509 | Test Fixture to Measure the Saturation Characteristics of Coupled Multi-Winding Inductors [#19489]

Marzieh Karami, Xuechao Wang and Rangarajan Tallam, *Rockwell Automation, United States*

P10510 | Calorimetric Power-Loss Measurement of a High-Power Film Capacitor with Actual Ripple Current Generated by a PWM Inverter [#19604]

Kazunori Hasegawa and Ichiro Omura, *Kyushu Institute of Technology, Japan*

P10511 | Electro-Thermal Limited Switching Frequency for Parallel Diodes [#18427]

Xiaoling Li, Huaping Jiang, Borong Hu, Hao Chen, Zheng Zeng, Li Ran and Philip Mawby, *Chongqing University, China; Dynex Semiconductor Ltd, United Kingdom; Chongqing University; The University of Warwick, China; University of Arkansas, United States; the University of Warwick, United Kingdom*

P10512 | Thermal Monitoring of Power Electronic Modules Using Device Self-Sensing [#18821]

Christoph H. van der Broeck, Timothy Polom, Robert D. Lorenz and Rik W. De Doncker, *ISEA, RWTH Aachen University, Germany; WEMPEC, UW Madison, United States*

P3904 | Transistor-Clamped Multilevel H-Bridge Inverter in Si and SiC Hybrid Configuration for High-Efficiency Photovoltaic Applications [#18844]

Yibin Zhang, Jiangbiao He, Sanjeevikumar Padmanaban and Dan Ionel, *University of Kentucky, United States; GE Global Research, United States; Aalborg University, Denmark*

S100 | LED Lighting

Room: Exhibit Hall A

Chairs: Marcos Alonso; Henry Chung

P10701 | A Multi-Output AC/DC Converter for LED Grow Lights [#19753]

Rahil Samani, Dawood Shekari, Hamid Pahlevani and Majid Pahlevani, *University of Calgary, Canada; Harvard Medical School, United States*

P10702 | A Modular Multi-channel Constant-Current LED Driver with High Frequency AC Square Voltage Bus [#18207]

Qingqing He, Quanming Luo, Chi Cao, Pengju Sun, Luowei Zhou and Yuqi Wei, *Chongqing University, China*

P10703 | High-Efficiency Multiple-String Linear LED Driver with Genetic Algorithm for Low Power Application [#18031]

Na Ren, Xiaofeng Lyu, Dong Cao, Zheng Zuo and Ruigang Li, *University of California, Los Angeles, United States; North Dakota State University, United States; AZ Power Inc., United States*

P10704 | A Remotely Control Dimming System for LED Lamps with Power Factor Correction [#18752]

Radwa M. Abdalaal, Carl Ngai Man Ho, Carson K. Leung, Ohin Nibrasul I. and Syed Habib Ur Rehman, *University of Manitoba, Canada*

P10705 | An Input-Adaptive Multi-Segmented LED Driver for Wide AC Input Applications [#18110]

Yi Chen, Degang Zhong and Yurong Nan, *Zhejiang University of Technology, China*

P10706 | Design a Modified Bi-Directional Converter for Solar LED Lighting System [#18889]

Yiwang Wang, Xiaogao Chen, Houjun Tang, Yong Yang, Huiqing Wen and Yan Lin, *Suzhou Vocational University, China; wuxi solartale solar pv Technology Co.,Ltd, China; Shanghai Jiaotong University, China; Soochow University, China; Xian Jiaotong-Liverpool University, China; Suzhou LUXEN Solar Energy Co.,Ltd, China*

P10707 | A Low Cost AC Direct LED Driver with Reduced Flicker Using Triac [#19377]

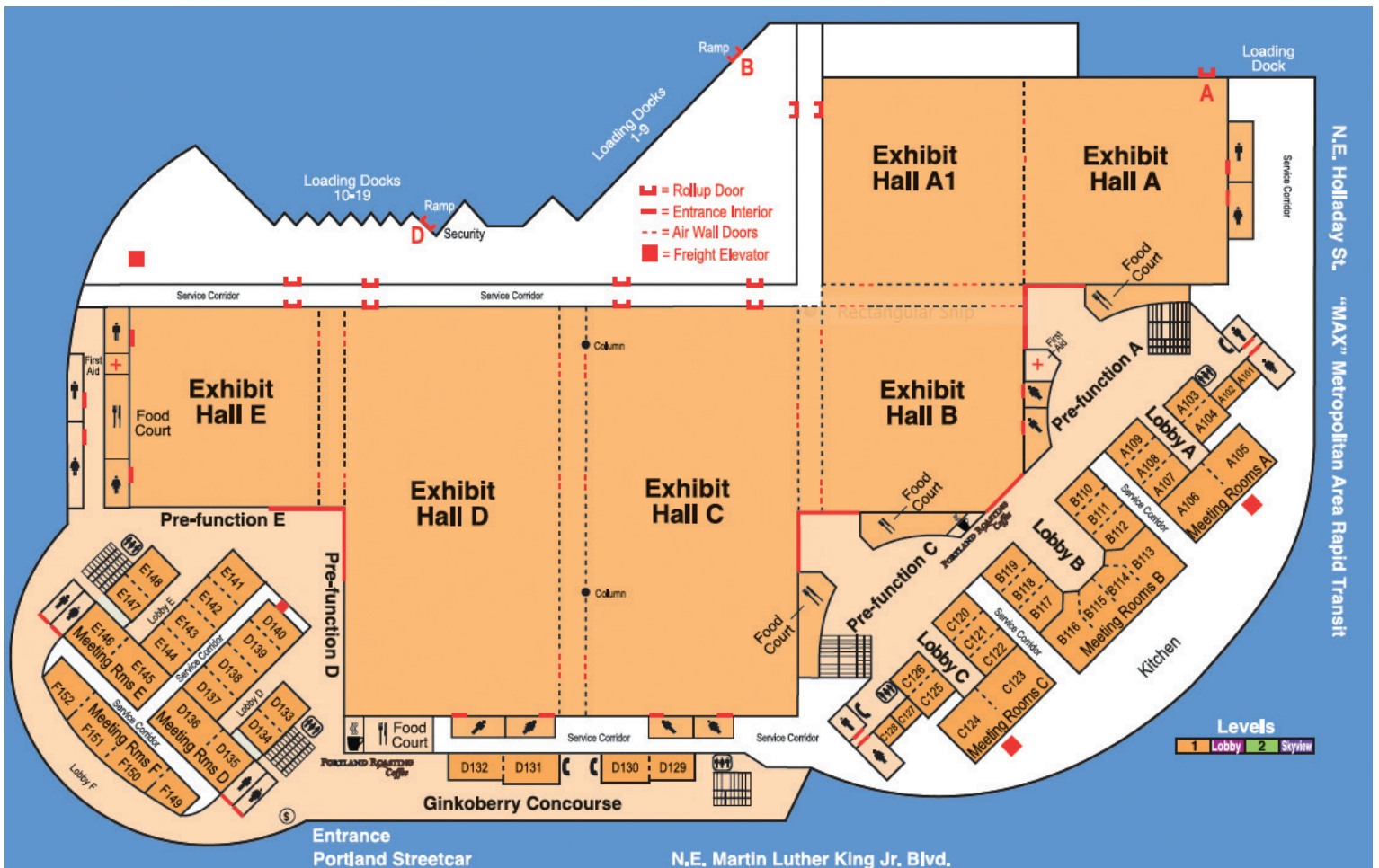
Yongjun Li, Jaeduk Han and Seth Sander, *UC Berkeley, United States*

P10708 | A 14-W 94%-Efficient Hybrid DC-DC Converter with Advanced Bootstrap Gate Drivers for Smart Home LED Applications [#19508]

Loan Pham-Nguyen, Hanh-Phuc Le, Van-Quyet Nguyen, Duc-Manh Nguyen, Huy-Dung Han and Kim-Hoang Nguyen, *Hanoi University of Science and Technology, Viet Nam; University of Colorado Boulder, United States, United States*

CONVENTION CENTER FLOOR PLAN

Level 1



Level 2

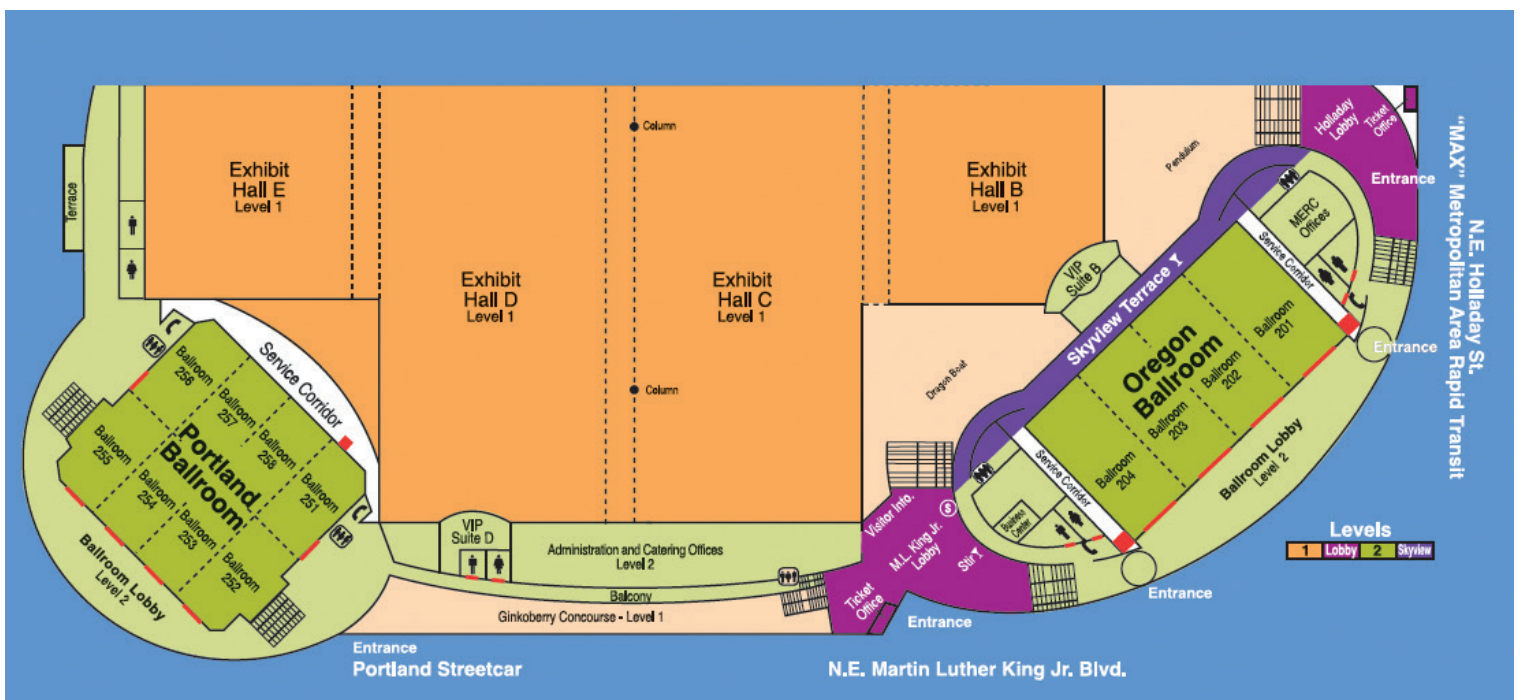
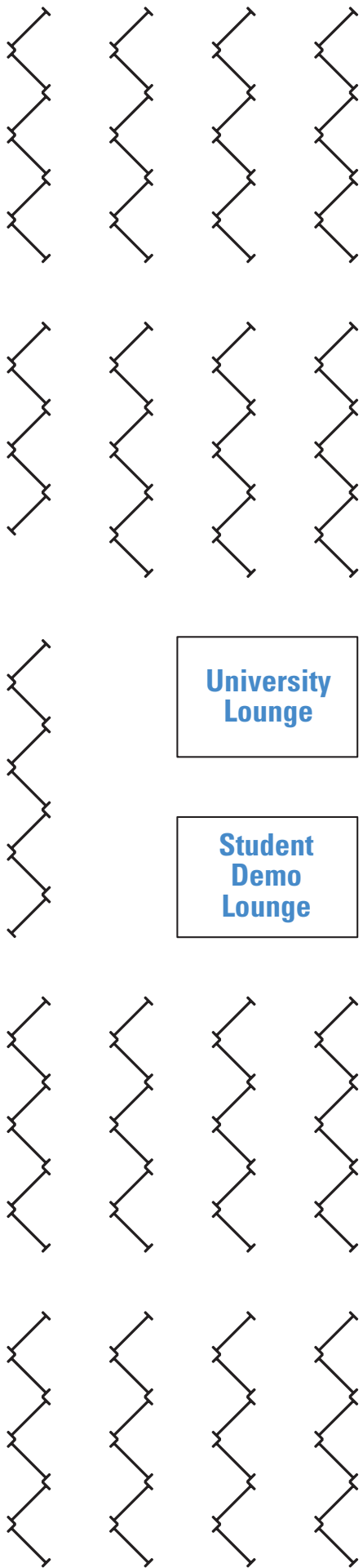


EXHIBIT HALL FLOOR PLAN



Stetson

615	613	611
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607	605	603	601
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614	612	610
515	513	511

606	604	602	600
507	505	503	501

University Lounge

Cyber Lounge & Product and Services Theater

506	504	502	500
405	403	401	

Student Demo Lounge

404	402	400
305	303	301

314	312	310
213	211	

306	304	302	300
207	203	201	

214	212	210
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206	204	202	200
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Exhibitors Celebrating 10 Years!

- 5S Components..... #405
- How2Power..... #303
- Opal-RT..... #404
- Plexim Inc..... #310
- Proto Lam LLC..... #306

PRODUCTS AND SERVICES SESSIONS

These half-hour, industry-driven sessions, provide an in-depth look off the show floor from our exhibitors, showcasing their innovative products and services.

Monday, September 24 | Room?

5:00PM – 5:30PM

Accelerate Motor Test and Development Up To 100X

Speaker: Mike Hoyer, *Applications/Marketing Engineer*

5:00PM – 5:30PM | Text Characterizing electric motors and drives, especially for electric and hybrid vehicles is a very important topic in many engineering labs worldwide. Every lab has unique interests to test and validate experiments using multiple pieces of measurement equipment from different suppliers. While these systems work, they often have high levels of complexity and operate much slower than an optimized system. This presentation proposes a solution specifically designed for motor and drive testing consolidating many systems into one allowing for rapid efficiency motor mapping and custom advanced real-time analysis significantly boosting productivity, capability and research and development by many days.

Monday, September 24 | Room?

6:20PM – 6:50PM

Using the Teledyne LeCroy Motor Drive Analyzer to Optimize Motor/Drive Performance During a Single Semiconductor Device Switching Period

Speaker: Ken Johnson, *Director of Marketing, Product Architect*

6:20PM – 6:50PM | Optimization of control systems and drive performance requires calculation of power activity during very short time periods that correspond to the power semiconductor device switching period. The Teledyne LeCroy Motor Drive Analyzer (MDA) provides such power analysis with correlation of power activities to typical control system signals. This session will showcase testing done using the MDA for variable flux electric machine analysis, volt-second sensing control analysis in a Deadbeat-Direct Torque and Flux (Motor) Control (DB-DTFC) and comparison of dynamic losses for various DTFC and Vector field-oriented controlled (FOC) surface and interior permanent magnet motors (SPM and IPM).

Tuesday, September 25 | Room?

11:00AM – 11:30AM

Challenges and Testing Techniques for the Next Generation of Fast-Switching, GaN & SiC (WBG) Based Power Converters

Speaker: Seshank Malap, *Application Engineer*

11:00AM – 11:30AM | This talk will discuss how the new power devices (SiC and GaN) perform compared to the more mature cousins (MOSFETs & IGBTs), and what precautions engineers and scientists should take to optimize their performance. We will also discuss the best practices of dealing with sensitive parasitic, effects of inductance and capacitance on testing data, and how best to mitigate those effects. Lastly we will consider the best ways of testing component and system losses to get the highest efficiency possible from the power converter designs. These principles also apply to traditional, fast switching power devices including MOSFETs and IGBTs.

Tuesday, September 24 | Room?

11:40AM – 12:10PM

Vitrek – High Voltage Test & Measurement

Speaker: Chad Clark, *Sales Manager*

11:40AM – 12:10PM | Vitrek will present details about three test & measurement products:

- a) PA900 Precision Harmonic Power Analyzer, a high performance economically-priced power analyzer that delivers multi-channel, high-accuracy, wideband performance.
- b) 4700 Precision High Voltage Meter offering the highest level of measurement accuracy, featuring a color touch-screen user interface. The 4700 measures up to 10KV DC or rms AC directly and with available HV SmartProbes, the measurement range can be extended to 35KV, 70KV, 100KV and 150KV.

STUDENT DEMONSTRATIONS

Monday, September 24

4:30PM – 7:00PM

Tuesday, September 25

2:30PM – 5:00PM

Location: Student Demonstration Lounge, Exhibit Hall A

Student Demonstrations provide an opportunity for students from various universities and countries to showcase their emerging technology research outcomes and interact with academia and industry.

A Misalignment Tolerant Wireless EV Charging System

Demonstrator: Wenwei Victor Wang, *University of Auckland, New Zealand*

6.78MHz Omnidirectional Wireless Charging Bowl for Portable Devices Application

Demonstrator: Junjie Feng, *Virginia Tech, United States*

27.12 MHz Real-Time Smart-Controlled Bi-Directional Wireless Power Transfer with Current-Mode Class D Converters

Demonstrator: Xin Zan, *University of Michigan, Ann Arbor, United States*

Master-Slave Control of Parallel-Operated Interfacing Inverters Based on Digital Wireless Communication

Demonstrator: Dong Li, *University of Manitoba, Canada*

Design for Reliability and Robustness (DfR2) Tool Platform for Power Electronic Systems

Demonstrator: Vernica, *Aalborg University, Denmark*

Hybrid PWM Scheme for Mitigating Zero-Crossing Distortion in Totem-Pole Bridgeless PFCHo

Demonstrators: Tin Tang, Chung Pui Tui, Wing-to Fan, Shun-cheung Yeung, *City University of Hong Kong, China*

Robust Compensation of Dead Time in Grid Connected Bridge Inverters

Demonstrator: Katelin Spence, *University of New Brunswick, Canada*

Critical-Mode-Based Soft-Switching Modulation for High-Frequency Three-Phase Bi-Directional AC/DC Converters

Demonstrator: Zhengrong Huang, *Virginia Tech, United States*

Energy Recycling SMPS Test Bench

Demonstrators: Aparna Tumkur, Sinan Al-Obaidi, *Texas A&M University, United States*

An Extremely Low-Cost Multi-Panel PV Emulator for Research and Education based on “Workbench”

Demonstrator: Sanchit Mishra, *University of Minnesota, United States*

High Frequency, Ultra Lightweight Motor Drive for Aviation Applications

Demonstrator: Christopher Barth, *University of Illinois at Urbana Champaign, United States*

High-Power-Density High-Efficiency Single-Stage Isolated 48V-to-1.8V Point-of-Load Converter Utilizing Integrated Magnetics

Demonstrator: Ashish Kumar, *University of Colorado Boulder, United States*

A 70kW High Density Inverter with Hybrid Si/GaN Design and Novel Internal-Parallelization Topology

Demonstrator: Zhongyi Quan, *University of Alberta, Canada*

Five-Level GaN Envelope Amplifier (500W 400kHz)

Demonstrator: Chao Wang, *Tsinghua University, China*

All GaN High-Frequency and High-Density Power Supply Unit

Demonstrator: Tianxiang Chen, *University of Texas at Austin, United States*

EXHIBITOR LISTING

Alphabetical Listing by Exhibitor Name

Company Name	Booth Number
5S Components Inc.	405
Abstract Power Electronics	513
Altair	505
Cambridge University Press	402
DEWESoft LLC	504
EGSTON Power Electronics GmbH	610
ELANTAS PDG, Inc.	615
Electronic Concepts, Inc	501
GaN Systems	312
Ganpower Intl Inc	301
GE Global Research	206
General Motors	606
GMW Associates	403
HBM Test and Measurement	500
Hioki USA	400
How2Power	303
HVR Advanced Power Components Inc.	314
IEEE Energy Conversion Congress and Expo (ECCE)	212
IEEE Industry Applications Society (IAS)	214
IEEE Power Electronics Society (PELS)	203
Infineon Technologies Americas Corp.	213
MagneForce	515
MathWorks	207
Mersen	211
Mesago PCIM GmbH	302
Motor Design Ltd.	304
OPAL RT	404
Payton America Inc	511
Plexim, Inc	310
Powersim Inc.	305
Powersys Inc.	604
Proto Lam, LLC	306
Tektronix Inc.	401
Teledyne LeCroy	210
Typhoon HIL	507
Vitrek-High Voltage Test & Measurement	202
Wiley	502
Wolfspeed	300
Wolong Electric Group Co. Ltd.	200
Zes Zimmer	506

Numerical Listing by Booth Number

Company Name	Booth Number
Wolong Electric Group Co. Ltd.	200
Vitrek-High Voltage Test & Measurement	202
IEEE Power Electronics Society (PELS)	203
GE Global Research	206
MathWorks	207
Teledyne LeCroy	210
Mersen	211
IEEE Energy Conversion Congress and Expo (ECCE)	212
Infineon Technologies Americas Corp.	213
IEEE Industry Applications Society (IAS)	214
Wolfspeed	300
Ganpower Intl Inc.	301
Mesago PCIM GmbH	302
How2Power	303
Motor Design Ltd.	304
Powersim Inc.	305
Proto Lam, LLC	306
Plexim, Inc	310
GaN Systems	312
HVR Advanced Power Components Inc.	314
Hioki USA	400
Tektronix Inc.	401
Cambridge University Press	402
GMW Associates	403
OPAL RT	404
5S Components Inc.	405
HBM Test and Measurement	500
Electronic Concepts, Inc	501
Wiley	502
DEWESoft LLC	504
Altair	505
Zes Zimmer	506
Typhoon HIL	507
Payton America Inc	511
Abstract Power Electronics	513
MagneForce	515
Powersys Inc.	604
General Motors	606
EGSTON Power Electronics GmbH	610
ELANTAS PDG, Inc.	615



IEEE ENERGY CONVERSION CONGRESS & EXPO BALTIMORE, MD ▲ SEPT. 29 - OCT. 3

IMPORTANT DATES

January 15, 2019

Digest submission

May 1, 2019

Author notification

June 30, 2019

Final papers with IEEE copyright forms

Call for Papers



General Chair

Yan-Fei Liu

Queen's University, Canada

ECCE 2019 Technical Program

Co-Chairs

Brad Lehman

Northeastern University, USA

Bulent Sarlioglu

University of Wisconsin-Madison, USA

Yilmaz Sozer

University of Akron, USA

Jian Sun

Rensselaer Polytechnic Institute, USA

The Eleventh Annual IEEE Energy Conversion Congress and Exposition (ECCE 2019) will be held in Baltimore, Maryland, USA on September 29 - October 3, 2019. ECCE is a pivotal international event on energy conversion. ECCE 2019 will feature both industry-driven and application-oriented technical sessions, as well as expositions. The conference will bring together practicing engineers, researchers and other professionals for interactive and multidisciplinary discussions on the latest advances in various areas related to energy conversion.

Technical papers are solicited on any subject pertaining to the scope of the conference that includes, but is not limited to, the following major topics:

Energy Conversion Systems and Applications

- ▶ Renewable and alternative energy
- ▶ Smart grids, micro-grids, and utility applications
- ▶ Electrical energy storage
- ▶ Energy conversion for Information Technology and communication systems
- ▶ Energy harvesting
- ▶ Energy efficiency for residential, commercial and industrial applications
- ▶ Wireless power transfer (WPT)
- ▶ Lighting applications and displays
- ▶ Transportation electrification
- ▶ High power/voltage power conversion
- ▶ High voltage isolation and lightning strike protection

Component, Converter and Subsystem Technologies

- ▶ Power electronic devices (Si and wide band-gap) and applications
- ▶ Power conversion topologies, modulation, and control
- ▶ Modeling and control of components, converters and systems
- ▶ Rotating/linear electro-mechanical devices and drive systems
- ▶ Passive components and materials
- ▶ Power electronic packaging, integration, and advanced manufacturing
- ▶ Reliability, diagnostics, prognostics, and health management
- ▶ EMI and EMC
- ▶ Thermal management, advanced cooling technologies

Digests Submission: Prospective authors are requested to submit a digest no longer than five (5) pages, single column, single spaced, that summarizes the proposed paper. The digest should include key equations, figures, tables and references as appropriate, but no author names or affiliations. **Digests not conforming to these requirements will be rejected without review.** The digests must clearly state the objectives of the work, its significance in advancing the state of the art, and the methods and specific results in sufficient detail. All digests will go through a double-blind peer review process to ensure confidentiality and fair review. Please refer to the conference website for a detailed list of technical topics and the digest submission method. Questions can be directed to the TPC Chairs via email at ecce2019tpc@gmail.com.

www.ieee-ecce.org/2019



IEEE ENERGY CONVERSION CONGRESS & EXPO BALTIMORE, MD ▲ SEPT. 29 - OCT. 3

IMPORTANT DATES

February 17, 2019

Submission of completed one-page Tutorial Proposal Form

March 27, 2019

Notification of acceptance.

June 30, 2019

Full Tutorial materials due

Call for Tutorials



General Chair

Yan-Fei Liu
Queen's University, Canada

ECCE 2019 Technical Program Co-Chairs

Brad Lehman
Northeastern University, USA

Bulent Sarlioglu
University of Wisconsin-Madison, USA

Yilmaz Sozer
University of Akron, USA

Jian Sun
Rensselaer Polytechnic Institute, USA

The Eleventh Annual IEEE Energy Conversion Congress and Exposition (ECCE 2019) will be held in Baltimore, Maryland, USA on September 29 - October 3, 2019. The conference will bring together practicing engineers, researchers and other professionals for interactive discussions on the latest advances in various areas related to energy conversion. ECCE has grown to become the foremost technical conference and exposition for people looking for energy conversion solutions; solutions that are timely, practical, customer focused, market sensitive, and cost effective. Engineers from throughout the energy conversion industry's broad spectrum come to ECCE specifically to take advantage of the concentrated brain trust assembled annually in one very special location to do business in a convivial and innovative atmosphere, a perfect blend of state of the art technical prowess and commercial opportunities under one roof.

The ECCE organizing committee invites proposals for half-day tutorials to be presented on Sunday, September 29, 2019. The organizing committee is particularly interested in tutorials that are of value to the practicing engineer, with an emphasis on solutions to practical problems. Tutorials are solicited on any subject pertaining to the scope of the conference that includes, but is not limited to, the major topics listed below.

Energy Conversion Systems and Applications

- ▶ Renewable and alternative energy
- ▶ Smart grids, micro-grids, and utility applications
- ▶ Electrical energy storage
- ▶ Energy conversion for Information Technology and communication systems
- ▶ Energy harvesting
- ▶ Energy efficiency for residential, commercial and industrial applications
- ▶ Wireless power transfer (WPT)
- ▶ Lighting applications and displays
- ▶ Transportation electrification
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Component, Converter and Subsystem Technologies

- ▶ Power electronic devices (Si and wide band-gap) and applications
- ▶ Power conversion topologies, modulation, and control
- ▶ Modeling and control of components, converters and systems
- ▶ Rotating/linear electro-mechanical devices and drive systems
- ▶ Passive components and materials
- ▶ Power electronic packaging, integration, and advanced manufacturing
- ▶ Reliability, diagnostics, prognostics, and health management
- ▶ EMI and EMC
- ▶ Thermal management, advanced cooling technologies

Tutorials accepted for presentation will receive one conference registration together with an honorarium for \$1000. Note that publication of a technical paper at the conference will still require a full paid registration.

Tutorial Proposal Submission Guidelines: Tutorial proposals should be submitted as a digest summarizing the content of the tutorial. **Please follow the attached tutorial proposal form as the tutorial submission guideline.** Questions can be directed to the TPC Chairs via email at ecce2019tpc@gmail.com.

www.ieee-ecce.org/2019

Baltimore, MD, USA – September 29 – October 3, 2010



IEEE ENERGY CONVERSION CONGRESS & EXPO BALTIMORE, MD ▲ SEPT. 29 - OCT. 3

Tutorial Proposal Form

1. Title of Tutorial

2. Abstract

(No more than 500 words. If the tutorial is accepted, this abstract will be published on the conference website, program, and proceedings)

3. Outline of Tutorial

(Outline would only define the topics and the subtopics that would be covered. No detailed descriptions should be included in the proposal)

4. Lead Instructor

(Name, affiliation, and contact information)

Name	Affiliation
<hr/>	<hr/>
Email	Phone
<hr/>	<hr/>

5. Other Instructor(s) if applicable

(Name, affiliation, and contact information)

Name	Affiliation
<hr/>	<hr/>
Email	Phone
<hr/>	<hr/>

6. Instructor Bios: ~150 Words

(Please provide a brief biography for each instructor, describing the qualifications for presenting the proposed tutorial, including the work and publications that are most relevant to the proposal)



IEEE ENERGY CONVERSION CONGRESS & EXPO BALTIMORE, MD ▲ SEPT. 29 - OCT. 3

IMPORTANT DATES

March 31, 2019

Proposal submissions deadline

May 1, 2019

Notification of session acceptance

Call for Special Sessions Organizers



General Chair

Yan-Fei Liu
Queen's University, Canada

ECCE 2019 Technical Program Co-Chairs

Brad Lehman
Northeastern University, USA

Bulent Sarlioglu
University of Wisconsin-Madison, USA

Yilmaz Sozer
University of Akron, USA

Jian Sun
Rensselaer Polytechnic Institute, USA

The Eleventh Annual IEEE Energy Conversion Congress and Exposition (ECCE 2019) will be held in Baltimore, Maryland, USA on September 29 - October 3, 2019. ECCE is a pivotal international event on energy conversion. ECCE 2019 will feature both industry-driven and application-oriented technical sessions, as well as industry expositions and seminars. The conference will bring together practicing engineers, researchers and other professionals for interactive and multidisciplinary discussions on the latest advances in various areas related to energy conversion. ECCE has grown to become the foremost technical conference and exposition around electrical and electromechanical energy conversion. It focuses on solutions that are industrially oriented. People from a broad spectrum of the energy conversion industry and academia gather yearly at ECCE to interact in a convivial and innovative atmosphere, a perfect blend of state of the art, technical prowess and commercial opportunities in one attractive location.

The ECCE organizing committee invites organizers interested in organizing Special Sessions. Such sessions consist of oral presentations only, without written papers and are strongly oriented towards the latest industrial interest, as well as the latest collaboration opportunities between industry and academia. Presentations may be of a more commercial nature than those related to the papers in the standard technical session, and the organization of the sessions are more malleable and could be in the form of panel discussions. Audience participation and open source brainstorming session on focused topics are welcomed. Papers presented in special sessions are not subject to peer review and will not be made available in the conference proceedings. Presenters are encouraged to distribute their presentations through the conference mobile app.

Presentations are solicited on any subject pertaining to the scope of the conference described in its Call for Papers (obtainable from <http://ecceconferences.org/2019>). Those that will address the following aspects of growing interest and innovation are encouraged:

- ▶ Standard development for power electronics systems / products
- ▶ Power Supply on Chip (PwrSoC) and related technology
- ▶ High Efficiency, flicker free LED light fixtures
- ▶ DC Microgrid: trend, requirement, and technologies
- ▶ Innovative materials for improved components and/or systems in electrical and electromechanical energy conversion
- ▶ Components and systems for electrical applications in the oil & gas and mining sectors.
- ▶ Technologies and systems for large, cycle-efficient and cycle-intensive energy storage.
- ▶ Modelling of materials oriented to improve the estimation of the energy efficiency in the components and systems using them.
- ▶ Reliability, diagnostics and prognostics of components and modular systems.
- ▶ Thermal management, advanced cooling technologies

Proposal Submission Guidelines: Special Session organizers are requested to submit a maximum five page proposal summarizing the proposed Special Session with 4 or 8 presentations. The proposal should contain the session title, session organizer, title of each presentation, presenter for each presentation (with a short biography) and a summary of each presentation. . Please submit the proposal directly to ECCE 2019 Technical Program Committee Chairs via email at ecce2019tpc@gmail.com.

www.ieee-ecce.org/2019

Baltimore, MD, USA – September 29 – October 3, 2010

SAVE THE DATE

September 29 – October 3, 2019



BALTIMORE
Maryland
USA




IEEE ENERGY CONVERSION CONGRESS & EXPO



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<http://www.ieee-ecce.org/2019>



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