2nd IEEE Southern Power Electronics Conference (SPEC)

5-8 December 2016 Auckland, New Zealand

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

SPEC
IEEE Power Electronics Society
SOUTHERN POWER ELECTRONICS CONFERENCE

2nd IEEE SPEC ORGANISING COMMITTEE

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WELCOME

Dear All

As General Chairman and on behalf of the organizing committee, it is with great pleasure that I warmly welcome you to the 2nd IEEE Southern Power Electronics Conference (SPEC) 2016 at The University of Auckland, New Zealand.

SPEC was founded and sponsored by the Power Electronics Society (PELS) of the Institute of Electrical and Electronic Engineering (IEEE), with a vision to promote Power Electronics and its applications in the Southern Hemisphere, where resources and opportunities to network, share ideas and establish collaborations among members are somewhat limited. With this objective, the inaugural SPEC was held in December 2015 in Fortaleza, Brazil in the west region of the Southern Hemisphere. Given its success, it was decided that the 2nd SPEC should be held in the east region of the Southern Hemisphere in New Zealand in 2016.

SPEC 2016 offers an ideal opportunity for students, researchers, engineers and academics from across the globe to bring the latest research on technological advances and applications in Power Electronics to the Southern Hemisphere to promote the discipline. Your contributions towards advances within the field of power electronics through presentations and networking at the conference are highly valued.

New Zealand is a small country consisting of two islands, well known for its beautiful 'clean & green' landscape. Auckland, dubbed the 'City of Sails', is the commercial hub of New Zealand, and a vibrant metropolis in the North Island. SPEC 2016 is hosted by the Department of Electrical & Computer Engineering at The University of Auckland, the largest university in New Zealand, equipped with state-of-the-art conference facilities and situated in the heart of Auckland. I hope that that you will all enjoy the exciting social program planned for you, which includes outdoor activities, scrumptious food and fine New Zealand hospitality, along with some summer sunshine while you are here with us, and leave SPEC 2016 having had a most memorable experience.

I am grateful for the overwhelming support that we received from around the world following our request to participate in SPEC 2016, with well over 300 digest submissions. As a result, we expect approximately 300 participants at this conference, making SPEC 2016 one of the largest power electronics conference to be held in New Zealand. I would also like to extend my sincere gratitude for the support given by keynote, plenary and tutorial speakers, as well as reviewers, technical track and international publicity chairs.

Professor Bram Ferreira, as president of IEEE Power Electronics Society and Chairman of SPEC Steering Committee, Tourism New Zealand, postgraduate volunteers and The University of Auckland have also played a major role in supporting the conference, which is very much appreciated.

To hold a successful conference, it is vital to have a dedicated team of organizers, and I was fortunate to have such a team. I would therefore like to extend special thanks to the organizing committee who devoted their personal time and worked tirelessly over many months to ensure the success of SPEC 2016.

Thank you all for your contribution and participation. I wish you all a productive conference and hope that you return home safely at the close of proceedings, taking with you lasting memories of New Zealand.

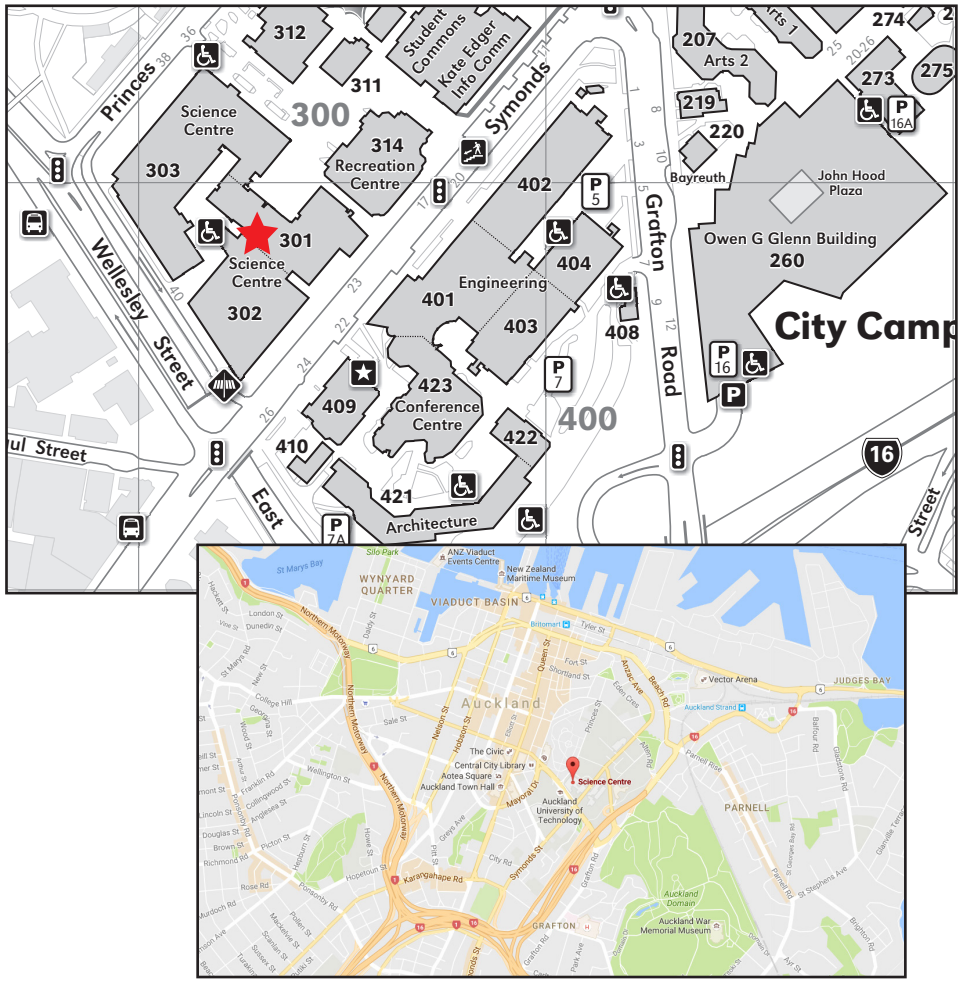
Yours sincerely
Udaya K Madawala
General Chairman

LOCATIONS

Conference Venue

Faculty of Science, Science Centre
23 Symonds St, Auckland, 1010

The newly completed and renovated Faculty of Science Centre has state of the art conference facilitates including case rooms, large seminar rooms and lecture theatres as well as function areas. It is close to down town Auckland, public transport and restaurants.



CONFERENCE VENUE FLOOR PLAN

SPONSORS

The organising committee of the 2016 IEEE 2nd Annual Southern Power Electronics Conference (SPEC) would like to thank the following sponsors for their support.

IEEE

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NEW ZEALAND

GENERAL INFORMATION

Conference Venue

Faculty of Science, Science Centre
23 Symonds St, Auckland, 1010

The following information is provided as a guide to the conference and venue. If you have any queries, please visit the registration desk.

Registration desk hours

For any questions, please visit the registration desk during the following hours:

Monday 5th December
8.00am – 5.00pm
Tuesday 6th December
8.00am – 5.00pm
Wednesday 7th December
8.00am – 3.00 pm
Thursday 8th December
8.00am – 5.00pm

Car parking

The University of Auckland's OGGB car parking is a short walk away from the conference venue.

Please note that the payment machines accept credit cards, cash and EFTPOS payments. Early bird rate ($12) applies if you enter and pay before 10.00am and exit before 6.30pm. If you leave after 6.30pm the rate will be $18.

Cameras and electronic recording

No electronic recording of presentations is permitted in any form without the express permission of conference organisers and speakers.

Conference catering

Lunches, morning and afternoon teas will be served in the Science Centre foyer (302-G60 & G80).

Dietary requirements

Care is taken to ensure all dietary requirements are catered to. Vegetarian and halal options are provided with each meal break. If you specified your dietary requirements when registering, please make yourself known to the catering staff at each meal break.

Internet access

Wireless internet access is available for use during the conference. Visit the registration desk for login details.

Mobile phones

During all presentations, please switch off or turn your mobile phones to silent.

Name tags

Please wear your name tag at all times during the workshop and social events. You will be asked to present your name tag to get on the buses for the conference dinner.

No smoking policy

Delegates should be aware that smoking is banned from all public buildings in New Zealand. This policy is strictly enforced. Also smoking is not permitted within University of Auckland premises. Smokers are able to smoke at designated places outside the University of Auckland premises.

Prayer rooms

There is a Muslim Prayer Space located in the Building below the Science Student Centre. Please notify someone from the registration desk if you require access to this room.

Presenting authors – Oral presentations

Presentation slots are 20 minutes long including 5 minutes for questions and answers. Each session chair will be keeping strictly to time. If you are scheduled to give a presentation, please ensure your PowerPoint is uploaded well in advance of your presentation time, preferably during the catering breaks or prior to the start of each day. To upload your presentation, please take it to your presentation room on a USB memory stick or CD. A member of the organising team will be available to assist you.

Presenting authors – Poster presentations

Poster sessions give a unique opportunity to engage in more interactive and in depth discussions than possible in an oral session. If you are presenting a poster please make sure that it is displayed on the designated board 10 minutes before the start of the session and you are available throughout the sessions for answering the questions from the attendees. Should you need support in attaching your poster please approach one of our conference staff. At the end of the session please remove the poster. Any posters that remain on the poster boards at the end of the session will be removed and kept at the Registration Desk.

Tour desk

There will be a tour operator present at the conference to assist you with tour and travel options. If you would like to contact them prior to arriving in New Zealand please email sharronh@exclusive-tours.co.nz

Urgent messages and lost property

Urgent messages for delegates and lost property can be directed to the registration desk.

Messages and lost property will be held there for collection until the conclusion of the workshop. Please do not leave your valuables unattended.

University of Auckland Recreation Centre

The University of Auckland's Recreation Centre has a special offer for delegates of the SPEC Conference. Visit the Recreation Centre during your upcoming visit to the University, show the Reception team your delegate name tag and you'll pay only $10 for your session (regular price $20).

For more information visit the Sport and Recreation website for more information www.universitysport.auckland.ac.nz

SOCIAL FUNCTIONS

Welcome Function

Monday 5th December | 4.30-6.30pm
302-G60 & G80

This will be a 'drinks and nibbles' event with the chance to meet and reconnect with fellow delegates. This function is available to those who have registered for the event. Please present your name tag on arrival as it includes your ticket to this reception.

IEEE Power Electronics Society (PELS) Young Professionals Reception

Monday 5th December | 6.30-9.00pm
301-G053 & 301-G10 & G64

An opportunity to mingle, interact, learn from the best minds of IEEE PELS and have some fun!

IEEE Power Electronics Society (PELS) invites you to join this event to learn from the life journey of the biggest leaders in power electronics at SPEC 2016 along with an evening well spent talking to people from across the globe. This year, the IEEE PELS Students and Young Professionals Reception at SPEC 2016 will specially be filled with distinguished speeches, meeting new power electronics peers, learning about the best practices in industry and academia, and having loads of fun with complimentary drinks and snacks. This event is free and open to all students, young professionals, and engineers. So, make sure you don't miss this wonderful chance to make new friends and meet new people.

IPT Forum

Tuesday 6th December | 4.30-6.30pm
301-G50 & 302-G60 & G80

This session provides the opportunity to discuss matters relating to IPT in a forum-like environment with experts. Wine and nibbles will be served at this event.

Conference Dinner

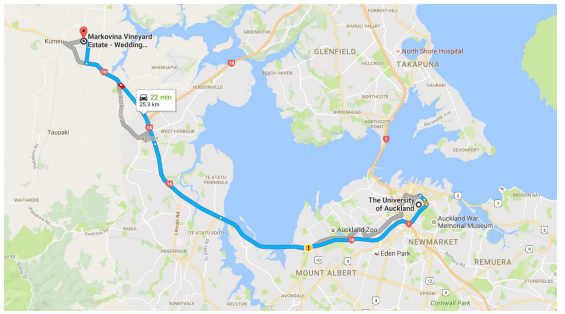
Wednesday 7th December | 3.00-11.30pm
Markovina Vineyard Estate

The conference dinner will be held at the beautiful Markovina Vineyard Estate in Kumeu.

Buses will leave from Alfred Street at 3pm, a short walk from the conference venue. Please follow the conference volunteers once the conference sessions have concluded.

On the way to Markovina the buses will stop off at Muriwai; a coastal community on the West Coast of Auckland. It is home to a large colony of gannets and is known for its surf and distinctive silty black sand. You will have the opportunity to walk around before boarding the bus to Markovina.

Markovina Vineyard Estate is a stunning venue located in the heart of Kumeu's wine making region, west of Auckland. Established in 1966 it has developed from a boutique winery into a flexible wedding and function centre.



AUCKLAND INFORMATION

The following information is provided as a guide to Auckland. If you have any queries, please visit the registration desk.

Emergencies, medical needs and illnesses

If you have an emergency you can contact the police, paramedics and fire department by calling 111 from any landline or mobile phone.

If you require non-emergency medical attention during the workshop, please inform the registration desk.

Getting around

The Link bus connects Auckland city fringe suburbs with the central business district. There are also environmentally-friendly, hybrid City Circuit buses that follow a route around the inner city. Buses run to all parts of the Auckland region from the Britomart transport Centre, downtown. Trains run regularly to central, south and west Auckland suburbs from the Britomart rail station. To plan your journey please use the journey planner at www.maxx.co.nz

If you require a taxi there are a number of companies to choose from. Some recommended companies are:

Auckland Co-op Taxi: 09 300 3000
Discount Taxi: 09 529 1000
Green Cabs: 0508 447 336
Corporate Cabs: 09 377 07730
Airbus Shuttle: 09 366 6400

Britomart

Britomart is a vibrant shopping, entertainment and business precinct in the heart of downtown Auckland. Surrounded by beautiful heritage buildings, it's a neighbourhood of buzzing restaurants and cool bars, designer boutiques and quirky art spaces. You'll find cutting-edge street fashion, designer homewares and the HQs of some of New Zealand's leading creative and corporate organisations.
www.britomart.org

Viaduct Harbour

Hobson Wharf, Corner of Quay and Hobson Street. With over 20 bars and restaurants to choose from in one waterfront destination, Viaduct Harbour is a superb place to dine or relax and watch the world go by. On Friday and Saturday nights the bars and restaurants are filled with people looking for fun and excitement.
www.viaduct.co.nz

SkyCity

Corner of Victoria and Federal Streets and features 5-star restaurants, bars, clubs, casinos and the sky tower!
www.skycityauckland.co.nz

Ponsonby Road

Ponsonby road, Auckland's hippest strip, is easily accessible by the Inner Link bus and home to over 100 of Auckland's top cafes, bars and restaurants. Take a stroll down the strip to check out the boutique shops, local fashion scene and some of the best coffee in Auckland.
www.iloveponsonby.co.nz

Karangahape Road

Karangahape Road, affectionately known as K'Road, is known for its creative, eclectic culture, boutique shops and buzzing nightlife. Unique and exciting, this vibrant area offers everything from contemporary art and live music to vintage stores.

Auckland Museum and Domain

Auckland Museum is one of New Zealand's most outstanding historical buildings, boldly situated in the Domain - a central city pleasure garden - you encounter exhibitions that will excite you with the artisitc legacy and cultures of the Pacific people. See the monumental carvings, buildings, canoes and taonga (treasures) of the Maori. The diversity of cultures which now combine to form the rich tapestry of race, nationality and creed which is modern New Zealand.

The Domain features a number of attractions and activities; The Wintergardens are a feature of the Domain with the Auckland War Memorial Museum sitting at the highest point. There are formal gardens, duck ponds, large green open spaces edged by mature trees, bush walks and statuary. The 75ha park has been developed around the cone of an extinct volcano. The 'tuff rings' created by volcanic activity thousands of years ago can be seen in the land contours and forms a natural amphitheatre with about 10 hectares developed as first-class sports fields.

Want to see more?

If you are wanting to explore the greater Auckland region there are ferries available from the Ferry Terminal in Auckland CBD to a variety of Auckland locations; namely Devonport, Rangitoto and Waiheke Island.

• Devonport - Imagine being minutes from an unspoilt slice of paradise! Only 12 minutes across the harbour from Auckland City, Devonport is a colourful, passionate community, nestled between a volcanic cone, Takarunga, and the sparkling Waitemata harbour. Come and discover our place of Open Spaces, Open Minds and Open Hearts: friendly boutique shops, inspiring art galleries, welcoming cafes and restaurants.

• Rangitoto - Emerging from the sea just 600 years ago, pest-free Rangitoto Island is the youngest volcano in New Zealand. An Auckland icon and deeply enriched with history, it's long been a favourite day trip for walkers, and a much loved boating destination.

• Waiheke Island – From world class vineyards to unique eco-tours, Waiheke Island offers something for everyone. Only 30-40 minutes by ferry from Auckland's CBD lies another world to be discovered.

KEYNOTE SPEAKER

Prof. John Boys

University of Auckland, New Zealand
Tuesday 6th December | 9 - 9.50am

25 Years of IPT – a Team Effort

This Keynote lecture traces the history of Inductive Power Transfer (IPT) from its serendipitous beginnings to a widespread technology covering a range of applications. Wireless Power Transfer was first suggested 200 years ago but a technology to support it was not then available but this situation changed dramatically with the advent of power electronics and particularly with power transistors. These devices allowed the generation of high powers at high frequency and IPT as we know it was born.

Working at the University of Auckland and against a near universal background saying that, 'IPT is impossible and cannot be done,' we made a first IPT system for factory automation applications and demonstrated it to interested persons. We were extremely lucky that Daifuku, a large materials handling company, was interested if the power level could be increased by a factor of 400, and if the efficiency was then above 75%. Mr Hamaguchi's vision and foresight was critical in these decisions: we contracted with Daifuku to make a prototype for them fully aware that this combination of high power and high efficiency, simultaneously, had never before been achieved.

This presentation traces how a prototype was made to meet and exceed Daifuku's specifications and how IPT has gone on from there to higher and lower power levels – particularly communications, factory automation and especially clean factory automation (eFA,) and EV charging. The presentation shows how new words – track, pick-up, pad, controller, decoupling – and others were coined to support the new technological concepts and are now in widespread use.

In the course of this work a large number of people have been involved and without their inputs the technology would never have succeeded.

Biography

John Talbot Boys was born in Invercargill in 1940 and completed a BE in EEE in 1962, and a PhD in Physics in 1968 before going overseas for 5 years, in England with Redac Software Ltd and in The Republic of Ireland with a US Multinational, SPS Technologies. He returned to New Zealand in 1974 to a lectureship at the University of Canterbury transferring to the University of Auckland in 1977, where he is currently a Distinguished Professor Emeritus in the Department of Electrical and Computer Engineering.

Professor Boys' research interests are Power Electronics, AC Motor Control, and Inductive power Transfer and in all of these he has published widely had Patents granted, and had successful collaborations with National and International Industries. He has won a significant number of prizes culminating in The Prime Minister's Prize (with Grant Covic) for work with IPT. Professor Boys' Professional interests are with The Institution of Professional Engineers (IPENZ) where he is a Distinguished Fellow, and more academically he is a Fellow of the Royal Society of New Zealand (FRSNZ).

In other interests Professor Boys is a keen golfer and a regular Church attender, and takes a real interest in the effect of technology on our standard of living and happiness.

Notes:

PLENARY SPEAKERS

Prof. Hirofumi Akagi

Tokyo Institute of Technology, Japan
Tuesday 6th December | 11.20am-12.10pm

High-Power Converters and its Applications: Today and Tomorrow

This talk lays emphasis on an overview of high-power converters and its controls and applications to high-voltage grid connections and medium-voltage high-power motor drives. It also presents experimental results obtained from a few different downscaled systems that have been designed, constructed and tested in the speaker's laboratory. As an example, a promising ac-to-ac direct power conversion system intended for medium-voltage and high-power motor drives is given, which will be replaced with a conventional line-commutated cycloconverter using thyrisotrs in the near future.

Moreover, this talk includes a 750-V, 100-kW, 20-kHz bidirectional isolated dc-dc dual-active-bride (DAB) converter with focus on conversion efficiency and power-loss breakdown. The dc-dc converter is characterized by using the leading-edge 1.2-kV, 400-A SiC-MOSFET dual modules without free-wheeling SBD, and magnetic devices based on a nano-crystalline soft-magnetic material. The SiC dual (two-in-one) module used in this experiment is the same in appearance, that is, size, shape, and terminal/pin arrangement as the latest 1.2-kV, 300-A Si-IGBT dual module. The overall efficiency from the dc input to the dc out terminals is over 98.0% in a broad range of 3 kW to 100-kW, excluding the power losses of the gate-drive circuit and the digital-controller.

At present, SiC-MOSFET/SBD modules are available on the market, and a voltage-source PWM inverter using 3.3-kV, 1.5-kA SiC-MOSFET/SBD modules for electric commuter trains with a nominal dc catenary voltage of 1.5 kV has been put on a field test in Japan.

Biography

Hirofumi Akagi received his Ph. D. degree in electrical engineering from the Tokyo Institute of Technology, Tokyo, Japan, in 1979. He is currently Professor in the Department of Electrical and Electronic Engineering at the Tokyo Institute of Technology. Prior to that, he was working for Nagaoka University of Technology as Assistant and then Associate Professor, and Okayama University as Professor. His research interests include power conversion systems and their applications to industry, transportation, and utility. He has authored and coauthored more than 120 IEEE Transactions papers.

Dr. Akagi received six IEEE Transactions Prize Paper Awards and 14 IEEE Industry Applications Society Committee Prize Paper Awards. He is the recipient of the 2001 IEEE Power Electronics Society William E. Newell Award, the 2004 IEEE Industry Applications Society Outstanding Achievement Award, the 2008 IEEE Richard H. Kaufmann Technical Field Award, the 2012 IEEE Power & Energy Society Nari Hingorani Custom Power Award, and the 2014 EPE Outstanding Service Award. He was elected as an IEEE Fellow in 1996.

Dr. Akagi served as the President of the IEEE Power Electronics Society from January 2007 to December 2008 for two years. Since January 2015, he has been serving as the Division II Director.

Prof. Johann Kolar

ETH Zurich, Switzerland
Tuesday 6th December | 2.00-2.50pm

Multi-Objective Optimization in Power Electronics

The development of power electronics converters is driven by increasing demands on power density and efficiency as well as lower relative costs. Conventional single-objective optimizations are targeting only single performance indices, i.e. are ignoring the actual mutual coupling and/or necessary trade-offs between different performance figures. Accordingly, a multi-objective optimization approach, which allows to comprehensively explore the influence of all design parameters and to calculate the absolute performance limit in a multi-dimensional performance space is required to ensure the full utilization of a set of base technologies.

The talk will first discuss the translation of power electronics converter design and evaluation into a mapping of a design space into a performance space, explain the meaning of the Pareto surface and design space diversity and propose a specific combination of performances for characterizing the technology node of power electronics. Next, a comprehensive comparative evaluation of three-level and five-level dual active bridge DC/DC converters based on the Pareto front will be shown. Furthermore, the use of multi-objective optimization for analyzing the performance improvement of a non-isolated single-phase DC/AC converter built for the GOOGLE Little Box Challenge will be detailed, which also reveals an interesting design space diversity. In addition, results of an efficiency/power density/costs optimization of three-phase Si and SiC photovoltaics inverter topologies will be summarized, highlighting that only a system-level and life-cycle cost analysis allows to identify and quantify the advantages of SiC over Si power semiconductor technology.

Finally, the S-curve of modern power electronics technology will be extrapolated, key topics of future research in the area of component and converter modeling and optimization will be highlighted, and the expected convergence of power electronics simulations and measurements as well as the expected future decoupling of the design and manufacturing of highly integrated power electronics converters, i.e. the transition to "fab-

less" power electronics manufacturing will be discussed. Finally, an extension of the considerations of single converter systems to converter clusters and power supply chains will be proposed in combination with a new set of corresponding performance indices in order to provide a basis for a future system-oriented consideration of power electronics converters.

Biography

Johann W. Kolar is a Fellow of the IEEE and is currently a Full Professor and the Head of the Power Electronic Systems Laboratory at the Swiss Federal Institute of Technology (ETH) Zurich. He has proposed numerous novel PWM converter topologies, and modulation and control concepts and has supervised over 60 Ph.D. students. He has published over 650 scientific papers in international journals and conference proceedings, 3 book chapters, and has filed more than 120 patents. He has presented over 15 educational seminars at leading international conferences and has received 21 IEEE Transactions and Conference Prize Paper Awards, the 2014 IEEE Middlebrook Award, and the ETH Zurich Golden Owl Award for excellence in teaching. The focus of his current research is on ultra-compact and ultra-efficient SiC and GaN converter systems, wireless power transfer, Solid-State Transformers, Power Supplies on Chip, and ultra-high speed and bearingless motors.

Prof. Frede Blaabjerg

Aalborg University, Denmark
Wednesday 7th December | 11.20am-12.10pm

Design for Reliability in Power Electronic Systems

In recent years, the automotive and aerospace industries have brought stringent reliability constraints on power electronic converters because of safety requirements. Today customers of many power electronic products expect up to 20 years of lifetime and they also want to have a "failure free period" and all with focus on the financials. The renewable energy sectors are also following the same trend, and more and more efforts are being devoted to improving power electronic converters to account for reliability with cost-effective and sustainable solutions. This presentation will introduce the recent progress in the reliability aspect study of power electronic converters for power electronic applications with special focus on renewables. It will cover the following contents: the motivations for highly reliable electric energy conversion in renewable energy systems; the reliability requirements of typical renewable energy systems and its implication on the power electronic converters; failure mechanisms and lifetime models of key power electronic components (e.g., power semiconductor switches, capacitors, and fans); long-term mission profiles in Photovoltaic (PV) and wind power applications and the component level stress analysis; reliability analysis methods, tools, and improvement strategies of power electronic converters for renewable energy systems. A few case studies on PV and wind power based renewable energy systems will also be discussed.

Biography

Frede Blaabjerg (S'86–M'88–SM'97–F'03) was with ABB-Scandia, Randers, Denmark, from 1987 to 1988. From 1988 to 1992, he was a Ph.D. Student with Aalborg University, Aalborg, Denmark. He became an Assistant Professor in 1992, an Associate Professor in 1996, and a Full Professor of power electronics and drives in 1998. His current research interests include power electronics and its applications such as in wind turbines, PV systems, reliability, harmonics and adjustable speed drives.

He has received 15 IEEE Prize Paper Awards, the IEEE PELS Distinguished Service Award in 2009, the EPE-PEMC Council Award in 2010, the IEEE William E. Newell Power Electronics Award 2014 and the Villum Kann Rasmussen Research Award 2014. He was an Editor-in-Chief of the IEEE TRANSACTIONS ON POWER ELECTRONICS from 2006 to 2012. He has been Distinguished Lecturer for the IEEE Power Electronics Society from 2005 to 2007 and for the IEEE Industry Applications Society from 2010 to 2011. He is nominated in 2014 by Thomson Reuters to be between the most 250 cited researchers in Engineering in the world.

Prof. Braham Ferreira

Delft University of Technology, Netherlands
Wednesday 7th December | 2.00-2.50pm

Significant Paths for Future Power Electronics Technology Development

Power Electronics is 110 years old and is widely applied in a variety of applications. Over the years transformational innovations shaped the course of technology development. The introduction of the semiconductor switches is undoubtedly the most important event. Two other transformations are electronics powered AC drives that displaced DC drives, and recently the modular multilevel converters that ended the 30 year rule of thyristor based current fed converters in HVDC systems.

What does the future hold ten to twenty years from now and can technology development be influenced to address important needs? The IEEE Power Electronics Society discussed this question at FEPPCON, a workshop that was adopted as a biennial technology strategic planning event. The presentation discusses three significant innovation paths inspired by FEPPCON discussion threads, including the underlying ideas of subsequent PELS initiatives and some personal viewpoints. Three topics are addressed.

- Wide-band-gap semicconductors as game changer: Silicon, which is a suboptimal semiconductor material for power applications, has served the industry adequately for so many years. But, now WBG material based power devices are becoming available. SiC and GaN devices have superior characteristics compared to silicon. However on its own WBG devices will not be able to make inroads into major application areas of power electronics; a better technology platform for heterogeneous circuit integration is also needed.

- The wireless electronic power grid: Conventional power systems are not well suited for the 3 billion people globally in off-grid and poor-grid environments who live in extreme energy poverty and are denied the opportunity to improve their lives. Low cost PV and highly efficient LED lighting are two technologies that are enabling a low cost "copper-less" grid where devices are connected by a cloud based communication platform that can manage and coordinate large fleets of energy devices.

- The broadband electronic AC grid: A fresh look is needed at how power quality and harmonics are viewed because of the growing number of problems related to the introduction of power electronics components in AC grids. Harmonic power, usually regarded as a source of electric pollution should be applied to the benefit of the system.

Biography

Braham Ferreira received his B.Sc., M.Sc. and PhD in electrical engineering from the Rand Afrikaans University, Johannesburg, South Africa, in 1980, 1982 and 1988 respectively. In 1981 he was with the Institute of Power Electronics and Electric Drives, Technical University of Aachen, and worked as a systems engineer at ESD Pty (Ltd) from 1982-1985. From 1986 thru 1997 he was at the Department of Electrical Engineering, Rand Afrikaans University, where he held the Carl and Emily Fuchs Chair of Power Electronics in later years. Since 1998 he is holding the chair in Power electronics and Electrical Machines at the Delft University of Technology in The Netherlands and served as head of the Department during 2006-2010. Dr. Ferreira is author and co-author of 100 journal and transactions papers, 300 conference papers and 15 patents, and was awarded 15 prize paper awards. He is a Fellow of the IEEE.

IEEE Activies – South Africa Joint IAS/PELS/PES/IES chapter, chair (1993-6); South Africa Section, chair (1991-2); IEEE representative on SAIEE Council (1992-7); IEEE AFRICON '96, technical program chairman; IAS Power Electronic Devices and Components committee, chair (1998-9); Benelux Joint IAS/PELS chapter, founding chair (1999 – 2001); PELS Transactions, associate editor (2000-present); PELS AdCom member-at large(1999-2005); PELS treasurer (2005-2010); PELS Vice-President Meetings (2011- 4), PELS President (2015-6)

Other activities – Dutch Representative on the Executive Council of the European Power Electronic Association [EPE](1999 – 2002, 2007-2010); Dutch working group CIGRE National Study Committee 14 [application of power electronics in utilities], chair (1999 – 2002); FEPPCON, technical program co-chair (2001, 2004, 2009); EPE Solar Energy Chapter, founding chair (2011).

IPT FORUM SPEAKERS

Shuzo Nishino

Daifuku, Japan
Tuesday 6th December | 16.30pm-17.00pm

Abstract

The first time I saw a monorail run by inductive power transfer (IPT) was in September, 1991. The world's first three IPT vehicles, which were in a basement room of Auckland University, were switched on by Professor Boys. At that same moment, just in front of Daifuku's person in charge, Mr Hamaguchi, and myself, the three IPT vehicles started to smoothly move forwards and backwards. There is no doubt that IPT and its success was determined in that moment. Using examples and episodes, Nishino will introduce the history and future prospects of High-Efficiency Inductive Power Distribution technology - Daifuku's name for IPT, which has reached over 8000 systems operating around the world.

Biography

Shuzo Nishino was born in Kawanishi City, Japan, in 1960. He received a bachelors degree in electrical engineering from Osaka City University in 1982 and joined Daifuku Co., Ltd. He has been in charge of IPT technology since 1991. Now he is a general manager of the Intellectual Property Division and part-time lecturer at Osaka City University.

Fady Mishriki

PowerbyProxi, New Zealand
Tuesday 6th December | 17.00pm-17.50pm

Abstract

Fady will share insights and key learnings from the growth and commercialization of PowerbyProxi, while exploring the growing influence of wireless power and highlighting why he believes that power delivery is going to change profoundly in the near future form sockets to surfaces, from 'plugging in' to 'placing on'.

Biography

Fady is Chief Executive Officer and Founder of PowerbyProxi and one of the of world's true pioneers and visionaries for wireless power. Whilst a student at The University of Auckland Fady had the vision and drive to commercialize wireless power technology and establish PowerbyProxi. His perseverance and commitment saw him secure investment and partnerships with some of the largest companies in the world.

In 2014 he was awarded the University of Auckland's Entrepreneur of the Decade Award and in 2015 he was awarded The University of Auckland's Young Alumnus of the year award in recognition of his engineering and entrepreneurial achievements.

TUTORIAL SPEAKERS

Prof. Frede Blaabjerg

Aalborg University, Denmark
Monday 5th December | 8.30am-11.20am

Power Electronics – The Key Technology for Renewable Energy System Integration

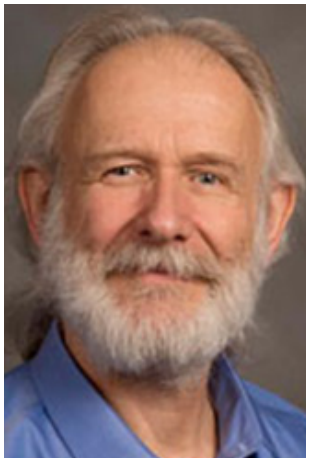
The energy paradigms in many countries (e.g. Germany and Denmark) have experienced a significant change from fossil-based resources to clean renewables (e.g. wind turbines and photovoltaics) in the past few decades. The scenario of highly penetrated renewables is going to be further enhanced – Denmark expects to be 100 % fossil-free by 2050. Consequently, it is required that the production, distribution and use of the energy should be as technologically efficient as possible and incentives to save energy at the end-user should also be strengthened. In order to realize the transition smoothly and effectively, energy conversion systems, currently based on power electronics technology, will again play an essential role in this energy paradigm shift. Using highly efficient power electronics in power generation, power transmission/distribution and end-user application, together with advanced control solutions makes the way for renewable energies. In light of this, some of the most emerging renewable energies, e.g. wind energy and photovoltaic, which by means of power electronics are changing character as a major part in the electricity generation, are explored in this presentation. Issues like technology development, implementation, power converter technologies, control of the systems, and synchronization are addressed. Special focuses are paid on the future trends in power electronics for those systems like how to lower the cost of energy and to develop emerging power devices and better reliability tool.

Biography

Frede Blaabjerg (S'86–M'88–SM'97–F'03) was with ABB-Scandia, Randers, Denmark, from 1987 to 1988. From 1988 to 1992, he was a Ph.D. Student with Aalborg University, Aalborg, Denmark. He became an Assistant Professor in 1992, an Associate Professor in 1996, and a Full Professor of power electronics and drives in 1998. His current research interests include power electronics and its applications such as in wind turbines, PV systems, reliability, harmonics and adjustable speed drives.

He has received 15 IEEE Prize Paper Awards, the IEEE PELS Distinguished Service Award in 2009, the EPE-PEMC Council Award in 2010, the IEEE William E. Newell Power Electronics Award 2014 and the Villum

Kann Rasmussen Research Award 2014. He was an Editor-in-Chief of the IEEE TRANSACTIONS ON POWER ELECTRONICS from 2006 to 2012. He has been Distinguished Lecturer for the IEEE Power Electronics Society from 2005 to 2007 and for the IEEE Industry Applications Society from 2010 to 2011. He is nominated in 2014 by Thomson Reuters to be between the most 250 cited researchers in Engineering in the world.



Prof. Dushan Boroyevich

Virginia Tech, USA
Monday 5th December | 8.30am-11.20am

Is SiC a Game Changer?

Over the last two decades there has been much exhilaration about the anticipated transformation of power electronics that SiC devices would bring, which has been accompanied by tremendous efforts of governments and companies to meet those expectations. The successful commercial use of SiC Schottky diodes over the last ten years has helped improve efficiency and reduce size of power converters in several applications, but only in the last couple of years several SiC active switching devices became commercially available at reasonable cost and volumes. CPES has been involved all-along in characterizing the newest SiC devices and evaluating their potential to change existing applications and open completely new ones.

The presentation will review the state-of-the-art and summarize CPES experiences in evaluating the use of SiC devices in dc-dc, ac-dc (single- and three-phase) and dc-ac power converters, as well as in three-phase motor drives, for transportation and higher power applications, ranging from kilowatts to megawatts. It will be shown that SiC devices can provide tangible improvements to existing applications so that their adoption will be mostly determined by the converter cost tradeoff. On the other hand, SiC opens two previously unachievable sorts of applications: power converters where power semiconductor devices operate at high-temperatures (> 200 ºC), and high-power conversion in the megawatt range with switching frequencies in tens of kilohertz. In these new applications, the SiC adoption is mostly governed by the system cost tradeoffs and will be fundamentally limited by the availability of other materials, passive devices, sensors, packaging, and system integration technologies that can operate at high-temperature, high-power and high-frequency.

Biography

Dushan Boroyevich received his Dipl. Ing. degree from the University of Belgrade in 1976 and his M.S. degree from the University of Novi Sad in 1982, in what then used to be Yugoslavia. He received his Ph.D. degree in 1986 from Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, USA.

From 1986 to 1990, he was an assistant professor and director of the Power and Industrial Electronics Research Program in the Institute for Power and Electronic Engineering at the University of Novi Sad. He then joined the Bradley Department of Electrical and Computer Engineering at Virginia Tech as associate professor. He is now American Electric Power Professor at the department and co-director of the Center for Power Electronics Systems (CPES). He has been the adviser for almost 50 doctoral and 50 masters' students and published with them over 800 papers in the areas of multi-phase power conversion, electronic power distribution systems, power electronics systems modeling and control, and multi-disciplinary design optimization.

Dushan was the president of the IEEE Power Electronics Society (PELS) for 2011-12. He is a Fellow of IEEE and recipient of numerous awards, including the IEEE William E. Newell Power Electronics Technical Field Award, the IEEE PELS Harry A. Owen Distinguished Service Award, and European Power Electronics Association (EPE) Outstanding Achievement Award. He is an Honorary Professor at the Xi'an Jiaotong University in Xi'an, China, and K.T. Li Chair Professor at the National Cheng Kung University, in Tainan, Taiwan. He is a member of the US National Academy of Engineering.

Prof. Grahame Holmes

RMIT University, Australia
Monday 5th December | 8.30am-11.20am

Principles and Practices Of Digital Current Regulation for AC Systems

Current regulation plays a key role in power electronic conversion systems. The basic concept is to compare a measured current against a defined reference, and to minimise the error between these two quantities by adjusting the switching of the associated power electronic converter. However, while simple in principle, achieving this goal for AC current regulators has proved to be very challenging.

This tutorial will present the current state-of-the-art for digital current regulation of AC converter systems. It will begin by showing how PWM transport and sampling delays are the primary constraints for linear regulators. Strategies to overcome these constraints will then be explored, including back EMF compensation, PR resonant control and its equivalent synchronous dq frame implementation. An analytical approach to calculate the maximum gains for these strategies will be developed, verified by simulation and matching experimental results. The concepts will then be applied to the more challenging problems of current regulation with an LCL filter, and the influence of common mode EMI filtering on the current regulation process. Finally, the latest advances in hysteresis regulation will be presented, using variable hysteresis bands to maintain a constant switching frequency, and

digitally implementing what is usually regarded as an analogue regulation system.

Biography

Professor Holmes graduated from the University of Melbourne in 1974, and has a Masters degree in power systems engineering, and a PhD in PWM theory for power converters. For 26 years he was an academic at Monash University, working in the area of Power Electronics, where he established the Power Electronics Research Group to support graduate students and research engineers working together on a mixture of theoretical and practical R&D projects. The interests of the group include fundamental modulation theory, current regulators for drive systems and PWM rectifiers, active filter systems for quality of supply improvement, resonant converters, current source inverters for drive systems, and multilevel converters. In 2010, Professor Holmes took up the position of Innovation Professor – Smart Energy at RMIT University. This position has allowed him to expand his research activities also into applications of power electronics, particularly in the area of Smart Grids and Smart Energy technologies.

Professor Holmes has a strong commitment and interest in the control and operation of electrical power converters. He has made a significant contribution to the understanding of PWM theory through his publications and has developed close ties with the international research community in the area. He is has published over 230 papers at international conferences and in professional journals, and has published a major reference book on Pulse Width Modulation of Power Converters which is now recognised as a seminal work in the area. He is a Fellow of the IEEE and is an active member of the IEEE Power Electronics Society and reviews papers for all major IEEE transactions in his area.

Prof. Ron Hui & Dr. Chi Kwan Lee

University of Hong Kong/Imperial College, London
Monday 5th December | 1.30pm-4.20pm

Electric Springs: Basic Principles, Circuit Topologies and Applications to Smart Grids

Traditional control paradigm of “power supply following demand” does not suit emerging power grids that are fed with increasing renewable energy generation of intermittent nature. In order to achieve power system stability, it is necessary to maintain instantaneous balance between power supply and demand. A new control paradigm of having “power demand following supply” must be adopted. This opens a new research area of demand-side response.

Electric springs is an emerging demand-side response technology. Based on power electronics technology, Electric Springs are designed to provide distributed support for maintaining the stability of mains frequency and voltage. Similar to having many small mechanical springs supporting a mattress without the need for mutual communication, they are expected to be distributed over the power gird. By using input control, they provide instantaneous active and reactive power compensation so as to reduce fluctuations in mains voltage and frequency caused by the injection of intermittent renewable power. This tutorial will be divided in three parts. The first part covers the basic principles of the Electric Springs and their functions. The second part deals with various circuit topologies and control methodologies that can achieve electric spring functions. The last part is related to the application potentials of electric springs on power systems.

Biography

Prof. Ron Hui obtained his Ph.D at Imperial College London. He has previously held academic positions in the University of Nottingham and University of Sydney. He is currently Chair Professor of Power Electronics at the University of Hong Kong and Imperial College London. His research interests cover wireless power transfer, planar magnetics, sustainable lighting, power electronics topologies and smart grid technologies. Over 60 of his patents have been adopted by industry.

He is the recipient of the 2010 IEEE Rudolf Chope R&D Award, 2010 IET Achievement (Crompton) Medal and 2015 IEEE William E. Newell Award. He received four 1st Place IEEE Transactions Prize Paper Awards in the period of 2009-2016. He is a Fellow of the Australian Academy of Technological Sciences & Engineering (since 2010) and also the Royal Academy of Engineering, United Kingdom (since 2016).

Dr Lee received the B.Eng. and Ph.D. degrees in electronic engineering from the City University of Hong Kong, Kowloon, Hong Kong, in 1999 and 2004, respectively. He is currently an Assistant Professor at the Department of Electrical & Electronic Engineering, The University of Hong Kong. Since 2010, He has been a Visiting Researcher with Imperial College London.

He won an IEEE Power Electronics Transactions First Prize Paper Award for his publications on Mid-Range Wireless Power Transfer in 2015. He is a co-inventor of the Electric Springs and planar EMI filter. His current research interests include wireless power transfer, clean energy technologies and smart grids.

Prof. Johann Kolar & Jonas E. Huber

ETH Zurich, Switzerland
Monday 5th December | 1.30pm-4.20pm

Fundamentals and Application-Oriented Evaluation of Solid-State Transformer Concepts

Smart and/or Solid-State Transformers (SSTs) are formed by power electronic interfaces at the medium-voltage (MV) input and low-voltage (LV) output side, which are linked through a medium-frequency (MF) transformer. Accordingly, SSTs show a high power density and are offering high controllability. Therefore, SSTs are seen as key elements of future smart microgrids and are well suited for replacing bulky low-frequency (LF) transformers of traction vehicles. However, the connection to MV, the high overall complexity and realization costs, and the potentially lower efficiency are still major challenges for practical applications.

The tutorial starts with a brief review of the basics of transformers and identifies in a next step the motivation, requirements, and challenges associated with SST applications in future locomotives and smart distribution systems.

Next, the key challenges and/or conceptual aspects of SST design, single-cell vs. multi-cell converter approaches using Si or SiC semiconductors, isolated front-end vs. isolated back-end converter architectures, reliability of multi-cell converters, medium-frequency transformer design, multi-cell converter control system partitioning, protection, etc. are discussed. Furthermore, the operation of high-power isolated DC/DC converters which are integral parts of basic SST architectures is explained. In addition, issues of the modular construction and testing of high-power medium-voltage systems are summarized.

Finally, current research projects on SST topologies and all-SiC demonstrator systems at ETH Zurich are briefly described and the most promising application scenarios for SSTs, e.g. in future datacenters, offshore wind farms, More Electric Aircraft, and deep sea AC and DC distribution systems, as well as future research areas are identified, before the tutorial concludes with a critical evaluation of the SST concept against LF-transformer-based solutions.

The tutorial is tailored to serve the interests of a broad audience with academic or industrial backgrounds.

Biography

Johann W. Kolar is a Fellow of the IEEE and is currently a Full Professor and the Head of the Power Electronic Systems Laboratory at the Swiss Federal Institute of Technology (ETH) Zurich. He has proposed numerous novel PWM converter topologies, and modulation and control concepts and has supervised over 60 Ph.D. students. He has published over 650 scientific papers in international journals and conference proceedings, 3 book chapters, and has filed more than 120 patents. He has presented over 15 educational seminars at leading international conferences and has received 21 IEEE Transactions and Conference Prize Paper Awards, the 2014 IEEE Middlebrook Award, and the ETH Zurich Golden Owl Award for excellence in teaching. The focus of his current research is on ultra-compact and ultra-efficient SiC and GaN converter systems, wireless power transfer, Solid-State Transformers, Power Supplies on Chip, and ultra-high speed and bearingless motors.

Jonas E. Huber received his MSc degree (with distinction) from the Swiss Federal Institute of Technology (ETH) Zurich, Switzerland, in 2012. He then joined the Power Electronic Systems Laboratory, ETH Zurich, as a PhD student, where his main research interests are in the area of solid-state transformers, focusing on the analysis, optimization, and design of high-power multi-cell converter systems, reliability considerations, control strategies, grid integration aspects, and on the application-oriented evaluation of the SST concept in general, among others. After defending his PhD thesis in October 2016, he is currently with the Power Electronic Systems Laboratory, ETH Zurich, as a postdoctoral researcher.

Prof. Dehong Xu

Zhejiang University, China
Monday 5th December | 1.30pm-4.20pm

SiC MOSFET Three-Phase Inverters with Soft Switching Technology

Soft switching has been successfully applied in switching power supplies, resonant inverter for induction heating etc. However, application of soft switching to three-phase inverters are not so common up to now. Three-phase converters/inverters are widely used in Data Center, UPS, fast EV chargers, PV/Wind power inverter, and drives. In this presentation Space Vector Modulation(SVM) scheme for three-phase inverters or converters known as Zero-Voltage-Switching SVM(ZVS-SVM) is introduced. It can realize zero voltage switching for all switches including both inverter bridges switches and the auxiliary switch. Then the ZVS-SVM can be used either

three-phase AC/DC converters or inverters. Impact of SiC device on soft switching inverters is investigated with respect to the power density and conversion efficiency. Design of a soft switching SiC MOSFET grid inverter is explained. Finally experiment results of 30kW soft switching SiC MOSFET grid inverter for renewable energy are introduced.

Biography

Mark Dehong Xu (M'94-SM'09-F'13) received Ph.D. degrees from the Department of Electrical Engineering, Zhejiang University, China, in 1989. He becomes a full professor in Zhejiang University since 1996. He was a visiting professor in the Department of Electrical Engineering in University of Tokyo of Japan from May 1995 to June 1996, and Center of Power Electronics System in Virginia Tech in United State from June to December of 2000 and Power Electronics Lab of ETH in Zurich in 2006 respectively. He is interested in power electronics topology, control, and applications to renewable energy and energy efficiency. He has authored six books and more than 200 IEEE Journal or Conference papers. He holds more than 30 Chinese patents and 3 US patents. He received four IEEE journal or conference prize paper awards.

He was at-large Adcom member of IEEE Power Electronics Society from 2006 to 2008. He is an associate editor of both IEEE transaction on power electronics and IEEE transaction on Sustainable Energy. He was the General Chair of IEEE International Symposium on Industrial Electronics(ISIE2012, Hangzhou), IEEE International Symposium on Power Electronics for Distributed Generation Systems (PEDG2013, Arkansas), IEEE Power Electronics and Applications (PEAC2014, Shanghai), and International Future Energy Challenge Competition (IFEC2015). He is IEEE PELS Distinguish Lecturer in 2015-2016. He is winner of 2016 IEEE PELS R. D. Middlebrook Achievement Award. Since 2013, he is President of China Power Supply Society. He is IEEE Fellow.

SPECIAL TALKS

Special Talk 1

7 Design Tips for Selection Of Power Inductors
Monday 5th December | 11.20am-12.10pm

Alexander Gerfer

CTO, Würth Elektronik eiSos group

Special Talk 2

Realistic Life Time Estimation Based on Physics of Failure
Monday 5th December | 11.20am-11.45am

Susanne Otto

Senior Specialist - Reliability, DELTA Danish Electronics

Special Talk 3

Virtual Prototyping of High Power Devices and Modules Based on Physical High-Fidelity Modeling and Predictive Simulation
Monday 5th December | 11.45am-12.10pm

Gerhard Wachutka

Chair of Physics of Electrotechnology, Technical University of Munich

CONFERENCE PROGRAMME

	Monday	Tuesday	Wednesday	Thursday
8:00	Registration	Registration	Registration	Registration
8:30	Tutorials 1-3	Opening Ceremony	Oral Sessions *S7-S12*	Oral Sessions *S19-S23*
9:00		Keynote *Prof. J. Boys*		
9:50	Morning Tea	Morning Tea	Morning Tea	Morning Tea
10:00	Tutorials Cont.	Oral Sessions *S1-S3*	Oral Sessions *S13-S18*	Oral Sessions *S24-S28*
11:20	Special Talks 1-3	Plenary *Prof. H. Akagi*	Plenary *Prof. F. Blaabjerg*	Oral Sessions *S29-S33*
12:10	Pizza & Networking	Poster Session 1	Poster Session 3	
12:40		Lunch	Lunch	Lunch
13:30	Tutorials 4-6	Poster Session 2	Poster Session 4	Oral Sessions *S34-S38*
14:00		Plenary *Prof. J. Kolar*	Plenary *Prof. B. Ferreira*	
14:50	Afternoon Tea	Afternoon Tea	Afternoon Tea	Afternoon Tea
15:00	Tutorials Cont.	Oral Sessions *S4-S6*	Muriwai Tour & Dinner	Oral Sessions *S39-S43*
16:20	Break	Break		Conference Close
16:30	Welcome Reception	Plenary & Forum *Mr. F. Mishriki & Mr. S. Nishino*		
18:30	PELS YP Reception	Optional Guided Walks		

MONDAY 5TH DECEMBER | 8.30AM - 11.20AM

Tutorial 1

Room: 301-G050
Time: 8.30am - 9.50am & 10am - 11.20am
Power Electronics – The Key Technology for Renewable Energy System Integration.
Prof. Frede Blaabjerg *(Aalborg University, Denmark)*

Tutorial 2

Room: 301-G053
Time: 8.30am - 9.50am & 10am - 11.20am
Is SiC a Game Changer?
Prof. Dushan Boroyevich *(Virginia Tech, USA)*

Tutorial 3

Room: 302-G020
Time: 8.30am - 9.50am & 10am - 11.20am
Principles and Practices of Digital Current Regulation for AC Systems.
Prof. Grahame Holms *(RMIT University, Melbourne, Australia)*

MONDAY 5TH DECEMBER | 11.20AM - 12.10PM

Special Talk 1

Room: 301-G053
Time: 11.20am – 12.10pm
7 Design tips for selection of power inductors.
Alexander Gerfer *(Würth Elektronik, Waldenburg, Germany)*

Special Talk 2

Room: 302-G020
Time: 11.20am – 11.45am
Realistic life time estimation based on Physics of Failure.
Susanne Otto *(Senior Specialist - Reliability, DELTA Danish Electronics, Denmark)*

Special Talk 3

Room: 302-G020
Time: 11.45am – 12.10pm
Virtual Prototyping of High Power Devices and Modules Based on Physical High-Fidelity Modeling and Predictive Simulation.
Gerhard Wachutka *(Technical University of Munich, Germany)*

MONDAY 5TH DECEMBER | 1.30PM - 4.20PM

Tutorial 4

Room: 301-G050
Time: 1.30pm – 2.50pm & 3.00 - 4.20pm
Electric Springs: Basic Principles, Circuit Topologies and Applications to Smart Grids.
Prof. Ron Hui *(The University of Hong Kong, Hong Kong) & Dr. Chi Kwan Lee (The University of Hong Kong, Hong Kong)*

Tutorial 5

Room: 302-G020
Time: 1.30pm – 2.50pm & 3.00 - 4.20pm
SiC MOSFET Three-Phase Inverters with Soft Switching Technology.
Prof. Dehong Xu *(Zhejiang University, Hangzhou, China)*

Tutorial 6

Room: 301-G053
Time: 1.30pm – 2.50pm & 3.00 - 4.20pm
Fundamentals and Application-Oriented Evaluation of Solid-State Transformer Concepts.
Prof. Johann Kolar *(ETH Zurich, Switzerland) & Jonas E. Huber (ETH Zurich, Switzerland)*

TUESDAY 6TH DECEMBER | 8.30AM – 9.00AM

Room: 301-G050
Opening Ceremony

TUESDAY 6TH DECEMBER | 9.00AM – 9.50AM

Room: 301-G050
Keynote: 25 Years of IPT – a Team Effort
Prof John Boys

TUESDAY 6TH DECEMBER | 10AM – 11.20AM

S1: Modelling, Analysis and Control of WPT Systems

Room: 301-G050
Chairman: Prof. Hans-Peter Schmid; OTH Amberg-Weiden, University of Applied Sciences, Germany
Co-Chairman: Prof. Nirmal Nair; The University of Auckland, New Zealand

491. WIRELESS POWER AND DATA TRANSFER FOR ELECTRIC VEHICLE CHARGING AT CAR PARKS.
Alexander Gercikow, Andreas Fuchs and Hans-Peter Schmidt; *OTH, East Bavarian Technical University Amberg-Weiden, Germany*

257. A SIGMA-DELTA MODULATOR BASED PI CONTROLLER FOR BIDIRECTIONAL INDUCTIVE POWER TRANSFER SYSTEMS.
Akshya Swain; *The University of Auckland, New Zealand*, Dhafer Almakhles; *Prince Sultan University, Riyadh, Saudi Arabia*, Yuefeng Hou, Nitish Patel and Udaya Madawala; *The University of Auckland, New Zealand*

39. A POWER DISTRIBUTION MODEL OF MAGNETIC RESONANCE WPT SYSTEM IN SEAWATER.
Ke-Han Zhang, Zheng-Biao Zhu, Bai-Wei Song and De-Min Xu; *Northwestern Polytechnical University, China*

230. EFFICIENCY MAXIMIZATION OF WIRELESS POWER TRANSFER BASED ON SIMULTANEOUS ESTIMATION OF GENERALIZED TWO PARAMETERS.
Katsuhiro Hata, Takehiro Imura and Yoichi Hori; *The University of Tokyo, Japan*

S2: Performance and Design Issues in PM and Reluctance Machines

Room: 301-G053
Chairman: Prof. Tian-Hua Liu; *National Taiwan University of Science And Technology, Taiwan*
Co-Chairman: Dr. Nuwantha Fernando; *RMIT University, Australia*

48. DECOUPLING METHODOLOGY AND APPLICATION TO TRIPLE STAR INTERIOR PERMANENT MAGNET MACHINES.

Mehdi Ramezani and Olorunfemi Ojo; *Tennessee Technological University, United States*

93. APPLICATION OF AN ADAPTIVE PI CONTROLLER FOR A SWITCHED RELUCTANCE MOTOR DRIVE.

Jiancheng Song, Shichao Song, Bingni Qu; *Taiyuan University of Technology, China*

488. A LOW ASSEMBLY COST MAGNETIC GEARBOX.

Kiran Uppalapati; *COMSOL Corportation, United States*, Kang Li, Joshua Kadel, Jason Wright; *University of North Carolina, United States*; Jonathan Bird; *Portland State University, United States* and Wesley Williams; *University of North Carolina, United States*

21. DESIGN AND IMPLEMENTATION OF PREDICTIVE CONTROLLERS FOR DUAL-PMSM DRIVE SYSTEMS.

Tian-Hua Liu, Shao-kai Tseng, Ting-wei Lin and Yu-Chi Tu; *National Taiwan University of Science and Technology, Taiwan*

S3: Renewable Energy Systems

Room: 302-G020

Chairman: Prof. S. K Panda; *National University of Singapore, Singapore*

Co-Chairman: Prof. Patrick Hu; *The University of Auckland, New Zealand*

132. VOLTAGE SOURCE GRID-CONNECTED PV INVERTERS BASED ON MPPT AND DROOP CONTROL.

Yaoqin Jia and Rong Wu; *Xi'an Jiaotong University, China*

148. LCL-RL FILTER DESIGN FOR THE MEDIUM-VOLTAGE WIND ENERGY CONVERSION SYSTEM BASED ON DUAL MODULES PARALLEL USING PS-SVPWM.

Yaowei Hu, Jingling Cheng, Dongdong Chen and Guozhu Chen; *Zhejiang University, China*

237. SHAPING INERTIAL RESPONSE FROM WIND TURBINES: A MULTI-OBJECTIVE APPROACH.

Faizal Hafiz, Akshya Kumar Swain, Nitish Patel; *The University of Auckland, New Zealand* and Amruta Kar; *Unitec Institute of Technology, New Zealand*

307. IMPROVED CROWBARLESS LVRT CONTROL STRATEGY BASED ON FLUX LINKAGE TRACKING FOR BRUSHLESS DOUBLY FED INDUCTION GENERATOR.

Ruozhong Gao, Ailing Zhang; *Taiyuan University of Technology, China*, Zhizhong Ma; *Three Gorges Corporation China*, Shuhong Wang, Zhengfang Chen and Rongli Zhao; *Taiyuan University of Technology, China*

TUESDAY 6TH DECEMBER | 11.20AM – 12.10PM

Room: 301-G050

Plenary: High-Power Converters and its Applications: Today and Tomorrow

Prof Hirofumi Akagi

TUESDAY 6TH DECEMBER | 12.10PM – 12.40PM

Poster Session 1

Room: 305-GOOL1 Plaza

Chairman: Dr. Duleepa Thrimavithana, *The University of Auckland, New Zealand*

78. 3D MODELLING OF METAL SHIELD ON CIRCULAR COIL PAD FOR CONTACTLESS ELECTRIC VEHICLE CHARGING USING FINITE ELEMENT ANALYSIS.

Chen Yao, Weina Zhao, Dianguang Ma, Xijun Yang and Houjun Tang; *Shanghai Jiao Tong University, China*

123. HARMONIC ANALYSIS OF BIDIRECTIONAL LCL-IPT SYSTEM.

Mengyi Li (Shanghai Jiao Tong University); Gang Yao (Shanghai Jiao Tong University, China); Lidan Zhou (Shanghai Jiao Tong University, China); Zhizhu Yin (Shanghai Electric Group Co., Ltd, China);

49. MODELING AND ADVANCED CONTROL OF WIRELESS POWER TRANSFER SYSTEM WITH Z-SOURCE INVERTER.

Tianfeng Wang (Shanghai Jiao Tong University); Xin Liu (Shanghai Jiao Tong University); Houjun Tang (Shanghai Jiao Tong University); Yayun Dong (Shanghai); Xijun Yang (Shanghai Jiao Tong University);

229. IMPACT OF IRON DUST ON ELECTROMECHANICAL SYSTEMS: A CASE STUDY.

Michael Flankl, Arda Tuysuz and Johann W. Kolar; *Swiss Federal Institute of Technology (ETH Zurich),Switzerland*

152. LONG-TERM PERFORMANCE OF SODIUM SULFUR BATTERY.

Ken'ichi Saruta; *Tokyo Electric Power Company Holdings, Japan*

30. INVESTIGATION OF THE LIMITING FACTORS OF THE DEAD TIME MINIMIZATION IN A H-BRIDGE IGBT INVERTER.

Guangye Si, Zhiwei Shen, Zhenbin Zhang and Ralph Kennel; *Technical University of Munich, Germany*

102. LOW-COST HIGH-VOLTAGE ARBITRARY WAVEFORM GENERATOR FOR BROAD LIFETIME MEASUREMENTS OF ELECTROLUMINESCENT DEVICES.

Katrin Hirmer, Peter Schuster, Ferdinand Keil and Klaus Hofmann; *TU Darmstadt, Germany*

122. A CLASS OF PARALLEL OPERATED IMPEDANCE SOURCE INVERTERS.

Zeeshan Aleem and Moin Hanif; *University of cape town, South Africa*

390. THE STUDY ON CURRENT CONTROL TECHNIQUES ON ARP FOR ELEVATOR SYSTEM.

Hae Chan Park (Korea National University of Transportation); Il song Kim (Korea National University of Transportation,vKorea

103. BASIC CIRCUIT THEORETIC CONSIDERATIONS OF LED DRIVING: VOLTAGE-SOURCE VERSUS CURRENT-SOURCE DRIVING.

Zheng Dong (The Hong Kong Polytecnic University); Chikong Tse (The Hong Kong Polytecnic University); Ron Hui (The University of Hong Kong);

135. DESIGN OF AN LLC RESONANT CONVERTER FOR EDM APPLICATIONS.

Carl Odulio (University of the Philippines); Jon Clare (University of Nottingham); Alessandro Costabeber (University of Nottingham); Allan Nerves (University of the Philippines); Ray Ridley (Ridley Engineering); Alan Watson (University of Nottingham);

178. A NOVEL INTERLEAVED FLYBACK-TYPED CONVERTER WITH ZVS OPERATION.
Hung-Liang Cheng (Dept. of Electrical Engineering, I-Shou University); Yong-Nong Chang (National Formosa University); Hau-Chen Yen (Far East University); Chih-Chiang Hua (National Yunlin University of Science and Technology); Peng-Yu Su (Dept. of Electrical Engineering, I-Shou University,);

240. DESIGN METHOD AND EFFICIENCY ANALYSIS OF A DAB CONVERTER FOR PV INTEGRATION IN DC GRIDS.
Philipp Joebges (RWTH Aachen University); Jingxin Hu (RWTH Aachen University); Rik W. De Doncker (RWTH Aachen University);

251. FLEXIBLE EXPERIMENTAL FPGA BASED PLATFORM FOR TESTING AND VERIFYING DIGITAL CONTROLLED DC-DC CONVERTERS.
Karsten Holm Andersen (University of Southern Denmark); Morten Nymand (University of Southern Denmark);

297. ANALYSIS AND DESIGN METHOD OF ZCS DC-DC CONVERTER IN CONSIDERATION OF THE PARASITIC CAPACITANCE OF SWITCH AND ITS EFFECT ON LOSS REDUCTION.
Takahiro Ota (Kyushu University); Jun Imaoka (Kyushu University); Masahito Shoyama (Kyushu University); Hiroyuki Onishi (OMRON Corporation); Singo Nagaoka (OMRON Corporation); Sadaharu Morishita (OMRON Corporation);

300. DESIGN OF PID CONTROLLER USING CUCKOO SEARCH ALGORITHM FOR BUCK-BOOST CONVERTER OF LED DRIVER CIRCUIT.
Piyush Verma (University of Auckland); Nitish Patel (University of Auckland); Nirmal-Kumar Nair (University of Auckland); Afzal Sikander (Graphic Era University);

335. ELECTRICAL DESIGN CONSIDERATIONS FOR A 4 KW BUCK CONVERTER WITH NORMALLY-OFF GAN DEVICES AT A DC-LINK VOLTAGE OF 400 V.
Philipp Schülting (RWTH Aachen University); Dominik Kubon (RWTH Aachen University); Rik W. De Doncker (ISEA RWTH Aachen University);

127. A NEW TOPOLOGY FOR CURRENT-LIMITING SOLID-STATE HVDC CIRCUIT BREAKER.
Shuai Li (North China Electric Power University), Zhao Chengyong (North China Electric Power University); Jianzhong Xu (North China Electric Power University);

TUESDAY 6TH DECEMBER | 1.30PM – 2.00PM

Poster Session 2

Room: 305-GOOL1 Plaza
Chairman: Dr. Samitha Ransara, *The University Of Auckland, New Zealand*

341. FIELD-CIRCUIT ANALYSIS OF PLANAR TRANSFORMER AT MEDIUM FREQUENCY FOR CONVERTER APPLICATION.
Chengjian Lian (University of New South Wales) ; Daming Zhang (University of New South Wales);

353. FREQUENCY MODULATION OF A SERIES RESONANT DUAL ACTIVE BRIDGE TO MINIMIZE THE CIRCULATING REACTIVE CURRENTS IN THE HIGH FREQUENCY LINK.
Wynand Malan (Queensland University of Technology); Mahinda Vilathgamuwa (Queensland University of Technology); Geoffrey Walker (QU); Mark Broadmeadow (Queensland University of Technology);

436. ANALYSIS OF A CASCADED HIGH-BOOST NON-ISOLATED DC-DC CONVERTER WITH BIDIRECTIONAL POWER FLOW.
Ilham Osman (UNSW Australia); Dan Xiao (UNSW Australia); Faz Rahman (University of New South Wales);

503. IMPLEMENTATION OF AN INTERNAL MODEL CONTROLLER WITH ANTI-RESET WINDUP COMPENSATION FOR OUTPUT VOLTAGE TRACKING OF A NON-MINIMUM PHASE DC-DC BOOST CONVERTER USING FPGA.
Kobaku Tarakanath (IIT-Bombay) ; Sachin C. Patwardhan, (IIT-Bombay); Vivek Agarwal (IIT-Bombay);

62. AN IMPROVED CIRCULATING CURRENT CONTROL STRATEGY FOR MODULAR MULTILEVEL CONVERTERS THROUGH REDUNDANT VOLTAGE LEVELS.
Xingxing Chen (Xi'an Jiaotong University); Jinjun Liu (Xi'an Jiaotong University) ; Shaodi Ouyang (Xi'an Jiaotong University); Shuguang Song (Xi'an Jiaotong University);

100. LINEARIZED OPERATION OF MMC BATTERY ENERGY STORAGE SYSTEM.
Nan Li (Shandong University); Gao Feng (Shandong University) ;

114. IMPROVED WAVE SHAPE-PATTERN PERFORMANCE USING PHASE OPPOSITE DISPOSITION (POD) METHOD FOR CASCADED MULTILEVEL INVERTER.
Atikah Razi (Universiti Teknikal Malaysia Melaka); Ahmad Syafiq Wahab (Universiti Teknikal Malaysia Melaka) ; Syahar Azalia Ab. Shukor (Universiti Teknikal Malaysia Melaka); Ahmad Faris Najmuddin (Universiti Teknikal Malaysia Melaka);

328. COMPARATIVE ANALYSIS OF FPGA-BASED DIGITAL PULSE WIDTH MODULATION TECHNIQUES FOR MULTIPHASE DC-DC CONVERTERS.
Muqadsa Tahir (Queensland University of Technology); Geoffrey Walker (Queensland University of Technology); Mark Broadmeadow (Queensland University of Technology); Steven Bulmer (Queensland University of Technology); Gerard Ledwich (Queensland University of Technology);

336. DUAL ACTIVE BRIDGE ASSISTED MODULAR MULTILEVEL CONVERTER ALLOWING LOW FREQUENCY OUTPUT.
Shuguang Song (Xi'an Jiaotong University); Prof Jinjun Liu (Xi'an Jiaotong University) ; Shaodi Ouyang (Xi'an Jiaotong University); Xingxing Chen (Xi'an Jiaotong University);

483. ON ASSESSMENT OF PROMINENT HEURISTIC METHODS TOWARDS SELECTIVE HARMONIC MITIGATION.
Mohammadhossein Etesami, Negareh Ghasemi, Mahinda Vilathgamuwa and Wynand Malan; Queensland University of Technology, Australia

208. INCREASING THE OPERATING RANGE OF PERMANENT MAGNET SYNCHRONOUS MOTORS BY SWITCHING THE WINDING CONFIGURATIONS.
Miriam Boxriker (Karlsruhe Institute of Technology) ; Patrick Winzer (Karlsruhe Institute of Technology); Johannes Kolb (SHARE at KIT - Schaeffler Technologies AG & Co. KG); Martin Doppelbauer (Karlsruhe Institute of Technology);

215. PHASE-VARIABLE MODELING OF A SYNCHRONOUS RELUCTANCE MOTOR USING PSIM.
Ming-Fa Tsai (Minghsin University of Science and Technology) ; Chung-shi Tseng (Minghsin University of Science and Technology); Chun-han Chen (Industrial Technology Research Institute of Taiwan, ROC.); Yung-jen Cheng (Industrial Technology Research Institute of Taiwan, ROC.);
Chun-hsiang Yang (Industrial Technology Research Institute of Taiwan, ROC.);

383. DYNAMIC OPTIMISATION OF SWITCHING POINTS IN SWITCHED RELUCTANCE DRIVES.
Dave Winterborne (University of Newcastle) ; Pickert Volker (University of Newcastle);

231. ROBUSTNESS IMPROVEMENT BY USING LINEAR QUADRATIC REGULATOR CONTROL FOR PMSG.
Cheng Xiaoxiao (Shanghai Maritime University/University de Nantes); Mourad Ait-ahmed (University de Nantes); Mohamed-fouad Benkhoris (University de Nantes); Naima Aït-ramdane (University de Nantes) ; Tianhao Tang (Shanghai Maritime University);

107. SWITCHED-CAPACITOR CHARGE EQUALIZATION CIRCUIT FOR SERIES-CONNECTED BATTERIES.
Abdullah Sani (National Taiwan University of Science and Technology); Chih Kuo Hu (National Taiwan University of Science and Technology) ; Yao-ching Hsieh (National Taiwan University of Science and Technology); Huang-Jen Chiu; (National Taiwan University of Science and Technology); Jing-yuan Lin (National Taiwan University of Science and Technology);

282. STUDY ON COGGING TORQUE IN COAXIAL PLANETARY MAGNETIC GEAR.
Oleg Molokanov, Pavel Kurbatov, Sergey Osipkin and Pavel Dergachev; *Moscow Power Engineering Institute, Russia*

116. VOLTAGE REGULATION IN DC MICORGRID WITH VARIOUS CIRCUIT CONFIGURATIONS.
Made Andik Setiawan, Ahmed Abu Siada and Farhad Shahnia; *Curtin University, Australia*

TUESDAY 6TH DECEMBER | 2.00PM – 2.50PM

Room: 301-G050
Plenary: Multi-Objective Optimization in Power Electronics
Prof Johann Kolar

TUESDAY 6TH DECEMBER | 3.00PM – 4.20PM

S4: Advanced Converter Control

Room: 301-G050
Chairman: Prof. Grahame Holmes, *RMIT University, Australia*
Co-Chairman: Dr. Baljit Riar, *Utah State University, United States*

319. MODULATED MODEL PREDICTIVE ROTOR CURRENT CONTROL (M2PC) OF A DFIG DRIVEN BY AN INDIRECT MATRIX CONVERTER WITH FIXED SWITCHING FREQUENCY.
Alejandro Olloqui, Jose L. Elizondo (Tecnologico de Monterrey); Marco Rivera(Universidad de Talca); Manuel E. Macias(Tecnologico de Monterrey); Osvaldo M. Micheloud (Tecnologico de Monterrey); Ruben Pena (Universidad de Concepcion); Patrick Wheeler Wheeler(University of Nottingham);

313. CAPACITANCE MINIMIZATION IN MODULAR MULTILEVEL CONVERTERS: USING MODEL PREDICTIVE CONTROL TO INJECT OPTIMAL CIRCULATING CURRENTS AND ZERO-SEQUENCE VOLTAGE.
Christopher Townsend; *University of Newcastle, Australia*, Ricardo P. Aguilera (The University of Technology Sydney); Pablo Acuna (University of New South Wales); Georgios Konstantinou (UNSW Australia); Josep Pou (Nanyang Technological University); Galina Mirzaeva (University of Newcastle); Graham Goodwin (University of Newcastle);

342. BIDIRECTIONAL CURRENT SOURCE CONVERTER: DESIGN, CONTROL AND PERFORMANCE EVALUATION.
Baljit Riar(Utah State University); David Howey (University of Oxford); Duleepa Thrimawithana (University of Auckland); Dan Rogers (University of Oxford); Regan Zane (Utah State University);

444. ACCURATE STATE SPACE REALISATIONS OF RESONANT FILTERS FOR HIGH PERFORMANCE INVERTER CONTROL APPLICATIONS.
Brendan McGrath (RMIT University); Grahame Holmes (RMIT University);

S5: Novel Storage Techniques and Applications

Room: 301-G053
Chairman: Prof. Geoff Walker, *Queensland University Of Technology, Australia*
Co-Chairman: Dr. Jonathan Bradshaw, *Payment Express, Auckland, New Zealand*

252. EXPERIMENTAL INVESTIGATION ON PROPERTIES OF SMALL-SCALLE FLOW BATTERY.
Marcin Jarnut (University of Zielona Gora) ; Grzegorz Benysek (University of Zielona Gora); Szymon Wermiński (University of Zielona Gora); Bartosz Waśkowicz (University of Zielona Gora);

349. LOAD MODELING FOR ELECTRIC TAXI BATTERY CHARGING AND SWAPPING STATIONS: COMPARISON STUDIES.
Binjie Liao (Zhejiang University); Liang Li (State Grid Zhejiang Electric Power Company); Jun Yang Yang (State Grid Hangzhou Power Supply Company); Fushuan Wen (Universiti Teknologi Brunei); Md. Abdus Salam (Universiti Teknologi Brunei); Bo Li (State Grid Zhejiang Electric Power Company); Jianwei Mao (State Grid Zhejiang Electric Power Company);

399. AN ELECTRICAL MODEL CAPABLE OF ESTIMATING THE STATE OF ENERGY FOR LITHIUM-ION BATTERIES USED IN ENERGY STORAGE SYSTEMS.
Kaiyuan Li (Nanyang Technological University); King Jet Tseng (Singapore Institute of Technology);

356. SEMI-DECENTRALIZED CHARGING AND DISCHARGING CONTROL OF FLOATING BATTERIES IN MICROGRIDS.
Farhad Shahnia (Murdoch University);

S6: Operational Issues in Microgrids

Room: 302-G020
Chairman: Prof. S. K Panda; *National University of Singapore, Singapore*
Co-Chairman: Nirmal Nair; *The University of Auckland, New Zealand*

459. DETERMINATION OF WAVEFORM PARAMETERS FOR SHORT-TIME A.C. VOLTAGE AND CURRENT GENERATED BY IEC 61083-4 TDG.
Shuji Sato (Utsunomiya University); Seisuke Nishimura (Nippon Institute of Technology); Hiroyuki Shimizu; *Nippon Institute of Technology, Japan;*

338. OPERATION OF ISLANDED MICROGRID AT CONSTANT FREQUENCY WITH DISTRIBUTED GRID-SUPPORTING GENERATORS.
Daming Zhang (University of New South Wales);

210. CONDITION MONITORING SYSTEM OF UBIN ISLAND MICRO-GRID.
Wei Feng (Nanyang Technological University); Szu-cheng Chien (Nanyang Technological University); Yu Shwe Hnin (Nanyang Technological University); Tseng King Jet (Nanyang Technological University); Costas J. Spanos (University of California); Sanjib Kumar Panda (National University of Singapore);

110. NEW SEAMLESS OPERATION SCHEME FOR STAND-ALONE POWER SYSTEM WITH EG AND BESS-PV PANEL.
Byung-Moon Han, Jae-Hyuk Kim; Myongji University, South Korea

TUESDAY 6TH DECEMBER | 4.30PM – 6.30PM

Room: 301-G050 & 302-G060 & G080
Plenary & IPT Forum
Fady Mishriki & Shuzo Nishino

WEDNESDAY 7TH DECEMBER | 8.30AM – 9.50AM

S7: Modulation and Control of WPT Systems

Room: 302-G020
Chairman: Prof. Hao Ma *(Zhejiang University, China)*
Co-chairman: Prof. Patrick Hu *(The University of Auckland, New Zealand)*

309. EVALUATION OF A CURRENT DOUBLER IPT PICKUP CONTROLLER FOR MATERIALS HANDLING APPLICATIONS.
Hui Zhi (Zak) Beh (University of Auckland); Michael Neath (University of Auckland); Grant Covic (University of Auckland); John Boys (University of Auckland);

258. SINGLE-BIT MODULATOR BASED CONTROLLER FOR CAPACITIVE POWER TRANSFER SYSTEM.
Dhafer Almakhles (Prince Sultan University, Riyadh, Saudi Arabia); Nathan Pyle (University of Auckland); Hossein Mehrabi (University of Auckland); Akshya Swain (University of Auckland); Auigo Patrick Hu (University of Auckland);

281. ANALYSIS AND CONTROL OF POST REGULATION OF WIRELESS POWER TRANSFER SYSTEMS.
Hongchang Li (Nanyang Technological University); Kangping Wang (Xi'an Jiaotong University); Yang Xu (Xi'an Jiaotong University); Yi Tang (Nanyang Technological University);

149. A COMPARATIVE STUDY OF CURRENT CONTROL METHODS FOR A 5KW WIRELESS EV CHARGING SYSTEM.
Fang Liu (Tsinghua University); Zhengming Zhao (Tsinghua University); Kainan Chen (Tsinghua University); Jintong Nie (Tsinghua University); Yiming Zhang (Tsinghua University); Liqiang Yuan (Tsinghua University, China);

S8: Sensorless Control of PM Synchronous Machines

Room: 303-G013
Chairman: Prof. Robert Betz *(University Of Newcastle, Australia)*
Co-Chairman: Dr. Nuwantha Fernando *(Rmit University, Australia)*

17. SENSORLESS IPMSM POSITION CONTROL SYSTEM USING HIGH FREQUENCY INJECTION METHOD.
Tian-Hua Liu; *National Taiwan University of Science and Technology, Taiwan*, Shao-kai Tseng (National Taiwan University of Science and Technology, Taiwan); Ting-wei Lin (National Taiwan University of Science and Technology); Jui-Ling Chen (National Taiwan University of Science and Technology);

45. A SMOOTH AND FAST TRANSITION METHOD FOR PMSM SMO BASED SENSORLESS CONTROL.
Li Niu, Jianyang Zhai; *Rolls-Royce @ NTU Corporate Lab, Nanyang Technological University, Singapore*, Xiong Liu; *Rolls-Royce Singapore Pte. Ltd., Singapore*, Youyi Wang; *Nanyang Technological University, Singapore,* and Amit Gupta; *Rolls-Royce Singapore Pte. Ltd., Singapore*

311. SENSORLESS CONTROL OF A PM SYNCHRONOUS MOTOR IN OVER MODULATION REGIONS FOR HIGH SPEED OPERATION.
Hae-Jun Choi, Kwan-Yuhl Cho, Hag-Wone Kim; *Korea National University of Transportation, Korea* and Se-Kyo Chung; *Gyeongsang National University, Korea*

310. A POSITION SENSORLESS MODEL PREDICTIVE DUTY CYCLE CONTROLLER FOR AN IPMSM OVER WIDE SPEED RANGE USING CURRENT DERIVATIVE MEASUREMENTS.
Minh Bui, Faz Rahman, Dan Xiao and Faz Rahman; *University of New South Wales, Australia*

S9: Control and Protection Issues in DC Microgrids

Room: 303-G014
Chairman: Prof. Byung Moon Han *(Myongji University, South Korea)*
Co-Chairman: Prof. Nirmal Nair *(The University Of Auckland, New Zealand)*

206. MODELLING OF DC ARCS FOR PHOTOVOLTAIC SYSTEM FAULTS.
Madhawa Weerasekara, Mahinda Vilathgamuwa and Yateendra Mishra; *Queensland University of Technology, Australia*

398. PROTECTION CO-ORDINATION OF VOLTAGE WEAK DC DISTRIBUTION SYSTEMS: CONCEPTS.
Tsegay Hailu, Laurens Mackay, Mladen Gagic and J.A. Ferreira; *Delft University of Technology, Netherlands*

463. A NOVEL DC BUS SIGNALING METHOD USING PULSE FREQUENCY MODULATION FOR DC MICROGRID.
Choi Hyunjun, Jeehoon Jung; *Ulsan National Institute of Science and Technology, Korea,* and Youngpyo Cho; *Korea Electric Power Corporation, Korea*

52. BUS POWER CONTROL UNIT DEVELOPMENT AND HARDWARE-IN-THE-LOOP EVALUATION OF AIRCRAFT ELECTRIC POWER SYSTEM.
Danyang Wang (Nanjing University of Aeronautics and Astronautics); Shanshui Yang (Nanjing University of Aeronautics and Astronautics); Weifang Liu (Commercial Aircraft Corporation of China Ltd); Li Wang (Nanjing University of Aeronautics and Astronautics);

S10: Power Electronics in HVDC, HVAC and FACTS

Room: 303-G015
Chairman: Prof. Athula Rajapakse *(University Of Manitoba, Canada)*
Co-Chairman: Dr. Shantha Gamini *(Australian Maritime Collage, University Of Tasmania, Australia)*

41. STABILITY ANALYSIS OF DUAL INFEED VSCS INTEGRATED TO WEAK AC SYSTEM.
Bin Yuan (North China Electric Power University); Zhao chengyong (North China Electric Power University);

142. DC FAULT MODELING OF MMC-BASED HVDC GRIDS FOR OPTIMIZATION PURPOSES.
Epameinondas Kontos and Pavol Bauer; *Delft University of Technology, Netherlands*

330. SEQUENTIAL AUTO-RECLOSING METHOD FOR HYBRID HVDC BREAKER IN VSC HVDC LINKS.
Vinothkumar K; *ABB Global Industries and Services Private Limited, India,* Inger Segerqvist, Niclas Johannesson and Arman Hassanpoor; *Grid Systems, HVDC ABB AB, Sweden*

416. A NOVEL METHOD FOR ESTIMATION OF IGBT SWITCHING LOSSES IN VOLTAGE SOURCE CONVECTORS THROUGH EMT SIMULATIONS.
Naushath Mohamed Haleem and Athula Rajapaksha; *University of Manitoba, Canada*

S11: Emerging Topics in Power Electronics I

Room: 303-G016
Chairman: Prof. Patrick Wheeler *(University Of Nottingham, UK)*
Co-Chairman: Dr. Samitha Ransara *(The University Of Auckland, New Zealand)*

115. A 20-AMPERE, 4-QUADRANT POWER SUPPLY FOR MAGNETS.
Roberto Visintini and Marco Cautero; *Elettra Sincrotrone Trieste, Italy*

145. A CONTROL SCHEME COMBINING STATE-OF-CHARGE BALANCING AND VOLTAGE/CURRENT REGULATION FOR A DISTRIBUTED BATTERY SYSTEM BASED ON FLY-BACK CONVERTER.
Jian Qi; *The University of Sydney, Australia*, and Dylan Dah-Chuan Lu; *University of Technology Sydney, Australia*

179. HYBRID IMPEDANCE NETWORK-BASED CONVERTER WITH HIGH VOLTAGE GAIN AND NO COMMUTATION PROBLEM.
Ali Mostaan; *Iranian Central Oil Field Company, Iran,* Mohsen Soltani; *Aalborg University, Denmark*, and Saman Asghari Gorji; *Swinburne University of Technology, Australia*

315. WEIGHT CONSIDERATION OF LIQUID METAL COOLING TECHNOLOGY FOR POWER ELECTRONICS CONVERTER IN FUTURE AIRCRAFT.
Assel Sakanova, CF Tong, King Jet Tseng; *Nanyang Technological University, Singapore,* Rejeki Simanjorang and Amit K Gupta; *Rolls-Royce Singapore Pte.Ltd, Singapore*

S12: Soft Switching Converters

Room: 301-G053
Chairman: Prof. Graham Holmes *(Rmit University, Australia)*
Co-Chairman: Dr. Jonathan Bradshaw *(Payment Express, Auckland, New Zealand)*

433. EXTENDED SOFT SWITCHING OPERATION OF THREE-PHASE DUAL ACTIVE BRIDGE CONVERTERS WITH UNBALANCED TRANSFORMER IMPEDANCES.
Carlos Teixeira (RMIT University); Jan Riedel (RMIT University); Grahame Holmes (RMIT University); Brendan McGrath (RMIT University);

261. COMMON DUTY RATIO CONTROL OF SERIES RESONANT DUAL ACTIVE BRIDGE CONVERTER.
Anping Tong (Shanghai Jiao Tong University); Lijun Hang (Hangzhou Dianzi University); Guojie Li (Shanghai Jiao Tong University); Minglin Zhu (Shanghai Jiao Tong University); Da Xie (Shanghai Jiao Tong University);

419. ANALYSIS OF ZERO VOLTAGE SWITCHING REQUIREMENTS AND PASSIVE AUXILIARY CIRCUIT DESIGN FOR DC-DC SERIES RESONANT CONVERTERS WITH CONSTANT INPUT CURRENT.
Tarak Saha (Utah State University); Hongjie Wang (Utah State University); Baljit Riar (Utah State University); Regan Zane (Utah State University);

155. A VARY MODE CONTROL-BASED HIGH-EFFICIENCY FULL-BRIDGE LLC RESONANT CONVERTER OPERATING IN SUPER WIDE INPUT VOLTAGE RANGE.
Huipin Lin (Zhejiang University); Xiaoguang Jin (Zhejiang University); Xinnian Sun (Hangzhou Yinhu electric equipment Co.LTD); Wenxi Yao (Zhejiang University); Zhengyu Lyu (Zhejiang University); Yan Deng (Zhejiang University);

WEDNESDAY 7TH DECEMBER | 10.00AM – 11.20AM

S13: AC Machine Design, Control and Applications

Room: 302-G020
Chairman: Prof. Tian-Hua Liu *(National Taiwan University Of Science And Technology, Taiwan)*
Co-Chairman: Dr. Nuwantha Fernando *(Rmit University, Australia)*

47. ELECTROMAGNETIC DESIGN AND OPTIMIZATION ANALYSIS ON AN EMBEDDED SEGMENTED ROTOR FLUX SWITCHING MACHINE.
Xiaohe Ma; *Rolls-Royce@NTU Corporate Lab, Singapore,* Shuai Wang, Rong Su, King Jet Tseng; *Nanyang Technological University, Singapore*, Viswanathan Vaiyapuri, Amit Gupta, Ramakrishna Shanmukha and Chandana Gajanayake; *Rolls-Royce Singapore Pte. Ltd, Singapore*

406. EDDY-CURRENT-BASED CONTACTLESS SPEED SENSING OF CONDUCTIVE SURFACES.
Arda Tuysuz, Michael Flankl, Johann W. Kolar; *ETH Zurich, Switzerland*, and Annette Muetze; *Graz University of Technology, Austria*

498. FIELD MODULATED ELECTROMAGNETIC CLUTCH WITH SLIP CONTROL.
Nuwantha Fernando; *RMIT University, Australia*

504. TORQUE CHARACTERISTICS OF THE TSCAOI CONFIGURED INDUCTION GENERATOR.
Zhijia Wang (University of Auckland); Udaya Madawala (University of Auckland); Tian-Hua Liu (National Taiwan University of Science and Technology); Mahinda Vilathgamuwa (Queensland University of Technology); Duleepa Thrimawithana (University of Auckland);

S14: Novel Topologies and Modulation for Multilevel Converters

Room: 303-G013
Chairman: Prof. Dong-Choon Lee *(Yeungnam University, South Korea)*
Co-Chairman: Dr. Jonathan Bradshaw *(Payment Express, Auckland, New Zealand)*

55. H-BRIDGE FLOATING CAPACITOR VOLTAGE STABILITY CONDITIONS ANALYSIS BASED ON A MODIFIED HYBRID MULTILEVEL CONVERTER.
Hanyang Yu (Zhejiang University); Bin Chen (Huichuan Technology); Wenxi Yao (Zhejiang University); Zhengyu Lyu (Zhejiang University); Yan Deng (Zhejiang University);

388. ON THE DC/DC CONVERTERS FOR CASCADED ASYMMETRIC MULTILEVEL INVERTERS AIMED TO INJECT PHOTOVOLTAIC ENERGY INTO MICROGRIDS.
Pablo Silva, Javier Munoz, Rodrigo Aliaga, Patricio Gaisse, Carlos Restrepo and Mario Fernandez; *Universidad de Talca, Chile*

140. MULTI-PULSE VSC ARRANGEMENTS WITH COUPLED REACTORS.
Ryszard Strzelecki (Warsaw Electrotechnical Institute / ITMO University); Tomasz Sak (Warsaw Electrotechnical Institute); Zolov Pavel Dmitrović (ITMO University); Artur Moradewicz (Warsaw Electrotechnical Institute); Maciej Grabarek (Gdynia Maritime University);

470. A NOVEL OPERATING SCHEME OF FIVE-LEVEL HYBRID INVERTERS FOR MEDIUM VOLTAGE APPLICATIONS.
Ngoc Dat Dao and Dong-Choon Lee; *Yeungnam University, Korea*

S15: Active and Passive Devices for Power Electronics

Room: 303-G014
Chairman: Dr. Daming Zhang *(University Of New South Wales)*
Co-Chairman: Dr. Baljit Riar *(Utah State University, USA)*

363. AN IMPROVED SWITCHING LOSS MODEL FOR HIGH- VOLTAGE ENHANCEMENT-MODE GAN HEMTS.
Kangping Wang, Mofan Tian; *Xi'an Jiaotong University, China*, Hongchang Li; *Nanyang Technological University, Singapore*, Feng Zhang, Yang Xu and Laili Wang; *Xi'an Jiaotong University, China*

295. ERROR ANALYSIS OF HIGH FREQUENCY CORE LOSS MEASUREMENT FOR LOW-PERMEABILITY LOW-LOSS MAGNETIC CORES.
Farideh Javidi Niroumand and Morten Nymand; *University of Southern Denmark, Denmark*

226. PREDICTION OF HARMONIC CURRENT FREQUENCIES AND AMPLITUDES GENERATED IN POWER INDUCTORS DUE TO SATURATION IN FERRITE AND IRON POWDER CORES.
Markus Bienholz and Gerd Griepentrog; *Technical University of Darmstadt, Germany*

435. THE DESIGN OF A MAGNETIC COMPONENT TO CONCENTRATE MAGNETIC FIELDS FOR LOCALIZED INDUCTION HEATING.
Aaron Lin, Ben Pearce, Craig Baguley; *Auckland University of Technology, New Zealand,* Michael Causley; *Electronic Design Solutions Ltd, , New Zealand,* Alex Findlay and Matt Findlay; *Annealing Made Perfect Ltd, New Zealand*,

S16: Novel Mitigation Techniques, Modelling and Control in Power Quality

Room: 303- G015
Chairman: Prof. Athula Rajapakse *(University of Manitoba, Canada)*
Co-Chairman: Prof. Nirmal Nair *(The University of Auckland, New Zealand)*

141. FINITE ELEMENT METHOD BASED ELECTROMAGNETIC MODELING OF THREE-PHASE EMI FILTERS.
Illia Manushyn and Gerd Griepentrog; *Technical University Darmstadt, Germany*

302. MITIGATION CONDUCTED-EMI EMISSION STRATEGY BASED ON DISTRIBUTED PARAMETERS OF POWER INVERTER SYSTEM IN ELECTRIC VEHICLE.
Li Zhai (Beijing institute of technology); Liwen Lin (Beijing institute of technology); Chao Song (Beijing institute of technology); Xinyu Zhang (Beijing Institute of Radio Metrology and Measurement);

456. HYBRID ACTIVE DAMPING OF LCL-FILTERED GRID CONNECTED CONVERTER.
Abdelhady Ghanem (University of Nottingham); Mohamed Rashed (University of Nottingham); Mark Sumner (University of Nottingham); Mohamed Adel Elsayes (Mansoura University); Ibrahim Mansy (Mansoura University);

487. EXPLOITATION OF DIGITAL FILTERS TO ADVANCE THE SINGLE-PHASE T/4 DELAY PLL SYSTEM.
Yongheng Yang (Aalborg University); Keliang Zhou (University of Glasgow); Frede Blaabjerg (Aalborg University);

S17: Issues in Transportation and Mobility I

Room: 303-G016
Chairman: Prof. Ojo Olorunfemi *(Tennessee Tech University, USA)*
Co-Chairman: Dr. Shantha Gamini *(Australian Maritime Collage, University of Tasmania, Australia)*

162. RESERVING CHARGING STRATEGY FOR ELECTRIC VEHICLES BASED ON COMBINED MODEL OF ROAD-CHARGING STATION-ELECTRIC VEHICLE.
Haoming Liu (Hohai University); Man Niu (Hohai University); Weijie Wang (Hohai University);

250. EFFICIENCY MAP COMPUTATION OF ARBITRARY CONVERTER TOPOLOGIES IN EV POWERTRAINS.
Christian Axtmann (Karlsruhe Institute of Technology); Johannes Kolb (SHARE at KIT - Schaeffler Technologies AG & Co. KG); Michael Braun (Karlsruhe Institute of Technology);

269. CONTROL AND EFFICIENCY ANALYSIS FOR A LUNDELL-ALTERNATOR/ACTIVE-RECTIFIER SYSTEM IN AUTOMOTIVE APPLICATIONS.
Dimitrios Sarafianos (University of Cambridge); Danilo Llano (University of Cambridge); Bo Wen (University of Cambridge); Richard McMahon (WMG); Timothy Flack (University of Cambridge); Stephen Pickering (JaguarLandRover Ltd);

273. A NEW TOPOLOGY FOR AN UNIDIRECTIONAL GALVANIC ISOLATED COMBINED CONVERTER.
Ing. Martin Neuburger (University of Applied Sciences Esslingen); Walter Seeger (University of Applied Sciences Esslingen); Felix Bertele (University of Applied Sciences Esslingen); Ulrich Ammann (University of app); Duleepa Thrimawithana (University of Auckland);

S18: New Developments in WPT Systems

Room: 301-G053
Chairman: Prof. Xin Dai *(Chongqing University, China)*
Co-Chairman: Prof. Patrick Hu *(The University of Auckland, New Zealand)*

513. DETERMINING THE MAXIMUM POWER TRANSFER CONDITION FOR ULTRASONIC POWER TRANSFER SYSTEM.
Xin Dai (Chongqing university); Lu Li (Chongqing university); Ho Fai Leung (University of Auckland); Auigo Patrick Hu (University of Auckland); Yanling Li (Chongqing university); Guoping Hou (Chongqing Normal university);

304. FREE SPACE WIRELESS CHARGING IN CARS WITH FISHBONE DQ IPT COILS.
Ji H. Kim, Van Thai and Chun Rim; *Korea Advanced Institute of Science and Technology, Korea*

125. SHIFTING SLABS: ENHANCEMENT OF MAGNETIC COUPLING IN A WIRELESS POWER TRANSFER SYSTEM.
Yayun Dong (Shanghai Jiao Tong University, China); Wenwen Li (Shanghai Jiao Tong University, China); Xijun Yang (Shanghai Jiao Tong University); Dianguang Ma (Shanghai Jiao Tong University, China); Houjun Tang (Shanghai Jiao Tong University);

126. DESIGN OF A 13.56 MHZ IPT SYSTEM OPTIMISED FOR DYNAMIC WIRELESS CHARGING ENVIRONMENTS.
Juan M. Arteaga (Imperial College London); Samer Aldhaher (Imperial College London); George Kkelis (Imperial College London); David Yates (Imperial College London); Paul Mitcheson (Imperial College London);

WEDNESDAY 7TH DECEMBER | 11.20AM – 12.10PM

Room: G301-G050
Plenary: Design for reliability in power electronic systems
Prof Frede Blaabjerg

WEDNESDAY 7TH DECEMBER | 12.10PM – 12.40PM

Poster Session 3

Room: 305-G00L1
Chairman: Mr. Saranga Weerasinghe *(The University of Auckland, New Zealand)*

417. INTEGRATION OF SOLID STATE TRANSFORMER WITH DC MICROGRID SYSTEM.
Welbert Rodrigues (Federal University of Ouro Preto); Renato Santana (Federal University of Minas Gerais); Anna Paula Cota (Federal University of Minas Gerais); Thiago Oliveira (Federal University of Minas Gerais); Lenin Martins Ferreira Morais (Federal University of Minas Gerais); Porfírio Cortizo (Federal University of Minas Gerais, Brazil);

515. ANALYSIS ON MAGNETIC FLUX DENSITY AND CORE LOSS FOR HEXAGONAL AND BUTT-LAP CORE JOINT TRANSFORMERS.
Omar.sh. Alyozbaky; *University of Mosul, Iraq*, Maryam Isa (Universiti Putra Malaysia); Mohd Zainal Abidin Ab-kadir (Universiti Putra Malaysia); Mahdi Izadi (Universiti Putra Malaysia); Norhafiz Azis (Universiti Putra Malaysia); Chandima Gomes (Universiti Putra Malaysia);

306. APPLICATION OF MODIFIED SLIDING MODE VARIABLE STRUCTURE CONTROL IN PV MPPT.
Yalin Wang (Jiangnan University); Lei Wu (Jiangnan University); Jing Hui (Jiangnan University); Yimin Fang (Jiangnan University);

387. COIL OPTIMIZATION AGAINST MISALIGNMENT FOR WIRELESS POWER TRANSFER.
Prasad Sampath; *Queensland University of Technology, Australia*, Arokiaswami Alphones; *Nanyang Technological University, Singapore*, and Mahinda Vilathgamuwa; *Queensland University of Technology, Australia*

499. SIZING AND MODELING OF A STANDALONE HYBRID RENEWABLE ENERGY SYSTEM.
Monaaf D.A. Al-Falahi, Kutaiba Sabah Nimma, S. D. G. Jayasinghe and Hossein Enshaei; *Australian Maritime College, University of Tasmania, Australia*

112. NEW TECHNIQUE FOR POWER SHARING IN DC MICROGRIDS.
Made Andik Setiawan (Curtin University); Ahmed Abu Siada (Curtin University); Farhad Shahnia (Murdoch University);

99. OPTIMIZED CURRENT CONTROL AND DYNAMIC COORDINATION STRATEGY FOR LARGE-CAPACITY HARMONIC COMPENSATION SYSTEM.
Kangli Liu (Southeast University); Quan Gu (NR Electric, China); Wu Cao (Southeast University, China); Jianfeng Zhao (Southeast University); Jun You (Southeast University);

108. A COMPOSITE CURRENT CONTROL STRATEGY FOR THREE-PHASE SHUNT ACTIVE POWER FILTERS.
Jiancheng Song, Feiyan Tian, Yunguang Gao and Lijun Zheng; *Taiyuan University of Technology, China*

153. A DC-LINK VOLTAGE BALANCING STRATEGY BASED ON CONTROLLABLE NEUTRAL CURRENT INJECTED FOR T-TYPE THREE-LEVEL ACTIVE POWER FILTER.
Dongdong Chen (Zhejiang University); Qunwei Xu (Zhejiang University); Yaowei Hu (Zhejiang University); Guozhu Chen (Zhejiang University);

201. POWER LOSS MINIMIZATION OF COMMON-MODE NOISE REDUCED SINGLE-PHASE INVERTER BY POWER DEVICE COMBINATION.
Lee Seungju, Jong Uk Lee, Hag-Wone Kim and Kwan-Yuhl Cho; *Korea National University of Transportation, Korea*

396. STRATEGY FOR FLEXIBLE OPERATION OF THREE-PHASE CONVERTERS.
Alessandro Luz (São Paulo State University-UNESP); Jakson Bonaldo (UTFPR); José Antenor Pomilio (UNICAMP); Helmo K. MOrales-Paredes (São Paulo State University-UNESP);

198. CHALLENGES TO GRID SYNCHRONIZATION OF SINGLE-PHASE GRID-CONNECTED INVERTERS IN ZERO-VOLTAGE RIDE-THROUGH OPERATION.
Zhen Zhang (Northwestern Polytechnical University); Yongheng Yang (Aalborg University); Frede Blaabjerg (Aalborg University); Ruiqing Ma (Northwestern Polytechnical University);

333. REAL TIME HOTSPOT DETECTION USING SCAN-METHOD ADOPTED WITH P&O MPPT FOR PV GENERATION SYSTEM.
Hossam Bakhsh (Kanagawa Institute of Technology); Kazutaka Itako (Kanagawa Institute of Technology);

355. EIGENVALUES AND PARTICIPATION FACTORS FOR THE SYSTEM OF COUPLED ADJACENT MICROGRIDS.
Farhad Shahnia; *Murdoch University, Australia*

389. EXPERIMENTAL IMPLEMENTATION OF AN ELECTRONIC LOAD FOR GLOBAL MAXIMUM POWER POINT TRACKING.
Rodrigo Aliaga (Universidad de Talca); Javier Munoz (Universidad de Talca); Fausto Cadena (Universidad de Talca); Pablo Cossuta (Instituto Tecnológico de Buenos Aires); Miguel Aguirre (Instituto Tecnológico de Buenos Aires); Luis Moran (Universidad de);

394. ENERGY STORAGE SYSTEM FOR GLOBAL MAXIMUM POWER POINT TRACKING ON CENTRAL INVERTER PV PLANTS.
Nicolas Muller-Pollmann (Universidad Tecnica Federico Santa Maria); Samir Kouro (Universidad Tecnica Federico Santa Maria); Hugues Renaudineau (Universidad Tecnica Federico Santa Maria); Patrick Wheeler (University of Nottingham);

414. NEW CONTROL DESIGN FOR GRID-CONNECTED INVERTER USING LCL FILTER.
Domenico Sgrò, Silas A. S. Tibúrcio, Ruth P. S. Leão, Raimundo F. Sampaio, Fernando L. M. Antunes; *Federal University of Ceará, Brazil*

475. FPGA BASED ENCODERLESS PREDICTIVE CONTROL OF BACK-TO-BACK POWER CONVERTER PMSG WIND TURBINE SYSTEMS WITH EXTENDED KALMAN FILTER.
Zhenbin Zhang (T); Fengxiang Wang (Quanzhou Institute of Equipment Manufacturing, Haixi Institutes); Guangye Si (Technical University of Munich); Ralph Kennel (Technical University of Munich);

WEDNESDAY 7TH DECEMBER | 1.30PM – 2.00PM

Poster Session 4

Room: 305-GOOL1
Chairman: Dr. Craig Baguley *(Auckland University of Technology, New Zealand)*

53. FREQUENCY SEPARATION STAGE DESIGN FOR A RELIABLE DATA LINK IN AN IPT SYSTEM FOR ELECTRIC VEHICLES.
Martin Trautmann, Benedikt Sanftl, Robert Weigel, and Alexander Koelpin; *University of Erlangen-Nuremberg, Germany*

243. RESEARCH ON A NOVEL BRIDGELESS BOOST PFC CONVERTER.
Junda zhang (State Grid ZheJiang Taizhou Huangyan Power Supply Company); Ping Shen (College of Astronautics Nanjing University of Aeronautics and Astronautics Nanjing); Zecheng Zheng (State Grid ZheJiang Taizhou Huangyan Power Supply Company); Mingxu Chen (Power Corporation of Taizhou,Taizhou,Zhejiang); Xiaoping Fu (Power Corporation of Taizhou,Taizhou,Zhejiang); Yiwen Li (State Grid ZheJiang Taizhou JiaoJiang Power Supply Company); Tianyi Yao (State Grid ZheJiang Taizhou Huangyan Power Supply Company);

118. LI-ION BATTERY DETERIORATION EVALUATION OF SHORT RANGE FREQUENT CHARGING ELECTRIC BUS OVER LONG-TERM OPERATION IN COLD REGION.
Wei-Hsiang YANG, Zhe-Dong WU, Kenichiro EDA, Yushi KAMIYA and Yasuhiro DAISHO; *WASEDA University Japan*

128. FLUCTUATION SUPPRESSION CONTROL OF WIND POWER GENERATION UTILIZING DETERMINISTIC OPTIMIZATION METHOD.
Satoshi Takayama and Atsushi Ishigame; *Osaka Prefecture University, Japan*

159. DEVELOPMENT OF A FLYWHEEL ENERGY STORAGE BASED WELDING SYSTEM.
Marc Hagemeyer, Norbert Fröhleke, Dora V. M. M. Krishnay and Joachim Böcker; *Paderborn University, Germany*

163. DISPATCH STRATEGY FOR ENERGY STORAGE STATION IN DISTRIBUTION NETWORK WITH HIGH PENETRATION PHOTOVOLTAIC GENERATION.
Jilei Ye (China Electric Power Research Institute); Jinhua Xue (China Electric Power Research Institute); Qiong Tao (China Electric Power Research Institute); Bo Yang (China Electric Power Research Institute); Haoming Liu (Hohai University);

165. HOUSEHOLD ENERGY EFFICIENCY MANAGEMENT AND OPTIMIZATION WITH ENERGY STORAGE.
Jinhua Xue, Jilei Ye, Deshun Wang, Bo Yang; *China Electric Power Research Institute, China*, Jingjing Zhai; *Nanjing Institute of Technology, China*, and Haoming Liu; *Hohai University, China*

360. RESEARCH ON CONTROL STRATEGY FOR GRID SYNCHRONIZATION AND ISOLATION FOR INTELLIGENCE MICRO-GRID SYSTEM.
Xun Liu, Wenzhou Liu, Bo Du, Zhihong Jiang, Ning Li and Dengkao Xi; *Changchun Institute of Technology, China*

361. AN IMPROVED DISPATCHABLE WIND TURBINE GENERATOR AND DUAL-BATTERY ENERGY STORAGE SYSTEM TO REDUCE BATTERY CAPACITY REQUIREMENT.
Yang Li (Queensland University of Technology); San Shing Choi (Queensland University of Technology); Mahinda Vilathgamuwa (Queensland University of Technology); Dai Lin Yao (Nanyang Technological University);

367. MODEL ORDER REDUCTION SUITABLE FOR ONLINE LINEAR PARAMETER-VARYING THERMAL MODELS OF ELECTRIC MOTORS.
Fang Qi, Duy An Ly, Christoph van der Broeck, Decheng Yan and Rik W. De Doncker; *RWTH Aachen University, Germany*

239. SIGNIFICANCE OF THERMAL CROSS-COUPLING EFFECTS IN POWER SEMICONDUCTOR MODULES.
Alexander Stippich, Markus Neubert, Alexander Sewergin and Rik W. De Doncker; *ISEA RWTH Aachen University Germany*

195. IDENTIFICATION OF THE MINIMUM DETECTION OF TRANSFORMER BUSHING FAILURE BASED ON FREQUENCY RESPONSE ANALYSIS (FRA).
Omar Aljohani and Ahmed Abu-siada; *Curtin University, Australia*

474. AN OPTIMAL DC BUS VOLTAGE CONTROL METHOD TO IMPROVE THE JUNCTION TEMPERATURE OF IGBTS IN LOW SPEED OPERATIONS OF TRACTION APPLICATIONS.
Xubin Wang, Xuemei Wang and Xun Yuan; *South China University of Technology, China*

500. EFFECT OF LOAD CHANGES ON HYBRID SHIPBOARD POWER SYSTEMS AND ENERGY STORAGE AS A POTENTIAL SOLUTION: A REVIEW.
Viknash Shagar, Shantha Gamini and Hossein Enshaei; *Australian Maritime College, University of Tasmania, Australia*

44. IMPACT OF EFFICIENT DC LOADS: LED LIGHTING AS EQUIVALENT TO LARGE POWER GENERATION PLANT.
J.A. Qureshi; *Auckland University of Technology, New Zealand,* Rabeea Hasan, *Engro Power and Polymers Ltd, Pakistan*, Tooba Mujtaba; *K-Electric Ltd, Pakistan*, and Tek Lie; *Auckland University of Technology, New Zealand*

264. SIMULTANEOUS INDUCTION HEATING OF SUS VESSEL AND IMPELLER OF AGITATOR.
Takaaki Shimizu, Keisuke Kintsu, Noriyuki Kimura, Toshimitsu Morizane, Hideki Omori; *Osaka Institute of Technology, Japan*, Kazushige Nakao and Hiroki Ishida; *Fukui University of Technology, Japan*

WEDNESDAY 7TH DECEMBER | 2.00PM – 2.50PM

Room: 301-G050
Plenary: Significant Paths for Future Power Electronics Technology Development
Prof. Braham Ferreira

WEDNESDAY 7TH DECEMBER | 3.00PM – 10.00PM

Markovina Vineyard Estate
Please meet in the main foyer (302-G060 & G080) and everyone will walk down to bus stop together.

THURSDAY 8TH DECEMBER | 8.30AM – 9.50AM

S19: New Methodologies and Structures for WPT Systems

Room: 302-G020

Chairman: Prof. Hans-Peter Schmidt *(OTH Amberg-Weiden, University of Applied Sciences, Germany)*
Co-chairman: Dr. Duleepa Thrimavithana *(The University of Auckland, New Zealand)*

312. IMPEDANCE MATCHING RANGE EXTENSION METHOD FOR MAXIMUM POWER TRANSFER TRACKING IN IPT SYSTEM.
Xin Dai, Xiaofei Li, Yanling Li and Yue Sun; *Chongqing University, China*

344. A COIL STRUCTURE OPTIMAL METHOD BASED ON VERTICAL COUPLING FOR INDUCTIVE POWER TRANSFER.
Fan Zhu, Yunyu Tang and Hao Ma; *Zhejiang University, China*

357. LCL AND CL COMPENSATIONS FOR WIRELESS THREE-PHASE BI-DIRECTIONAL EV CHARGING SYSTEMS.
Yuan Song, Udaya K. Madawala, Duleepa J. Thrimawithana, and Aiguo Patrick Hu; *The University of Auckland, New Zealand*

401. A NEW WIRELESS EV CHARGER WITH COMMUNICATION FUNCTION BY S/SP TRANSFER CIRCUIT.
Tomoki Onishi (Osaka Institute of Technology); Jin Jia (Osaka Institute of Technology); Hideki Omori (Osaka Institute of Technology); Noriyuki Kimura (Osaka Institute of Technology); Toshimitsu Morizane (Osaka Institute of Technology); Mutuo Nakaoka (University of Malaya); Naoki Inoue (ROHM);

S20: Novel AC/DC Converters

Room: 303-G013

Chairman: Dr. Morten Nymand *(University of Southern Denmark)*
Co-Chairman: Dr. Shantha Gamini *(Australian Maritime Collage, University of Tasmania, Australia)*

194. RESEARCH ON A SINGLE-STAGE FLYBACK/BOOST LED DRIVER WITH LOWER OUTPUT RIPPLE.
Weiming Lin, Hongxin Chen and Shunyuan Ke; *Fuzhou University, China*

294. HIGH FREQUENCY THREE-PHASE PWM GRID CONNECTED DRIVE USING SILICON-CARBIDE SWITCHES.
Alireza Kouchaki (University of Southern Denmark); Radu Lazar (Danfoss Drives A/S); Jacob L. Pedersen (University of Southern Denmark); Morten Nymand (University of Southern Denmark);

464. LONG-DISTANCE DISTRIBUTION LINE COMPENSATION USING POWER ELECTRONIC TRANSFORMER.
Shaodi Ouyang, Jinjun Liu, Shuguang Song and Xingxing Chen; *Xi'an Jiaotong University, China*

347. ANALYSIS OF ACTIVE POWER DECOUPLING IN SINGLE-PHASE RECTIFIER USING SIX-SWITCH TOPOLOGY.
Naga Brahmendra Yadav Gorla, Kawsar Ali, Pritam Das and Sanjib Kumar Panda; *National University of Singapore, Singapore*

S21: Novel Control Methods for Microgrids

Room: 303-G014

Chairman: Prof. Patrick Wheeler (University Of Nottingham, UK),
Co-Chairman: Prof. Nirmal Nair (The University Of Auckland, New Zealand)

284. MICROGRID ENERGY COORDINATION CONTROL OF DISTRIBUTED POWER SUPPLY BASED ON HYBRID ENERGY STORAGE.
Fangchen Huang (Jiangnan University); Jing Hui (Jiangnan University); Wenzhou Lu (Jiangnan University); Wenxu Yan (Jiangnan University); Lei Wu (Jiangnan University);

372. A HIERARCHICAL OPERATION STRATEGY OF PARALLEL INVERTERS FOR EFFICIENCY IMPROVEMENT AND VOLTAGE STABILIZATION IN MICROGRIDS.
Shike Wang (Xi'an Jiaotong University); Jinjun Liu (Xi'an Jiaotong University); Zeng Liu (Xi'an Jiaotong University); Teng Wu (Xi'an Jiaotong University); Xin Meng (Xi'an Jiaotong University); Baojin Liu (Xi'an Jiaotong University);

332. CONSENSUS ALGORITHM BASED ADAPTIVE DROOP CONTROL FOR DC MICROGRID.
Jian Hu (Zhejiang University); Ma Hao (Zhejiang University); Mo-yuen Chow (North Carolina State University);

81. COMPARISON BETWEEN VIRTUAL SYNCHRONOUS GENERATOR AND DROOP CONTROLLED INVERTER.
Xin MENG, Zeng LIU, Jinjun LIU, Teng WU, Shike WANG, and Baojin LIU; *Xi'an Jiaotong University China*

S22: Emerging Topics in Power Electronics II

Room: 303-G015

Chairman: Prof. Geoff Walker *(Queensland University of Technology, Australia)*
Co-Chairman: Mr. Saranga Weerasinghe *(The University of Auckland, New Zealand)*

326. REVIEW OF DESIGN AND CHALLENGES OF DC SSPC IN MORE ELECTRIC AIRCRAFT.
Devinda A. Molligoda, Pradip Chatterjee; *Rolls-Royce@NTU Corporate Lab, Nanyang Technological University, Singapore*, Chandana Gajanayake, Amit Gupta; *Rolls-Royce Singapore Pte. Ltd., Singapore*, and King Jet Tseng; *Nanyang Technological University, Singapore*

343. A THREE PORT RESONANT SOLID STATE TRANSFORMER WITH MINIMIZED CIRCULATING REACTIVE CURRENTS IN THE HIGH FREQUENCY LINK.
Wynand L. Malan, D. Mahinda Vilathgamuwa, Geoffrey R. Walker; *Queensland University of Technology, Australia*, and Marc Hiller, *Karlsruhe Institute of Technology, Germany*

350. DESIGN OF CASCADED CONTROL LOOP FOR SOLAR POWER OPTIMIZER BASED ON A BUCK-BOOST CONVERTER.
Leonardo Callegaro, Mihai Ciobotaru; *University of New South Wales, Australia*, Daniel Pagano; *Federal University of Santa Catarina,* Brazil, John E. Fletcher, Pablo Acuna Rios; *University of New South Wales, Australia*, and

379. CURRENT VECTOR CONTROL BASED ON AVERAGE CAPACITOR VOLTAGE STRATEGY AND HYBRID MODULATION APPLIED TO THE CONTROL OF A 7-LEVEL PUC THREE-PHASE INVERTER.
Marcela Vilalba Onizuka, Raymundo Cordero García, João Onofre Pereira Pinto; *Federal University of Mato Grosso do Sul Campo Grande, MS-Brazil*, and Luiz Eduardo Borges da Silva; *Federal University of Itajuba, MG-Brazil*

S23: New Modulation and Control Techniques in DC/AC Converters

Room: 303-G016
Chairman: Prof. Gao Feng *(Shandong University, China)*
Co-Chairman: Dr. Baljit Riar *(Utah State University, USA)*

378. ANALYSIS OF A NOVEL COUPLED INDUCTOR FOR LCL FILTER IN GRID-CONNECTED INVERTER.
Lixin Jiang, Qianhong Chen and Xiaoyong Ren; *Nanjing University of Aeronautics and Astronautics, China)*

443. MPC-BASED CONTINUOUS TIME OPTIMIZED SPACE VECTOR MODULATION.
Galina Mirzaeva (University of Newcastle); Christopher Townsend (University of Newcastle); Graham Goodwin (University of Newcastle); and Henry Farrell (University of Newcastle);

28. MODELING AND ANALYSIS OF ELEMENTARY POSITIVE OUTPUT SUPER-LIFT CONVERTER FEEDING CONSTANT POWER LOAD.
Li Jing (Xi'an Jiaotong University); Jinjun Liu (Xi'an Jiaotong University);

482. RIPPLE ELIMINATION FOR DC/AC DAB CONVERTER WITH PHASE SHIFT AND DUTY CYCLE CONTROL.
Jiang You; *Harbin Engineering University, China*, Mahinda Vilathgamuwa, Negareh Ghasemi and Wynand Malan; *Queensland University of Technology, Australia*

THURSDAY 8TH DECEMBER | 10AM – 11.20AM

S24: Object Detection and Optimization in WPT Systems

Room: 302-G020
Chairman: Prof. Grant Covic *(The University of Auckland, New Zealand)*
Co-Chairman: Dr. Samitha Ransara *(The University of Auckland, New Zealand)*

364. LIVING OBJECT DETECTION SYSTEM BASED ON COMB PATTERN CAPACITIVE SENSOR FOR WIRELESS EV CHARGERS.
Seog Y. Jeong, Hyeong G. Kwak, Gi C. Jang and Chun T. Rim; *Korea Advanced Institute of Science and Technology, Korea*

496. LEAKAGE AND COUPLING OF SQUARE AND DD MAGNETIC COUPLERS.
Matthew Pearce, Grant Covic and John Boys; *The University of Auckland, New Zealand*

366. DESIGN OF 3 MHZ DC/AC INVERTER WITH RESONANT GATE DRIVE FOR A 3.3 KW EV WPT SYSTEM.
David C. Yates, Samer Aldhaher and Paul D. Mitcheson; *Imperial College London, UK*

227. A COMPARATIVE STUDY ON EFFICIENCY AND LEAKAGE MAGNETIC FIELD OF TRANSFER COILS WITH DIFFERENT STRUCTURES IN A MAGNETIC RESONANT WPT SYSTEM.
Jin Jia (Osaka Institute of Technology); Hideki Omori (Osaka Institute of Technology); Masahiro Tsuno (Nichicon Corporation); Toshimitsu Morizane (Osaka Institute of Technology); Noriyuki Kimura (Osaka Institute of Technology); Mutsuo Nakaoka (University of Malaya);

S25: Novel AC/AC and AC/DC Converters

Room: 303-G013
Chairman: Prof. Gao Feng *(Shandong University, China)*
Co-Chairman: Dr. Shantha Gamini *(Australian Maritime Collage, University of Tasmania, Australia)*

447. REACTIVE COMPONENT INJECTION CONTROL OF THE MODULAR MULTI-OUTPUT POWER ELECTRONIC TRANSFORMER.
Shaodi Ouyang, Jinjun Liu, Shuguang Song and Xingxing Chen; *Xi'an Jiaotong University, China*

507. A HIGH POWER DENSITY POWER FACTOR CORRECTION FRONT END BASED ON A 7-LEVEL FLYING CAPACITOR MULTILEVEL CONVERTER.
Shibin Qin, Yutian Lei, Intae Moon, Carl Haken, Ethan Bian, Erik Saathoff, Wonho Chung, Derek Chou and Robert C.N. Pilawa-Podgurski; *University of Illinois, United States*

276. DESIGN AND IMPLEMENTATION OF A HYBRID CONTROLLER FOR AC – DC POWER FACTOR CORRECTION CONVERTER.
AILEEN CABEROS (Tatung University); Shu-chuan Huang (Tatung University); Xerxex Dan Gumera (National Taipei University); Wan-rone Liou (National Taipei University);

380. A BIDIRECTIONAL ISOLATED AC/DC CONVERTER FOR BATTERY APPLICATION.
Zhongyang Li, Ke Jin, Ling Gu and Chenghua Wang; *Nanjing University of Aeronautics and Astronautics, China*

S26: Operational Issues in Microgrids

Room: 303-G014
Chairman: Prof. Guojie Li *(Shanghai Jiaotong Universit, China)*
Co-Chairman: Prof. Nirmal Nair *(The University of Auckland, New Zealand)*

408. FROM VOLTAGE STIFF TO VOLTAGE WEAK DC DISTRIBUTION GRIDS: OPPORTUNITIES AND CHALLENGES.
Tsegay Hailu, Laurens Mackay, Mladen Gajic and J.A. Ferreira; *Delft University of Technology, Netherlands*

506. MITIGATION OF VOLTAGE UNBALANCE IN A LOW VOLTAGE BIPOLAR DC MICROGRID USING A BOOST SEPIC TYPE INTERLEAVED DC-DC COMPENSATOR.
Prajof Prabhakaran and Vivek Agarwal; *IIT-Bombay, India*

26. A NEW MASTER-SLAVE BASED SECONDARY CONTROL METHOD FOR VIRTUAL SYNCHRONOUS GENERATOR.
Xin MENG, Zeng LIU, Jinjun LIU, Teng WU, Shike WANG and Baojin LIU; *Xi'an Jiaotong University, China*

79. COMMERCIAL AIRCRAFT DISTRIBUTION NETWORK RECONFIGURATION BASED ON POWER PRIORITY.
Binxin Tang, Shanshui Yang; *Nanjing University of Aeronautics and Astronautics, China*, Huijuan Zhang; *Aviation Key Laboratory of Science and Technology on Aero Electromechanical System Integration, China*, and Li Wang; *Nanjing University of Aeronautics and Astronautics, China*

S27: Emerging Topics in Power Electronics III

Room: 303-G015
Chairman: Dr. Saad Mekhilef *(University of Malaya, Malaysia)*
Co-Chairman: Dr. Craig Baguley *(Auckland University of Technology, New Zealand)*

423. A 400 KHZ SIC-MOSFETS HIGH-FREQUENCY INVERTER FOR TINY-FOREIGN METAL DETECTION.
Takuya Shijo, Shinya Kurachi, Yujiro Noda, Hiroaki Yamada and Toshihiko Tanaka; *Yamaguchi University, Japan*

462. ONLINE ELECTRO-THERMAL MODEL FOR REAL TIME JUNCTION TEMPERATURE ESTIMATION FOR INSULATED GATE BIPOLAR TRANSISTOR (IGBT).
Mohamed Halick Mohamed Sathik; *Rolls Royce@NTU Corporate Lab, Singapore*, Tseng King Jet; *Nanyang Technological University*, *Singapore*, Karthik Kandasamy, Sundararajan Prasanth; *Rolls Royce@NTU Corporate Lab, Singapore*, Simanjorang Rejeki; Amit Gupta and Chandana Gajanayake; *Rolls-Royce Singapore Pte. Ltd. Singapore*

490. LIFETIME ESTIMATION OF ELECTROLYTIC CAPACITORS IN A FUEL CELL POWER CONVERTER AT VARIOUS CONFIDENCE LEVELS.
Dao Zhou, Huai Wang and Frede Blaabjerg; *Aalborg University, Denmark*

514. SOFT-SWITCHING ACTIVE-CLAMP FLYBACK MICROINVERTER FOR PV APPLICATIONS.
Rasedul Hasan, Saad Mekhilef, Mutsuo Nakaoka; *University of Malaya, Malaysia*, and Katsumi Nishida; *Ube National College of Technology, Japan*

S28: New Developments in DC/AC Converters

Room: 303-G016
Chairman: Prof. Dehong Xu *(Zhejiang University, China)*
Co-Chairman: Dr. Duleepa Thrimavithana *(The University of Auckland, New Zealand)*

94. SWITCH MODE CONVERTER BASED HIGH PERFORMANCE POWER-HARDWARE-IN-THE-LOOP GRID EMULATOR.
Guangye Si and Ralph Kennel; *Technical University of Munich, Germany*

185. DESIGN OF ZERO-VOLTAGE-SWITCHING THREE-PHASE GRID INVERTER.
Chengrui Du, Ning He and Dehong Xu; *Zhejiang University, China*

301. SOFT SWITCHING INVERTER WITH RESONANCE TRACKING CONTROL USING QUASI VARIABLE CAPACITOR.
Sachio Kubota; *National Institute of Technology, Toba College, Japan*

144. SINGLE-PHASE TRANSFORMER BASED Z-SOURCE AC-AC CONVERTERS.
Zeeshan Aleem and Moin Hanif; *University of Cape Town, South Africa*

THURSDAY 8TH DECEMBER | 11.20AM – 12.40PM

S29: Design Issues in WPT Systems

Room: 302-G020
Chairman: Prof. Chun Rim *(Korea Advanced Institute of Science And Technology, Korea)*
Co-Chairman: Dr. Jonathan Bradshaw *(Payment Express, Auckland, New Zealand)*

451. STUDY ON OPTIMAL DESIGN OF WPT RESONATORS BASED ON GENETIC ALGORITHM.
Zhao-Hong Ye, Zhi-Juan Liao, Yue Sun and Xin Dai; *Chongqing University, China*

477. A COMPARATIVE STUDY OF VARIOUS MAGNETIC DESIGN TOPOLOGIES FOR A SEMI-DYNAMIC EV CHARGING APPLICATION.
Adeel Zaheer and Grant Covic; *The University of Auckland, New Zealand*

495. DIFFERENTIATING COUPLING FACTOR AND VA TRANSFER OF IPT SYSTEMS USING BIPOLAR PAD PRIMARIES.
Fei Yang Lin, Grant Covic and John Boys; *The University of Auckland, New Zealand*

130. DEVELOPMENT OF A MODULAR INDUCTIVE POWER TRANSFER SYSTEM WITH A REACTIVE POWER CORRECTION FOR EV APPLICATION.
Sarp Gueney Cimen and Benedikt Schmuelling; *University of Wuppertal Germany*

S30: High Power Converters

Room: 303-G013
Chairman: Prof. Josep Pou, *(Nanyang Technological University, Singapore)*
Co-Chairman: Dr. Shantha Gamini *(Australian Maritime Collage, University of Tasmania, Australia)*

139. A NOVEL APPROACH TO ENERGY SAFETY IMPROVEMENT IN MARINE POWER PLANTS WITH ACTIVE POWER SURGE COMPENSATOR.
Maciej Grabarek and Ryszard Strzelecki; *Gdynia Maritime University, Poland*

385. LOSS DISTRIBUTION ANALYSIS OF THREE-LEVEL ACTIVE NEUTRAL-POINT-CLAMPED (3L-ANPC) CONVERTER WITH DIFFERENT PWM STRATEGIES.
Gang Zhang; *University of Electronic Science and Technology of China, China*, Yongheng Yang, Francesco Iannuzzo; *Aalborg University, Denmark*, Kai Li; *University of Electronic Science and Technology of China, China*, Frede Blaabjerg; *Aalborg University, Denmark*, and Hongbing Xu; *University of Electronic Science and Technology of China, China*

391. THE PRACTICAL USE OF SIC DEVICES IN HIGH POWER, HIGH FREQUENCY INVERTERS FOR INDUSTRIAL INDUCTION HEATING APPLICATIONS.
Enrique J. Dede, José Jordán and Vicente Esteve; *University Valencia, Spain*

298. OFFSET PWM IN MODULAR MULTILEVEL CONVERTERS FOR STORED ARM ENERGY REDUCTION.
Georgios Konstantinou, Harith R. Wickramasinghe; *University of New South Wales, Australia*, Salvador Ceballos; *Tecnalia, Energy and Environment Division, Spain*, and Josep Pou; *Nanyang Technological University, Singapore*

S31: Design and Control Issues in PM and Reluctance Machines

Room: 303-G014
Chairman: Dr. Nuwantha Fernando *(Rmit University, Australia)*
Co-Chairman: Dr. Baljit Riar *(Utah State University, USA)*

133. ACTIVE SOURCE CURRENT FILTERING TO MINIMIZE THE DC-LINK CAPACITOR IN SWITCHED RELUCTANCE DRIVES.
Annegret Klein-Hessling, Bernhard Burkhart and Rik W. De Doncker; *RWTH Aachen University, Germany*

233. ANALYSIS OF THE DIFFERENCE BETWEEN NEGLECTED AND CONSIDERED STATOR RESISTANCE IN PERMANENT MAGNET SYNCHRONOUS MOTORS.
Luca Puccetti, Lorenz Horlbeck and Markus Lienkamp; *Technical University of Munich, Germany*

268. PRELIMINARY INVESTIGATION OF ELECTROMAGNETIC AND THERMAL PERFORMANCE IMPROVEMENT FROM CLOSED STATOR SLOT IN SWITCHED RELUCTANCE MACHINES.
Shuai Wang; *Rolls Royce@NTU Corporate Lab, Singapore*, King Jet Tseng; *Nanyang Technological University, Singapore*, Viswanathan Vaiyapuri; *Rolls-Royce Singapore Pte. Ltd. Singapore*, Rong Su; *Nanyang Technological University, Singapore*, Amit Gupta; *Rolls-Royce Singapore Pte. Ltd. Singapore*

494. MARINE PROPULSION PM MOTOR CONTROL UNDER INVERTER PARTIAL FAULT.
Nuwantha Fernando; *RMIT University, Australia*, Shantha Gamini; *Australian Maritime College, University of Tasmania, Australia* and Alireza Tashakori; *Swinburne University of Technology, Australia*

S32: Novel Aspects of Power Converters

Room: 303-G015
Chairman: Prof. Yang Xu *(Xian Jiaotong University)*
Co-Chairman: Mr. Saranga Weerasinghe *(The University of Auckland, New Zealand)*

359. A WIRE-INTEGRATED INDUCTOR USED FOR DC-DC CONVERTER.
Mofan Tian, Naizeng Wang, Junge Wang, Kangping Wang, Xu Yang, and Laili Wang; *Xi'an Jiaotong University, China*

91. INTEGRATED MAGNETICS FOR POWER DENSITY IMPROVEMENT OF DIFFERENTIAL RECTIFIERS AND INVERTERS.
Minxin Wu, Sinan Li, Siew-Chong Tan and S. Y. (Ron) Hui; *The University of Hong Kong, Hong Kong, China*

454. A NEW CONTROLLER FOR MODULAR MULTI-LEVEL CONVERTERS.
Su Zhang, Baljit Riar, Udaya Madawala and Duleepa Thrimawithana; *The University of Auckland, New Zealand*

505. FLOATING POWER PLATFORM FOR MOBILE COLD-IRONING.
Shantha Gamini, Monaaf D.A. Al-Falahi, Hossein Enshaei; *Australian Maritime College, University of Tasmania, Australia*, Nuwantha Fernando; *RMIT University, Australia*, and Alireza Tashakori; *Swinburne University of Technology, Australia*

S33: Novel Control of DC/DC Converters

Room: 303-G016
Chairman: Prof. Geoff Walker *(Queensland University of Technology, Australia)*
Co-Chairman: Dr. Samitha Ransara *(The University of Auckland, New Zealand)*

76. OFF-LINE BALANCED FORWARD-FLYBACK CONVERTER.
Luc Peters (AME); Jan Schellekens (AME); Frank Clermonts (AME); Jorge L. Duarte (Eindhoven University of Technology);

209. DIRECT FLUX LINKAGE CONTROL SCHEME FOR HIGHLY UTILIZED DC/DC CONVERTERS WITH SIMPLE INTERLEAVING METHOD.
Bernd Bohnet, Christian Axtmann, Rüdiger Schwendemann and Michael Braun; *Karlsruhe Institute of Technology, Germany*

242. PARTIAL POWER DC-DC CONVERTER FOR LARGE-SCALE PHOTOVOLTAIC SYSTEMS.
Jaime Zapata (Universidad Tecnica Federico Santa Maria); Thierry Meynard (University of Toulouse); Samir Kouro (Universidad Tecnica Federico Santa Maria);

59. DESIGN AND IMPLEMENTATION OF A BIDIRECTIONAL FLYBACK BOOST/BUCK INTEGRATED CONVERTER.
Rebecca Liang, Jiann-Fuh Chen and Chun Hean Lim; *National Cheng Kung University, Korea*

THURSDAY 8TH DECEMBER | 1.30PM – 2.50PM

S34: Grid Integration Issues and Magnetic Circuits in WPT Systems

Room: 302-G020
Chairman: Prof. Chun Rim *(Korea Advanced Institute of Science And Technology, Korea)*
Co-Chairman: Dr. Duleepa Thrimavithana *(The University of Auckland, New Zealand)*

346. METAL OBJECT DETECTION CIRCUIT WITH NON-OVERLAPPED COILS FOR WIRELESS EV CHARGERS.
Gi C. Jang, Seog Y. Jeong, Hyeong G. Kwak and Chun T. Rim; *Korea Advanced Institute of Science and Technology, Korea*

497. SHAPED PASSIVE MAGNETIC FIELD SHAPING FOR ROADWAY IPT.
Matthew G. S. Pearce, James D. D. Gawith, Abiezer Tejeda, John T. Boys and Grant A. Covic; *The University of Auckland, New Zealand*

501. PREDICTIVE ACTIVE POWER-FLOW CONTROL OF TWO-WAY WIRELESS POWER TRANSFER SYSTEM IN V2G SERVICES.
Ahmed Mohamed, Alberto Berzoy and Osama Mohammed; *Florida International University, United States*

502. A COMPARATIVE STUDY ON GRID-INTEGRATION TECHNIQUES USED IN BI-DIRECTIONAL IPT BASED V2G APPLICATIONS.
Gaurav Kalra; *The University of Auckland, New Zealand*, Chang Y Huang; *Qualcomm NZ Ltd., New Zealand,* Duleepa Thrimawithana, Udaya Madawala; *The University of Auckland, New Zealand*, and Martin Neuburger; *Esslingen University of Applied Sciences, Germany*

S35: Modulation and Control of Multilevel Converters

Room: 303-G013
Chairman: Dr. Suvajit Mukherjee *(Nanyang Technological University, Singapore)*
Co-Chairman: Dr. Shantha Gamini *(Australian Maritime Collage, University of Tasmania, Australia)*

109. MODELING AND CONTROL OF CASCADE MULTILEVEL INVERTER FOR POWER CONDITIONING APPLICATIONS.
Hildo Guillardi Júnior (University of Campinas); José Antenor Pomilio (University of Campinas); Simone Buso (University of Padova); Leopoldo Rossetto (University of Padova);

234. ADVANCED RESAMPLING TECHNIQUES FOR PWM AMPLIFIERS IN REAL-TIME APPLICATIONS.
Edward J. Burstinghaus, Gerard F. Ledwich, Geoffrey R. Walker, Houman Pezeshki and Mark A. H. Broadmeadow; *Queensland University of Technology, Australia*

334. CONTROL OF THE MODULAR MULTILEVEL CONVERTER AS A PHOTOVOLTAIC INTERFACE UNDER UNBALANCED IRRADIANCE CONDITIONS WITH MPPT OF EACH PV ARRAY.
Jake Stringfellow, Terrence Summers and Robert Betz; *University of Newcastle, Australia*

150. SIMPLIFIED CARRIER BASED SPACE VECTOR FOR N-LEVEL CONVERTER.
Suvajit Mukherjee, Peng Wang; *Nanyang Technological University, Singapore*, and Michael Zagrodnik; *Rolls-Royce Singapore pvt. Ltd. Singapore*

S36: Design Issues and Sensorless Control of AC Machines

Room: 303-G014
Chairman: Prof. Robert Betz *(University Of Newcastle, Australia)*
Co-Chairman: Dr. Baljit Riar *(Utah State University, USA)*

212. STUDY OF INFLUENCE OF INDUCTANCE VARIATION OF POSITION SENSORLESS CONTROL OF SYNRM AT LOW SPEEDS BY ESTIMATING HIGH-FREQUENCY EXTENDED EMF CAUSED BY SUPERIMPOSED CURRENT.
Ayame Makimura; *National Institute of Technology, Gifu College, Japan*, Yuta Nomura; *Chiba University, Japan*, Shota Kondo; *Nagoya University, Japan*, Mutuwo Tomita; *National Institute of Technology, Gifu College, Japan*, Masaru Hasegawa; *Chubu University, Japan*, Shinji Doki; *Nagoya University, Japan*, and Shinji Kato; *National Institute of Technology, Gifu College, Japan*

327. ACOUSTIC OPTIMIZATION USING VIBRATION SENSOR FEEDBACK TO THE CONTROLLER.
Annegret Klein-Hessling, Fang Qi, Iliya Ralev and Rik W. De Doncker; *RWTH Aachen University, Germany*

421. LOCAL VECTOR CONTROL APPLIED TO CURRENT CONTROL.
Robert Betz and David Gay; *University of Newcastle, Australia*

461. EVALUATION OF AN FPGA CURRENT DERIVATIVE MEASUREMENT SYSTEM FOR THE FUNDAMENTAL PWM EXCITATION SENSORLESS METHOD FOR IPMSM.
Deqi Guan, Faz Rahman, Dan Xiao and Bui Minh; *University of New South Wales, Australia*

S37: Novel Methodologies Applicable to Power Quality Issues

Room: 303-G015
Chairman: Athula Rajapakse, (University of Manitoba, Canada)
Co-Chairman: Dr. Jonathan Bradshaw (Payment Express, Auckland, New Zealand)

386. AN ANALYTICAL SOLUTION OF SWITCHING ANGLES FOR SELECTIVE HARMONIC ELIMINATION (SHE) IN A CASCADED SEVEN LEVEL INVERTER.
Sraddhanjoli Bhadra, Dennis Gregory and Hirak Patangia; *University of Arkansas at Little Rock, United States*

403. CLASSIFICATION OF POWER QUALITY EVENTS USING WAVELET PACKET TRANSFORM AND EXTREME LEARNING MACHINE.
Chirag Naik (Sarvjanik College of Engineering & Technology); Faizal Hafiz (the University of Auckland); Akshya Swain (the University of Auckland); Amruta Kar (Unitec Institute of Technology, Auckland);

409. INTERACTION ADMITTANCE BASED MODELING OF MULTI-PARALLELED GRID-CONNECTED INVERTER WITH LCL FILTER.
Minghui Lu, Frede Blaabjerg and Xiongfei Wang; *Aalborg University, Denmark*

422. IMPROVEMENT OF HARMONICS COMPENSATION PERFORMANCE OF SMART CHARGER WITH CONSTANT DC-CAPACITOR VOLTAGE CONTROL FOR ELECTRIC VEHICLES IN SINGLE-PHASE THREE-WIRE DISTRIBUTION FEEDERS.
Kei Nishikawa (Yamaguchi University); Fuka Ikeda (Yamaguchi University); Hiroaki Yamada (Yamaguchi University); Toshihiko Tanaka (Yamaguchi University); Masayuki Okamoto (National Institute of Technology, Ube College);

S38: Control and Design Issues in DC/DC Converters

Room: 303-G016
Chairman: Dr. Jin Xiaoguang *(Zhejiang University, China)*
Co-Chairman: Dr. Samitha Ransara *(The University of Auckland, New Zealand)*

449. MODEL PREDICTIVE CONTROL FOR DC-DC BOOST CONVERTERS WITH CONSTANT SWITCHING FREQUENCY.
Cheng Long (Beijing Jiaotong University); Pablo Acuna (University of New South Wales); Ricardo P. Aguilera (University of Technology, Sydney); Mihai Ciobotaru (University of New South Wales); Jiang Jiuchun (Beijing Jiaotong University);

277. HOLD-UP TIME EXTENSION METHOD FOR FORWARD CONVERTER.
Xiaoguang Jin (Zhejiang University); Huipin Lin (Zhejiang University); Bin Qian (Shanghai Institute of Space Power-Sources); Wenxi Yao (Zhejiang University); Yan Deng (Zhejiang University); Zhengyu Lyu (Zhejiang University);

382. PRACTICAL DESIGN AND VALIDATION OF AN LCL DC-DC CONVERTER.
Mohsen Jahromi, Galina Mirzaeva and Steven Mitchell; *University of Newcastle, Australia*

111. DOUBLE-INPUT BOOST/Y-SOURCE DC-DC CONVERTER FOR RENEWABLE ENERGY SOURCES.
Saman Asghari Gorji, Mehran Ektesabi and Jinchuan Zheng; *Swinburne University of Technology, Australia*

THURSDAY 8TH DECEMBER | 3.00PM – 4.20PM

S39: New Energy Harvesting Techniques

Room: 302-G020
Chairman: Dr. Liping Wang *(Nanyang Technological University, Singapore)*
Co-Chairman: Dr. Craig Baguley *(Auckland University of Technology, New Zealand)*

97. EXPERIMENTAL INVESTIGATION OF 6.78MHZ METAMATERIALS FOR EFFICIENCY ENHANCEMENT OF WIRELESS POWER TRANSFER SYSTEM.
Yayun Dong, Wenwen Li, Weikun Cai, Chen Yao, Dianguang Ma and Houjun Tang; *Shanghai Jiao Tong University, China*

348. COOLING SYSTEM INVESTIGATION OF THERMOELECTRIC GENERATOR USED FOR MARINE WASTE HEAT RECOVERY.
Liping Wang; *Rolls-Royce@NTU Corporate Lab, Singapore,* and Alessandro Romagnoli; *Nanyang Technological University, Singapore*

453. A 100MHZ RESONANT-LINEAR HYBRID CONVERTER FOR MICROWAVE WIRELESS POWER TRANSMISSION APPLICATIONS.
Ruian Tan and Ke Jin; *Nanjing University of Aeronautics and Astronautics, China*

157. TWO-STAGE SINGLE-PHASE PHOTOVOLTAIC GRID-TIED MICRO-INVERTER USING SOFT SWITCHING TECHNIQUES.
Mudassar Ahmed (Nanjing University of Aeronautics and Astronautics, Nanjing, China); Xu Yapo (Nanjing University of Aeronautics and Astronautics, Nanjing, China); Liu Huawu (Nanjing University of Aeronautics and Astronautics, Nanjing, China); Lijun Hang (Hangzhou Dianzi University, China); Guojie Li (Shanghai Jiaotong University); Hu Haibing (Nanjing University of Aeronautics and Astronautics, Nanjing, China);

S40: Control and Modelling of Electrical Storage Systems

Room: 303-G013
Chairman: Dr. Christopher Townsend *(University of Newcastle, Australia)*
Co-Chairman: Mr. Saranga Weerasinghe *(The University of Auckland, New Zealand)*

299. FRACTIONALLY-RATED DC-DC STAGES FOR USE IN CASCADED MULTILEVEL CONVERTERS APPLIED TO UTILITY-SCALE BATTERY ENERGY STORAGE SYSTEMS.
Christopher Townsend, Galina Mirzaeva, Graham Goodwin; *University of Newcastle, Australia*, Georgios Konstantinou; *University of New South Wales, Auatralia*, and Josep Pou; *Nanyang Technological University, Singapore*

460. MATLAB SIMULATION OF LITHIUM ION CELL USING ELECTROCHEMICAL SINGLE PARTICLE MODEL.
Ngoc Tham Tran, Mahinda Vilathgamuwa, Troy Farrell and San Shing Choi; *Queensland University of Technology, Australia*

508. IMPROVED VIRTUAL CAPACITIVE DROOP CONTROL FOR HYBRIDIZATION OF ENERGY STORAGES IN DC MICROGRID.
Pengfeng Lin; *ERI@N, Interdisciplinary Graduate School, Nanyang Technological University, Singapore*, Qianwen Xu, Peng Wang; *Nanyang Technological University, Singapore*, Jianfang Xiao; *Energy Research Institute@NTU, Nanyang Technological University, Singapore*, Hongchang Li; *Nanyang Technological University, Singapore*

325. RESEARCH ON HYBRID ENERGY STORAGE BY SUPER CAPACITOR-BATTERY AND CONTROL STRATEGY FOR INTELLIGENCE MICRO-GRID SYSTEM.
Xun Liu (Changchun University of Technology); Wenzhou Liu (Changchun Institute of Technology); Bo Du (Changchun Institute of Technology); Zhihong Jiang (Changchun Institute of Technology); Hong Cui (Changchun University of Technology); Qiaoyun Gao (Beijing Forever Technology Co.,Ltd); Yancheng Wei (Beijing Forever Technology Co.,Ltd); Ning Li (Changchun University of Technology); Dengkao Xi (Changchun University of Technology); Chang Liu (Tsinghua University);

S41: Fault Tolerant Converters

Room: 303-G014
Chairman: Dr. Kazi Ahsanullah *(National University of Singapore)*
Co-Chairman: Dr. Baljit Riar *(Utah State University, USA)*

262. FAST OPEN-TRANSISTOR FAULT DIAGNOSIS BASED ON CALCULATED BRIDGE ARM POLE-TO-POLE VOLTAGES IN VOLTAGE-SOURCE INVERTERS.
Zhan Li (Zhejiang University) ZHIHONG Bai (Electrical College, Zhejiang University); Yuxi Wang (State Grid Hangzhou Power Supply Company); Ma Hao (Zhejiang University);

345. INTER-TURNS FAULT DIAGNOSIS FOR SURFACE PERMANENT MAGNET BASED MARINE PROPULSION MOTORS.
Kazi Ahsanullah, Sanjib Kumar Panda; *National University of Singapore, Singapore*, Ramakrishna Shanmukha and Sivakumar Nadarajan*; Rolls-Royce Singapore Pte. Ltd. Singapore*

384. INTEGRATING THE NEW 2D-SHORT CIRCUIT DETECTION METHOD INTO A POWER MODULE WITH A POWER SUPPLY FED BY THE GATE VOLTAGE.
Stefan Hain and Mark-M. Bakran; *University of Bayreuth, Germany*

420. 20-NS SHORT-CIRCUIT DETECTION SCHEME WITH HIGH VARIATION-TOLERANCE BASED ON ANALOG DELAY MULTIPLIER CIRCUIT FOR ADVANCED IGBTS.
Koutaro Miyazaki; *University of Tokyo, Japan*, Ichiro Omura; *Kyusyu Institute of Technology, Japan*, Makoto Takamiya and Takayasu Sakurai; *University of Tokyo, Japan*

S42: Issues in Transportation and Mobility II

Room: 303-G015

Chairman: Prof. Martin Neuburger *(University of Applied Sciences Esslingen, Germany)*
Co-Chairman: Dr. Shantha Gamini *(Australian Maritime Collage, University of Tasmania, Australia)*

288. AN INTELLIGENT CHARGING CONTROL METHOD FOR ELECTRIC VEHICLE CHARGING SYSTEM.
Liu Zheng and Fan Shao-sheng; *Changsha University of Science&Technology, China*

308. IRONLESS AXIAL FLUX PERMANENT MAGNET MOTOR CONTROL WITH MULTILEVEL CASCADED H-BRIDGE CONVERTER FOR ELECTRIC VEHICLE APPLICATIONS.
Kevin Sun, Terrence Summers and Colin Coates; *University of Newcastle, Australia*

316. A PLANNING MODEL FOR CHARGING FACILITIES OF ELECTRIC VEHICLES CONSIDERING SPATIAL AND TEMPORAL CHARACTERISTICS OF CHARGING DEMANDS.
Binjie Liao (Zhejiang University); Jianwei Mao (State Grid Zhejiang Electric Power Company); Jun Yang (State Grid Hangzhou Power Supply Company); Fushuan Wen (Universiti Teknologi Brunei); Md. Abdus Salam (Universiti Teknologi Brunei); Liang Li (State Grid Zhejiang Electric Power Company); Bo Li (State Grid Zhejiang Electric Power Company);

375. DESIGN OF SUPER-RAPID CHARGING CAPACITOR SCOOTER WITH EDLC POWER SUPPLY AND PULSE POWER CHARGER.
Keiichi Kaneko (Osaka Institute of Technology); Hideki Omori (Osaka Institute of Technology); Noriyuki Kimura (Osaka Institute of Technology); Toshimitsu Morizane (Osaka Institute of Technology); Saad Mekhilef (University of Malaya); Mutsuo Nakaoka (University of Malaya);

S43: Performance Improvements in DC/DC Converters

Room: 303-G016

Chairman: Dr. Negareh Ghasemi *(Queensland University of Technology, Australia)*
Co-Chairman: Prof. Patrick Hu *(The University of Auckland, New Zealand)*

255. BIDIRECTIONAL DC-DC CONVERTER WITH HIGH STEP-DOWN AND STEP-UP VOLTAGE CONVERSION RATIO.
Shu-Hung Liao, Jen-Hao Teng and Si-Wei Chen; *National Sun Yat-sen University, Taiwan*

448. DESIGN OF AN EFFICIENCY IMPROVED DUAL-OUTPUT DC-DC CONVERTER UTILIZING A SUPERCAPACITOR CIRCULATION TECHNIQUE.
Kasun Subasinghage, Kosala Gunawardane, Tek Tjing Lie; *Auckland University of Technology, New Zealand*, Nihal Kularatna; *University of Waikato, New Zealand*

31. INPUT-PARALLEL OUTPUT-PARALLEL (IPOP) THREE-LEVEL (TL) DC/DC CONVERTERS WITH MINIMIZED CAPACITOR RIPPLE CURRENTS.
Dong Liu, Fujin Deng; *Aalborg University, Denmark*, Qi Zhang; *Xi'an University of Technology, China*, Zheng Gong; *University of Mining and Technology, China*, and Zhe Chen; *Aalborg University, Denmark*

176. A NOVEL QUADRATIC BUCK-BOOST DC-DC CONVERTER WITHOUT FLOATING GATE-DRIVER.
Ali Mostaan; *Iranian Central Oil fields Co., Iran*, Saman Asghari Gorji; *Swinburne University of Technology*, Mohsen Soltani; *Aalborg University, Denmark*, and Mehran Ektesabi; Swinburne University of Technology, Australia

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