

**24th International Conference on
Electrical Machines (ICEM 2020)**
August 23rd-26th, 2020
Gothenburg, Sweden (virtual conference, icem2020.se)

Final Program

Full version 2 (edited 2020-08-23)



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Welcoming Message from the General Co-Chairs

We are very honored to invite you to Gothenburg, Sweden, for the 24th International Conference on Electrical Machines.

The International Conference on Electrical Machines (ICEM) has established itself as an influential and recognized International event, being the only major international conference entirely devoted to electrical machines. Started in London in 1974, ICEM is now established as a regular event. Very successful recent editions were held in Helsinki (Finland) in 2000, Bruges (Belgium) in 2002, Cracow (Poland) in 2004, Chania (Greece) in 2006, Vilamoura (Portugal) in 2008, Roma (Italy) in 2010, Marseille (France) in 2012, Berlin (Germany) in 2014, Lausanne (Switzerland) in 2016, and Alexandroupoli (Greece) in 2018.

The ICEM 2020 conference is hosted by Chalmers University of Technology in Sweden. Chalmers has a long tradition in the research area of electrical machines.

Gothenburg is located on the Swedish west coast, with direct connections to most major cities in Europe. This 400-year-old harbor city blends a distinct charm with the pulse of a modern urban lifestyle. You easily get around on foot or by tram and will find numerous restaurants and cafés, flourishing gardens, historic sites, museums and music. A 30-minute ride from downtown brings you to a ferry to explore the tranquil archipelago. Late summer is beautiful to visit. Long hours of daylight and moderate temperatures ensure a pleasant stay.

Due to the COVID-19, this ICEM will be held as a virtual conference with all presentations on-line. The decision is made based on our priority on health and safety of our participants.

We will do our best to ensure the quality of the conference and exchange of academic knowledges. The virtual experiences will give us opportunities to virtually visit all sessions and watch the video materials at your convenience.

We would like to express our sincere thanks to all of you participating in ICEM 2020. It is especially meaningful and grateful that we have successfully managed to prepare this year's event as the first ever virtual conference under the Covid19 outbreak devastating the world. Thank you again for your interest in and contribution to ICEM2020!

Welcome and look forward to your active engagement and intellectual stimulation through the event!

General Co-chair: Yujing Liu
Chalmers University of Technology, Sweden



General Co-Chair: Gérard-André Capolino
University of Picardie "Jules Verne", Amiens, France



Message from the Technical Program Committee

The 24th event of ICEM is a major activity of the worldwide engineering community working in the field of electrical machines and their applications. It is therefore a great honor and a pleasure for us to be in charge of the technical program of ICEM 2020. This is the eighth event following Chania in 2006, Vilamoura in 2008, Roma in 2010, Marseille in 2012, Berlin in 2014, Lausanne 2016 and Alexandroupoli in 2018 since ICEM has decided a new shape of the organization to ICEM authors with the technical co-sponsorship of IEEE. On this account all participating authors have been required to submit a full provisional version of each of their paper for both regular tracks and special sessions.

For the 2020 event, the Organizing Committee has proposed to participants:

- 8 tutorials
- 6 tracks for regular papers
- 14 special sessions on “hot” topics
- 1 student forum

In total 508 papers have been submitted and 391 papers are included the final program. More than one thousand authors from countries all around the world contribute to the conference. There are more than 1700 reviews conducted and at least 3 reviews for each paper. In the technical program, the papers have been classified in oral sessions and poster sessions as the tradition.

The Technical Program represents fully integrated efforts of many people including authors, reviewers, track co-chairs, special session organizers, and local committee members. We believe that the state-of-the-art progress on electrical machines is well represented across both technical tracks and special sessions.

Welcome to ICEM 2020!

Aldo Boglietti, Jose Alfonso Antonino-Daviu, Luca Zarri, Sonja Lundmark

ICEM 2020 Technical Program Co-Chairs

Committees

ICEM 2020 Organizing Committee

Yujing Liu (Sweden), General Co-Chair
Gérard-André Capolino (France), General Co-Chair

ICEM NPO Administrative Committee (AdCom)

Voting members (elected): 20 persons

Francesco Parasiliti, Italy, Chair
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Antonino Di Gerlando, Italy, Secretary
Humberto Henao, France, Treasurer
Jose Alfonso Antonino-Daviu, Spain
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Anouar Belahcen, Finland
Aldo Boglietti, Italy, IEEE-IAS representative
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Ronghai Qu, China
Uwe Schaefer, Germany
Sandy Smith, UK
Noureddine Takorabet, France
Lucian Tutelea, Romania
Luca Zarri, Italy

Life members (voted): 2 persons

Heinz Bausch, Germany

Gérard-André Capolino, France

ICEM 2020 Local Organizing Committee

Torbjörn Thiringer, Chalmers Univ. of Technology
Sonja Lundmark, Chalmers Univ. of Technology
Mats Alaküla, Lund University
Francisco Márquez-Fernández, Lund University
Oskar Wallmark, Royal Institute of Technology

Rahul Kanchan, ABB Corporate Research
Ola Aglén, ABB Motors and generators
Robert Eriksson, Volvo Cars
Gabriel Domingues, BorgWarner

ICEM 2020 Technical Program Committee

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ICEM 2020 Student Forum Co-Chairs

Rahul Kanchan, Sweden
Mohamed Boussak, France

Jonas Kristiansen Nøland, Norway

ICEM Awards Chair

Jan Melkebeek, Belgium

Track Co-Chairs

Rotating Machines:

Pinjia Zhang, China
Frederik De Belie, Belgium
Alfonso Damiano, Italy

Fernando J. T. E. Ferreira, Portugal
Maarten Kamper, South Africa
Greg Heins, Australia

Design issues:

Giulio De Donato, Italy
Noureddine Takorabe, France

Anouar Belahcen, Finland
Michael Galea, UK

Special Machines:

Akira Chiba, Japan
Ronghai Qu, China

Sami Hlioui, France
Yacine Amara, France

Thermal and Losses Issues – Magnetic and insulation Materials:

Andreas Krings, Germany
Shafiq Nategh, Sweden

Marco Cossale, Switzerland

Electrical Drives:

Eric Armando, Italy
Gianmario Pellegrino, Italy

Marko Hinkkanen, Finland
Shafiq Odhano, UK

Diagnostic and Condition monitoring:

Thomas Wolbank, Austria
Raphael Romary, France

Lucia Frosini, Italy

Publication Co-Chairs

Antonio Luque, Spain

Andres Nogueiras, Spain

SPECIAL SESSIONS (Co-Chairs)

SS1. Electrical Machines for Renewables:

Chiara Boccaletti

Cristina Moscatiello

SS2. High Efficiency Electrical Machines: Innovative Materials, Design, Measurement and Manufacturing Techniques

Antonios Kladas

Masato Enokizono

SS3. High-Speed Electrical Machines:

Lassi Aarniovuori

Shaopeng Wu

SS4. Innovative Magnetic Materials for Electromagnetic Devices:

Luca Ferraris

Carole Henaux

SS5. Large synchronous generators:

Arne Nysveen

Urban Lundin

SS6. Motor and Generator Windings – Design, Performance and Manufacturing:

Fernando Ferreira

Marco Villani

SS7. Multiphase Machines Design and Control:

Dieter Gerling

Wei Xie

SS8. Novel Flux Modulation Machines and Controls:

Dawei Li

Yuting Gao

SS9. Software-Based Design of e-Machines: Present and Perspectives:

Paolo Pescetto

Andrea Credo

SS10. Advances in Electrical Machines and Drives for Green Maritime Applications:

John Prousalidis

Jean-Frederic Charpentier

SS11. Thermal Analysis of Electrical Machines Operating Under Harsh Conditions:

Antonio Marques Cardoso

Amel Adouni

SS12. Topology, Modelling, Control, and Reliable Operation of Energy Conversion Systems Based on Multi-Port Electrical Machines:

Yi Liu

Dao Zhou

SS13. Application of Electrical Machine in Modern Electric Vehicles:

Damijan Miljavec

Giuseppe Fabri

SS14. Electrical Machines Fault Diagnosis During Transient Operation:

Konstantinos Gyftakis

Jose Antonino-Daviu

General Information

Conference Venue & Virtual Conference

The original venue of the conference is the Swedish Exhibition & Congress Centre in Gothenburg, Sweden. Due to COVID-19, the conference is moved on-line with cloud-based conference arrangement. The conference materials can be accessed on the conference website and via links to the cloud-based database.

Tutorials

All of the 8 tutorials will be presented on Sunday, 23rd of August 2020, in three parallel sessions. Each tutorial will be organized as a Zoom webinar (no installation required for audience) with a presentation for 120 minutes and questions and answers for 30 minutes. The presenters will present their PPTs on-line in real-time. Participation to the tutorials, view the recorded replay, and downloading PDFs are free of charge for all the attendees registered in ICEM 2020 (student or regular). Audience can ask questions by typing questions in the Q&A or chat window. Chairmen or hosts should read all of the questions from the audience. If the questions are too many, chairmen or hosts can select among them. The presenters should answer the questions in text or orally to the audience.

Oral & Poster Paper Presentations

In ICEM 2020 Proceedings, there is no difference between oral-and poster presentations. All papers are treated in the same way and potentially available in the IEEE Xplore after the conference if they are properly presented. The papers in poster sessions should be presented in the same way as the oral sessions. No one-page posters are required.

The paper presentation will be managed on-line but not in real-time. They are pre-recorded by the presenters themselves and uploaded to the conference program. Registered participants can watch presentation video through the link in the final program. Audience can post questions in the Q&A file linked to the presentation. Authors should write answers to all the questions during the conference period (24-26 August). Quality of the answers will be one of the factors for the event awards including the Best Papers, the Best Posters and the Best Student Forum Posters. An unqualified video presentation of a paper will be considered as no presentation. Unpresented papers will not be included in the IEEE Xplore database.

The PDF copies of all papers can be viewed and downloaded. Before the papers transferred to IEEE Xplore, there will be one-week timeslot for authors to re-upload the final version after the conference.

Student Forum

The students in the Student Forum should present themselves and their work in videos. CVs and videos are linked in the final program. Three best presentations will receive the ICEM "Jorma Luomi Student Forum Award" during the closing ceremony.

Awards

In total 5 awards will be announced during the closing ceremony.

Opening Ceremony, Keynote Speeches, and Closing Ceremony

All the speeches on the Opening Ceremony, Keynotes, and the Closing Ceremony will be pre-recorded and accessible in time.

Conference Secretariat

Sweden Meetx,
icem2020@meetx.se

Conference Schedule

23rd August 2020: Tutorial sessions (Live)

Morning session, 9:00-11:30 European Central Time (CEST Central European Summer Time)

[Tutorial-1](#): *Development Technology of High Efficiency and High Power Density for High-Speed Motor*

[Tutorial-2](#): *Advanced Testing of Inverter-fed Drives*

[Tutorial-3](#): *A Flux-oriented-based Analysis of Three-phase Induction Machine (pre-recorded)*

Lunch session, 12:00-14:30 European Central Time (CEST)

[Tutorial-4](#): *Multiphysics Optimization and Prototyping of Innovative Synchronous Reluctance Motors*

[Tutorial-5](#): *Optimised Electrical Machine Designs for E-mobility Applications*

[Tutorial-6](#): *Magnetic Noise & Vibrations in EV HEV Electric Motors (e-NVH)*

Afternoon session, 15:00-17:30 European Central Time (CEST)

[Tutorial-7](#): *Experimental Loss Determination and Uncertainty Analysis of Electrical machines and Converters*

[Tutorial-8](#): *Advanced Linear Induction Machines and Drive Systems for Industrial Applications*

24th - 26th August 2020: Conference

- Opening ceremony
 - Welcome Message ([PDF](#), Video) by Prof. **Yujing Liu**, General Co-chair of ICEM2020
 - ICEM Present, Past and Future ([PDF](#), Video) by Prof. **Francesco Parasiliti**, Chair of ICEM Administrative Committee
- [Keynotes speeches](#)
- [Paper presentations](#) (pre-recorded videos for all oral and all poster presentations). No time slots are allocated for specific papers. Questions and Answers (Q&A) to presentations are linked to each paper. Questions should be answered under the conference period.
- [Student forum](#) Q&A can be used as communication
- Closing ceremony:
 - Summary of conference (Video coming soon)
 - Award announcement (Video coming soon)
 - ICEM 2022 ([Video](#)) at Valencia/Spain ([Video](#))

27th August 2020: Sponsored webinars (Live)

- [Sponsored webinar-1](#): *Modeling of Electric Machines, COMSOL*
- [Sponsored webinar-2](#): *Electric Drive System - meet up with the system chief engineer, Volvo Buss*
- [Sponsored webinar-3](#): *Introducing JMAG-Designer Ver.19.1, Powersys*

28th August – 28th November 2020:

ICEM 2020 virtual learning continues All the conference materials except a few with special requirements will stay available on-line for all registered participants for extra 3 months after the conference!

Tutorial-1: Sunday, 23rd August 2020, 09:00-11:30 CEST



Click to join Zoom Webinar ID: 661 8986 9432, Passcode: 09012308
Chairman: Prof. Antonio Kladas
Host: Prof. Yujing Liu (yujing.liu@chalmers.se for administration questions)

Development Technology of High Efficiency and High Power Density for High-Speed Motor

(PDF download) (Video replay)

Name: **Masato ENOKIZONO**
Institution: (1) Vector Magnetic Characteristic Technical Laboratory (Vector-MAGTEC); (2) Nippon Bunri University; (3) Oita University. Japan.
E-mail: enoki@oita-u.ac.jp, <http://www.vector-magtec.jp/>

Tutorial Abstract:

This paper describes the necessary technical issues for the development of high efficiency and high-speed motors with high power density. Especially, it aims at high efficiency by reducing core loss. Its key point is the necessary magnetic properties of materials for high speed motor iron core, its vector magnetic characteristics and magnetic characteristics analysis of the magnetic circuit design.

The analysis problems of electrical machines are usually inverse, as electrical machines have high power factor. The voltage is given, and the problem is to evaluate the current. On the other hand, in the case of the magnetic field measurements in the magnetic material, the magnetic field strength is given, and the problem is to evaluate the magnetic flux density. This constitutes a forward problem.

In order to properly analyze the core loss in electrical machines, it is necessary to consider the vector magnetic characteristics of iron parts by taking into account the phase shift between local magnetic field strength and flux density values.

Biography:



Prof. Masato Enokizono graduated from Kyushu University, School of Engineering and obtained Dr. Eng degree in 1978, Japan. He was appointed as researcher to the, Faculty of Engineering, Oita University in 1980. Then he was Professor of Faculty of Engineering, Oita university during 1985-2014. In 1986-1987 and 2006, he worked in PTB (Physikalisch-Technische Bundesanstalt) in Germany as researcher. He acted as a conference chairman of the 15th Biennial IEEE conference on Electromagnetic Field Computation (CEFC 2012 in Oita). He was president of Japanese Society of Applied Electromagnetics and Mechanics (JSAEM), 2009-2012. He was a special researcher of Technology Research Association of Magnetic Materials for High-Efficiency Motors (MagHEM) of Japanese government NEDO project, 2013-2017. In 2014 he founded

Vector Magnetic Characteristic Technical Laboratory. He is a Research Professor of Nippon Bunri University and also an Emeritus Professor of Oita University.

Tutorial-2: Sunday, 23rd August 2020, 09:00-11:30 CEST



Click to join Zoom Meeting ID: 673 3688 0930, Passcode: 09022308)
Chairman: Prof. Sandy Smith
Host: Prof. Sonja Lundmark (sonja.lundmark@chalmers.se for administration questions)

Advanced Testing of Inverter-fed Drives

(PDF download) (Video replay)

Name: **Johannes Teigelkoetter (1), Klaus Lang (2)**
Institution: (1) University of Aschaffenburg, Germany
 (2) HOTTINGER, BRÜEL & KJÆR, Germany
E-mail: Johannes.Teigelkoetter@th-ab.de, <https://www.th-ab.de/>
 Klaus.Lang@hbkworld.com, <https://www.hbm.com/en/>

Tutorial Abstract:

The concern for energy saving has drawn the attention of industry on more efficient inverter-fed drives in the industrial applications, transportation, power generation and home appliances. In order to achieve maximum efficiency with minimum size and costs, the inverter and the electrical machine must be very well matched to one another. A new inverter or machine design must be properly tested to check if the inverter-fed drive fulfills the requirements of the application since the nameplate data and the rated parameters are not enough to evaluate performance. Therefore, the inverter and the machine should be properly characterized and different parameters must be identified. For this purpose, an overview of the necessary measurement methods and some intelligent evaluation methods are presented in this tutorial.

The tutorial is addressed to industry R&D centers and academia and presents an advanced testing method of inverter-fed drives using a high-speed, high-precision data recorder that represents “all-in-one” measuring tool, including electrical quantities (voltage, current) measurement and mechanical (torque, speed, position) quantities.

Biographies:



Dr. Johannes Teigelkötter is a teaching and researching Professor in the fields of electrical machines, power electronics and drives at University of Applied Sciences Aschaffenburg, Germany. He studied electrical power engineering and received the Dipl.-Ing. (FH) degree at the University of Applied Sciences Düsseldorf in 1986. From 1986 to 1991 he worked as a development engineer in the field of power electronics and instrumentation at ABB in Lampertheim, Germany. After that, he worked as research assistant at the Ruhr-University Bochum, where he received the PhD (Dr.-Ing.) degree in 1996. From 1996 to 2000 Mr. Teigelkötter worked as a development engineer in drive technology for locomotives at Siemens, Erlangen, Germany.



Dipl.-Ing. Klaus Lang is Business Development Manager for Electric power testing at Hottinger Bruel & Kjaer (HKB) in Darmstadt, Germany. He studied Telekommunikations at the University of the German Telekom in Dieburg. Then he joined GOULD as a Product Specialist for paper recorders, later digital data recorders. Later at NICOLET, and then at LDS, he was Product Manager for transient recorders and digital storage oscilloscopes. Since HBM (now HBK) acquired LDS in 2009, he is responsible as Business Development Manager for “Electric Power Testing”.

Tutorial-3: Sunday, 23rd August 2020, 09:00-11:30 CEST



Click to join Zoom Webinar ID: 61624918842, Passcode: 09032308
Chairman: Dr. Xiaoliang Huang
Host: Prof. Torbjörn Thiringer (torbjorn.thiringer@chalmers.se for administration questions)

A Flux-oriented-based Analysis of Three-phase Induction Machines

(PDF download)_(Video replay: Part-1, Part-2a, Part-2b, Part-2c, Part-3)

Name: **Matteo Carbonieri, Nicola Bianchi, Luigi Alberti**
Institution: University of Padova
E-mail: matteo.carbonieri@studenti.unipd.it, nicola.bianchi@unipd.it, luigi.alberti@unipd.it

Tutorial Abstract:

The tutorial will describe a complete finite-element analysis procedure for induction motors, including squirrel cage motor. One of the main novelties of the proposed approach is that the machine performance is obtained performing only magneto-static finite element analyses. The synergy between analytical and finite element model leads to a rapid and precise estimation of the rotor induced current. The rotor currents are assigned as source and their value is adjusted in at maximum three simulation steps. Adopting magneto-static analysis, saturation phenomena are carefully considered in any operating condition. In addition, computational time is very low, since time-stepping analyses are avoided. The procedure proposed allows the motor performance to be directly derived, without any preliminary knowledge of the machine equivalent circuit. In the tutorial, how to apply this analysis procedure will be described in details. In addition, strategies to include the analysis of skewed rotors, MMF space harmonics, iron losses evaluation, ... will be explained.

Brief summary of the contents:

1. Theoretic introduction to highlight the rotor flux in the induction machine equations.
2. How to set stator and rotor currents into the magneto-static analysis of the machine.
3. How to consider the skewing of the rotor.
4. How to consider the Magneto-Motive-Force (MMF) harmonics.
5. Parameter and losses estimation is a key feature of the proposed procedure.
6. Efficiency map of the machine (thanks to the rapidity of the magneto-static simulations).
7. Particular applications.

Biographies:



Mr. Matteo Carbonieri received the master's degree in electrical engineering from the University of Padova, Padova, Italy, in 2017. He is currently Ph.D. student in the Electric Drives Laboratory, University of Padova, working on the design and analysis of electric machines.

Prof. Nicola Bianchi received the Laurea and Ph.D. degrees in electrical engineering from the University of Padova, Padova, Italy, in 1991 and 1995, respectively. He is a Full Professor in the Electric Drives Laboratory, Department of Electrical Engineering, University of Padova. His research activity is in the field of the design of electrical motors for electric drive applications.

Dr. Luigi Alberti received the Laurea and Ph.D. degrees in electrical engineering from the University of Padova, Padova, Italy, in 2005 and 2009, respectively. He is currently an Associate Professor in the Electric Drives Laboratory, University of Padova, working on the design, analysis, and control of electric machines.

Tutorial-4: Sunday, 23rd August 2020, 12:00-14:30 CEST



Click to join Webinar ID: 618 1328 3739, Passcode: 12012308
Chairman: Prof. Antonio Kladas
Host: Prof. Yujing Liu (yujing.liu@chalmers.se, contact with technical questions)

Multi-Objective Optimization and Prototyping of Innovative Synchronous Reluctance Motors

(PDF download) (Video replay)

Name: **Alberto Rubino (1); Emanuel Castagnaro (2)**
Institution: (1) SPIN Applicazioni Magnetiche, (2) Università degli Studi di Padova
E-mail: alberto.rubino@spinmag.it, emanuel.castagnaro@phd.unipd.it

Tutorial Abstract:

Because of the uncertainty on the price of permanent magnets, Synchronous Reluctance Machines are currently seen as a potential alternative for PMSMs. Although they cannot reach the same power density, they are able to create high torques, are robust, easy to manufacture and have lower material costs. Unfortunately, these machines are also known to have low power factor and high torque ripples which can create noise. The aim of this tutorial is to present the basics of this type of machine, understand which are their main design parameters and how they impact the machine performance, looking particularly at the torque ripples. The influence of the control strategy and rotor shapes are studied. An innovative asymmetric structure is shown, analyzed and compared to more classical structures. Then the vibration aspects of the machine are also looked at. The theory and analyses made are illustrated through simulation results. The main ones are checked against measurements thanks to tests that have been performed on real prototypes. The benefits of using optimization methods and applying them to determine rotor shapes and minimize torque ripple will be demonstrated. In addition, it will be shown how multi-physics objectives and constraints can be considered in the optimization.

Biographies:



Mr. Alberto Rubino was born in Alba (CN), Italy, in 1992. He attended Electrical Engineering at Turin Polytechnic. He received B.Sc. in July 2014 and M.Sc. in December 2016. His fields of interest include the electromechanical conversion of energy, thanks to electrical rotating machines. He has been working for SPIN Applicazioni Magnetiche in Piacenza since March 2017. In SPIN he is in charge of electromagnetic design and thermal verification of several types of electric motors and drives, using both analytic and finite element software. He is also expert in system-level analyses, including control aspects. He provided training courses to several companies, both regarding software utilization and theory of electrical machines.



Mr. Emanuel Castagnaro received the BS in Industrial Engineering in 2015 and the MS in Electrical Engineering in 2017 from the University of Pavia, Pavia, Italy. Currently he is a PhD student of the Department of Industrial Engineering at the University of Padova. His research interests are mainly focused on the NVH in synchronous machines, in particular in Synchronous Reluctance motors and Permanent Magnet motors.

Tutorial-5: Sunday, 23rd August 2020, 12:00-14:30 CEST



Click to join Webinar ID: 628 8029 4159, Passcode: 12022308

Chairman: Dr. Xiaoliang Huang

Host: Prof. Torbjörn Thiringer (torbjorn.thiringer@chalmers.se for administration questions)

Optimised Electrical Machine Designs for E-mobility Applications

(PDF download)_(Video replay: Part 1, Part 2)

Name: **Dr Mircea Popescu & Dr Melanie Michon**

Company: Motor Design Ltd

E-mail: Mircea.Popescu@motor-design.com, Melanie.Michon@motor-design.com

Tutorial Abstract:

Transport electrification is seen as one of the main solutions to reduce global CO₂ emissions and increased demand of mechanical energy can be provided by electrical energy. The best energy conversion systems are undoubtedly the combination: electrical machines + power electronics + batteries.

The increasing demand of full electric vehicles arises specific challenges in terms of design for manufacturing, low weight, material costs and material supply chain. There is a strong interest to reduce the volume and cost of active materials in propulsion motor technologies beyond their current state-of-art, with a strong focus on industrial feasibility for mass production. Potential solutions include increased motor speeds and higher pole numbers and/or the adoption of rare earth free typologies such as reluctance (switched and synchronous) and induction machines.

Cutting-edge sensitivity analysis and multi-objective optimisation techniques will be applied in the design of an electric motor for a PHEV traction application. Each candidate solution will be evaluated in terms of electromagnetic, thermal and mechanical behaviour across the full operating envelope. The optimisation will generate a pareto front which allows efficiency over a drive cycle to be traded off against motor cost. This approach utilises a high performance or cloud computing infrastructure to deliver a truly revolutionary design workflow.

Biographies:




Dr. Mircea Popescu is Chief Technology Officer for Motor Design, Ltd., UK and has more than 35 years of engineering experience. Dr. Popescu published 150+ papers and his publications have received three IEEE best paper awards. His consultancy contributions for industry are incorporated in many state-of-the-art products. Current major projects include ReFreeDrive, rare-earth free e-drives featuring low cost manufacturing, under EGVI Horizon 2020 program. An IEEE Fellow, Dr. Popescu acted as 2010-2017 IEEE IAS Electrical Machines Committee Officer and 2013-2016 Prominent Lecturer IEEE IAS Region 8.



Dr. Melanie Michon, is Head of Engineering for Motor Design, Ltd., UK. Melanie has gained a PhD degree in Electrical Engineering from the University of Sheffield. She has 20 years of combined academic and industrial experience enabling her to provide thought leadership and to drive innovation with a clear focus on IP development and commercialisation. She joined MDL in April 2019 in the position of Head of Engineering, where she heads the engineering team and is responsible for delivering grant funded and large engineering projects, as well as technical pre-sales support.

Tutorial-6: Sunday, 23rd August 2020, 12:00-14:30 CEST

 Click to join Zoom Meeting ID: 674 2133 8711, Passcode: 12032308
Chairman: Prof. Sandy Smith
Host: Prof. Sonja Lundmark (sonja.lundmark@chalmers.se for administration questions)

Magnetic Noise and Vibration in Main EV HEV Electric Motor Topologies

(PDF download)_(Video replay, may expired soon)

Name: **Jean LE BESNERAIS**
Institution: EOMYS ENGINEERING. France.
E-mail: jean.lebesnerais@eomys.com, www.eomys.com

Tutorial Abstract:

Electromagnetically-excited noise and vibrations (e-NVH) can drive the vibroacoustic signature of electric motors used in e-mobility applications. Tackling noise issues after manufacturing can be particularly expensive and may degrade e-powertrain overall performances (efficiency, cooling, weight). Electric motor designers now have taken into account e-NVH phenomena at early design stage, besides usual electromagnetic and thermal aspects.

This tutorial first presents noise sources in electric powertrains, including slotting and switching excitation sources. The physical process of air-borne and structure-borne magnetic noise generation is detailed, from current to sound pressure level, including resonance phenomena. It is shown that it is particularly important to identify main magnetic force wavenumbers and frequencies during early electromagnetic design stage of electrical machines.

Therefore, the analytic characterization of magnetic forces in two key EV HEV topologies is carried, namely Interior Permanent Magnet Synchronous Machines (Tesla model 3) and Squirrel Cage Induction Machines (Audi e-Tron). Differences in electromagnetic excitations is discussed and illustrated with spectrograms obtained using MANATEE[®] software multiphysics simulation tool.

Biography:



Dr. J. LE BESNERAIS made an industrial PhD thesis in Electrical Engineering at the L2EP laboratory of the Ecole Centrale de Lille, North of France, on the reduction of electromagnetic noise and vibrations in traction machines with ALSTOM Transport. After working as an engineer in the railway and wind turbine industries, he created EOMYS ENGINEERING in 2013, a company providing applied research and development services in electrical engineering.

EOMYS has developed a strong expertise in the analysis and reduction of noise and vibrations due to electromagnetic forces in rotating machines. The company has worked on both synchronous and induction machines, from W to MW range, obtaining up to 40 dB reduction after redesign. Based on its consulting experience, EOMYS has developed MANATEE (Magnetic Acoustic Noise Analysis Tool for Electrical Engineering), the first simulation software for the fast calculation of variable speed noise and vibrations due to magnetic forces.

Tutorial-7: Sunday, 23rd August 2020, 15:00-17:30 CEST

Click to join Webinar ID: 668 5886 3776, Passcode: 15012308



Chairman: Prof. Sandy Smith

Host: Prof. Yujing Liu (yujing.liu@chalmers.se contact with technical questions)

Electrical Machines and Converters Experimental Loss Determination and Uncertainty Analysis

(PDF download)_(Video replay)

Names: **Lassi Aarniovuori and Hannu Kärkkäinen**

Institution: Laboratory of Electrical Drives Technology, LUT-University, Lappeenranta, Finland.

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Tutorial Abstract:

Experiments play a major role in the research of motors and converters. The properties and efficiencies of the motors and converters are verified through experiments. The continuous improvement of the efficiency of the devices and distorted electrical waveforms create specific challenges for the task. This tutorial introduces the typical efficiency determination methods for converters and motors, highlights the corresponding international standards and analyses the measurement uncertainty using real case studies.

Efficiency is the ratio of the output power to the input power and can be directly determined by measuring the input and output powers. This input-output method is troublesome when the efficiency of the device is high because the uncertainty of the losses is approaching infinity when the efficiency is approaching unity. Therefore, loss segregation methods or calorimetric methods are recommended for high efficiency devices, but in practice the input-output method is the only viable method for regular use. One objective in this tutorial is to understand the limitations of the input-output method.

Uncertainty analysis is a basic tool in science, but it has been ignored in the field of electric motor systems. The accuracy of the power measurement in the case of pulse-width-modulation (PWM) has been a controversial topic. Here, the measurement uncertainty determination methodology in electrical (sinusoidal and PWM-supply) and mechanical power measurements is presented, and the loss and efficiency uncertainties of converters, motors and motor systems are analyzed.

Biographies:



Dr. Lassi Aarniovuori (SM'19) received M.Sc. degree in industrial electronics and D.Sc. degree in electrical drives from Lappeenranta University of Technology (LUT), Lappeenranta, Finland, in 2005 and 2010, respectively. Dr. Aarniovuori has conducted research into various industrial and academic research projects at LUT-University. He was a Marie Curie Fellow with the School of Engineering and Applied Science, Aston University, UK during 2017-2019. Currently, he is serving as an Adjunct Professor of Electric Motors and Drives at LUT. His current research interests include the field of electric motor drives, especially high-speed motor drives, harmonic power analysis, simulation and modelling of electric drives, efficiency measurements, and calorimetric measurement systems.



Mr. Hannu Kärkkäinen received his M.Sc. degree in electrical engineering from Lappeenranta University of Technology, Finland, in 2015, where he currently works as a junior researcher with the Department of Electrical Engineering. His research interests include electric drive systems, particularly loss and efficiency measurements and analysis of the motors and drives. Currently, Mr. Kärkkäinen is finalizing his D.Sc. thesis from the field of theory and methodology used in determination of electrical drive system losses and efficiency.

Tutorial-8: Sunday, 23rd August 2020, 15:00-17:30 CEST



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Chairman: Dr. Xiaoliang Huang

Host: Prof. Torbjörn Thiringer (torbjorn.thiringer@chalmers.se for administration questions)

Advanced Linear Induction Machines and Drive Systems for Industrial Applications

(PDF download)_(Video replay: Part 1, Part 2)

Name: **Wei Xu (1) and Marcello Pucci (2)**

Institution: (1) School of Electrical and Electronics Engineering, Huazhong University of Science and Technology. (2) Institute of Intelligent Systems for the Automation (ISSIA) - National Research Council of Italy.

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Tutorial Abstract:

Rotating machines (RMs) have been existing for almost 200 years (since 1820s). Their linear counterpart, called linear machines (LMs), have been introduced at the turn of 20th century, which can realize the conversion of electrical energy to linear motion mechanical energy (or vice versa) directly through electromagnetic forces. Due to the need of power electronics for motion control (in absence of a mechanical transmission), LMs have been paid wide industrial attention only after 1960s. The tutorial aims to share the advancements in the linear machine topologies, integrated modelling, high-performance control strategies and its emerging applications in transportation, energy conversion systems, and so on. Researchers and engineers from electrical, mechanical and information fields may find it useful when dealing with transportation motor and drive related design, optimization and control development, mechanical design and analysis, etc. The main subject of the tutorial will mostly focus on design and control for the linear induction machines (LIMs).

Biographies:



Prof. Wei Xu (M'09-SM'13) received the double B.E. and M.E. degrees from Tianjin University, Tianjin, China, in 2002 and 2005, and the Ph.D. from the Institute of Electrical Engineering, Chinese Academy of Sciences, in 2008, respectively, all in electrical engineering. From 2008 to 2012, he held several academic positions in Australia and Japan. Since 2013, he has been full professor with School of Electrical and Electronic Engineering, Huazhong University of Science and Technology (HUST), China. His research topics focus on linear machines and drives (<http://machinececs.see.hust.edu.cn/>). He has 100+ IEEE Transactions papers, three books, and 120+ Invention Patents. He is Fellow of the Institute of Engineering and Technology (IET). He will serve as the General Chair for 2021 International Symposium on Linear Drives for Industry Applications (LDIA 2021) and 2023 IEEE International Conference on Predictive Control of Electrical Drives and Power Electronics (PRECEDE 2023), in Wuhan, China, respectively. He has served as Associate Editor for several IEEE Transactions Journals, such as IEEE Transactions on Industrial Electronics, IEEE Transactions on Vehicular Technology, IEEE Transactions on Energy Conversion, and so on.



Dr. Marcello Pucci (M'03-SM'11) received the Laurea and Ph.D. degrees in Electrical Engineering from the University of Palermo, Italy, in 1997 and 2002, respectively. In 2000 he has been a host student at the Institute of Automatic Control, Technical University of Braunschweig, Germany. Since 2001, he has been a researcher at the Institute of Intelligent Systems for Automation, Section of Palermo, Italy, where he is currently a Senior Research Scientist. Dr. Pucci's research interests mainly include advanced control for AC machines, particularly the linear machines and drives. He is an associate editor of the IEEE Transactions on Industrial Electronics and IEEE Transactions on Industry Applications. He is a member of the Editorial Board of the "Journal of Electrical Systems".

Keynote Speakers



Dave Fulton: *Director of Electric Drive Innovation, BorgWarner*

David Fulton is the Director of Electric Drive Innovation at BorgWarner, a system leader for combustion, hybrid, and electric vehicles. In this role, he leads product & process technology development to provide competitive advantage in xEV powertrains. Prior to joining BorgWarner, David spent more than 20 years at Remy International, where he held engineering and management positions of increasing responsibility. He is inventor/co-inventor on 30 U.S. patents, a licensed professional engineer, and a member of SAE and IEEE. David received bachelor's and master's degrees in mechanical engineering from Valparaiso University and Northwestern University, respectively.

Title: Future trend and challenges for traction electrical machines (linked video)

As vehicle electrification increases so does the need for a wide variety of electrical architectures suited to various customer needs. Aside from the battery, transmission and power electronics components this includes a multitude of machines optimally designed for different applications and positions in the propulsion system. The requirements, constraints and optimization targets considered during the design of an electrical machine vary significantly between the architectures and applications. Moreover, considerations regarding commonality, manufacturability, existing production capacity and scalability can guide design decisions to reduce costs and time to market. BorgWarner has developed a wide portfolio of electrical machines suited for most automotive propulsion architectures through a combination of extensive knowledge of electrical machine design and optimization, high fill factor winding technologies well suited for mass production and deep system level understanding of the application requirements. This keynote will address some of the architectural considerations and outline current and future trends for vehicle electrification and the electrical machine they require.



Nils-Gunnar Vågstedt, PhD: *Head of Innovation R&D, Scania
 Chairman of Executive Board, Swedish Electromobility Centre (SEC)*

Nils-Gunnar Vågstedt is managing the innovation activities and processes at Scania, a world leading company on trucks and buses. He obtained his PhD in Vehicle Dynamics from Royal Institute of Technology, Sweden, in 1995. He has 25 years of working experiences at Scania to lead research and development covering mechanical, electrical, active safety and other aspects. In the last decade, he dedicated himself to inspiring and managing the development of electric and hybrid powertrains for heavy-duty vehicles. Nils-Gunnar is active in promoting the national academic research on transport electrification in Sweden and acts as the chairman of the executive board of Swedish

Electromobility Centre (SEC) in the last 5 years. He is also engaged in international standardization work and is co-chair in SAE J2954 wireless charging group for commercial vehicles. Nils-Gunnar has been involved in many important innovation projects at Scania and holds patents in the area of brake systems, electronics systems, and electrification solutions.

Title: Architecting the future of sustainable powertrain (linked video)

Electrification with efficient e-powertrains is spreading through the whole spectrum of applications of goods and people transportation, including those for heavy and long-distance commercial operation. Electrified powertrain solutions blend in, spreading from micro hybrid, via hybrid and plugins to full electric and electric roads. Batteries as well as fuel cell and hydrogen will be parts of the design puzzle. One thing will be in common; all of the electrified powertrains will use electric machines. The transition speed over to these solutions heavily relates to total cost for the operation. But the transition may as well be both hindered and accelerated by competing and new functionality. When designing efficient electrical machines for heavy goods and people transportation, other design criteria than usually applied to automotive need to be considered too. In order to handle the still diverse toolbox of potential solutions, Scania incorporate a core feature in its approach to innovation: modularity. This keynote aims to address the drivers for multitude of solutions for e-powertrains and how modularity may maximize the possibility to offer the customer a dedicated solution.

Paper presentations

Shortcuts to the technical sessions:

<u>TT1: Diagnosis and Condition Monitoring</u>	<u>SS5: Large synchronous generators</u>
<u>TT2: Electrical Drives</u>	<u>SS6: Motor and Generator Windings Design, Performance and Manufacturing</u>
<u>TT3: Rotating Machines</u>	<u>SS7: Multiphase Machines Design and Control</u>
<u>TT4: Special Machines</u>	<u>SS8: Novel Flux Modulation Machines and Control</u>
<u>TT5: Thermal and Losses Issues, Magnetic and Insulation Materials</u>	<u>SS9: Software Based Design of Machines Present and Perspectives</u>
<u>TT6: Design issue</u>	<u>SS10: The Electric Platform as Means for Green Shipping</u>
<u>SS1: Electrical Machines for Renewable</u>	<u>SS11: Thermal Analysis of Electrical Machines Operating Under Harsh Conditions</u>
<u>SS2: High Efficiency Electrical Machines Innovative Materials, Design, Measurement and Manufacturing Techniques</u>	<u>SS12: Topology, Modelling, Control, and Reliable Operation of Energy Conversion Systems Based on Multi-Port Electrical Machines</u>
<u>SS3: High Speed Electrical Machines</u>	<u>SS13: Applications of Electrical Machines in Modern Electric Vehicles</u>
<u>SS4: Innovative magnetic materials for electromagnetic devices</u>	<u>SS14: Electrical Machines Fault Diagnosis During Transient Operation</u>

Recommendation: the best way to use the links in the paper presentations is to download this Final Program to your local computer or mobile device. Click the links to get view on the PDFs and videos of the papers.

- PDF of the paper is linked to the Paper ID. e.g. “SD-xxxxxx”. Click on it, you will open the PDF. It is possible to download the paper.
- Video of the paper can be opened by click on “Video”. Videos are not downloadable due to copy right.
- Questions and Answers sheet of the same paper can be opened by click on “Q&A”. There are instructions in the Q&A sheet. “Send” is only used for sending in questions or answers.

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TT1 Diagnosis and Condition Monitoring

Session Title	Induction Motors				
Paper ID	Paper title	Authors	Country	Present ation	Link
SD-011665	Rotor fault detection in induction motors operated with different types of soft-starters_ITE	Marta García-Pellicer, Alfredo Quijano-López, José A. Antonino-Daviu, Iván Higuero-Torres, Ernesto Martínez-Montes, Guillem Gil-Prieto	Spain	Oral	Video Q&A Send
SD-007021	Detection of Rotor and Impeller Faults in Wet-rotor Pumps	Vincent Becker, Thilo Schwamm, Sven Urschel, Jose Alfonso Antonino-Daviu	Germany	Oral	Video Q&A Send
SD-009539	An Analytical Model for Detailed Transient Fault Analysis of Doubly-Fed Induction Machines	Frederic Maurer, Jonas Kristiansen Nøland	Norway	Oral	Video Q&A Send

SD-011509	Multi-Sensor Fault Diagnosis of Induction Motors Using Random Forests and Support Vector Machine	Alireza Nemat Saberi, Sarvavignoban Sandirasegaram, Anouar Belahcen	Finland	Oral	Video Q&A Send
SD-007013	Wavelet Scattering Transform Based Induction Motor Current Signature Analysis	Mesaad AlBader, Hamid Toliyat	United States	Oral	Video Q&A Send
SD-010308	Investigation of Rotor Current Spectrum Signature in the Healthy and Faulty Cage of a Dedicated Induction Motors in Load Conditions	Gheorghe Madescu, Marius Biriescu, Martian Mot, Lucian-Nicolae Tutelea	Romania	Oral	Video Q&A Send

Session Title	Mechanical Issues				
Paper ID	Paper title	Authors	Country	Present ation	Link
SD-004405	Shielding the endwindings to reduce bearing currents	Konstantin Vostrov, Juha Pyrhönen, Jero Ahola	Finland	Oral	Video Q&A Send
SD-005355	Reliability index for health monitoring of hydroelectric synchronous machine's insulation	Ghofril Kahwati, Souheil-Antoine Tahan, Arezki Merkhouf, Claude Hudon, Kamal Al-Haddad	Canada	Oral	Video Q&A Send
SD-004448	A Multisensor Induction Motors Diagnostics Method for Bearing Cyclic Fault	Marcello Minervini, Lucia Frosini, Leutrim Hasani, Andrea Albini	Italy	Oral	Video Q&A Send
SD-006564	Commutation Angle Self-Calibrating Technique for Brushless DC Motor Drives with Defective Hall-effect Position Sensors	Dimitrios Papathanasopoulos, Dionysios Spyropoulos, Epaminondas Mitronikas, Athanasios Karlis	Greece	Oral	Video Q&A Send
SD-009261	Influence of manufacturing tolerances and eccentricities on the unbalanced magnetic pull in permanent magnet synchronous motors	Unai Galfarsoro, Alex McCloskey, Sergio Zarate, Xabier Hernandez, Gaizka Almandoz	Spain	Oral	Video Q&A Send

Session Title	Synchronous Machines				
Paper ID	Paper title	Authors	Country	Present ation	Link
SD-005045	Diagnosis of Stator Faults in Synchronous Generators: Short Review and Practical Cases	Dimosthenis Verginadis, Jose Alfonso Antonino-Daviu, Athanasios Karlis, Michael Danikas	Greece	Oral	Video Q&A Send
SD-011843	Fault Tolerant Control by Asymmetric Operation of Double Three-Phase PMSMs with Inter-Turn Faults	Simon Foitzik, Martin Doppelbauer	Germany	Oral	Video Q&A Send
SD-005118	Detection of Rotor Faults in Salient Pole Generator Using Flux Density Monitoring	Maxime Ployard, Aurelie Fasquelle, Abdelmounaim Tounzi, Frederic Gillon	France	Oral	Video Q&A Send
SD-002216	Model-Based Fault Identification of Inter-Turn Winding Short Circuits in PMSM	Gabriel Forstner, Andreas Kugi, Wolfgang Kemmetmüller	Austria	Oral	Video Q&A Send
SD-002798	Investigation of the combined eccentricity and demagnetization fault in an AFPMSG	Alexandra Barmpatza, Joya Kappatou	Greece	Oral	Video Q&A Send

Session Title	TT Diagnosis and Condition Monitoring
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Paper ID	Paper title	Authors	Country	Presenta-tion	Link
SD-006394	A Simulink Model for the Induction Machine with an Inter-Turn Short Circuit Fault	İlker ŞAHin, Göksenin Hande Bayazit, Ozan Keysan	Turkey	Poster	Video Q&A Send
SD-004855	DFIG terminal and controller signal shaft misalignment fault signature – an experimental study	Yingzhao Wang, Nur Sarma, Anees Mohammed, Sinisa Djurovic	Ukraine	Poster	Video Q&A Send
SD-008273	Modeling Stator Winding Inter-Turn Short Circuit Faults in PMSMs including Cross Effects	Saeed Hasan Ebrahimi, Martin Choux, Van Khang Huynh	Norway	Poster	Video Q&A Send
SD-007447	Recent Advances of Neural Network based Methods in Induction Motor Fault Diagnosis	Yannis L. Karnavas, Ioannis D. Chasiotis, Maria Drakaki, Ioannis A. Tziafettas	Greece	Poster	Video Q&A Send
SD-003743	Increasing the Reproducibility of Impulse PD Measurements and Development of an Online Interturn Fault Monitoring Routine for External Rotor Motors	Lukas Weisenseel, Dennis Sieling, Jan Güdelhöfer	Germany	Poster	Video Q&A Send
SD-010596	Terminal Voltage Harmonic Analysis of Brushless Synchronous Generator for Fault Detection	Mehdi Rahnama, Abolfazl Vahedi, Arta Mohammad-Alikhani, Nouredine Takorabet	Iran	Poster	Video Q&A Send
SD-005983	Stator Interturn Short-circuit Fault Diagnosis in Synchronous Condensers Based on the Third Current Harmonic	Mengyao Jiang, Hongzhong Ma, Yuandi Lin, Chao Wei	China	Poster	Video Q&A Send
SD-012211	Analysis of Traction PMSM Operating under Static and Dynamic Eccentricities	Jan Sobra, Karel Hruska, Jan Laksar	Czech Republic	Poster	Video Q&A Send
SD-004707	Improved Fault-Ride-Through Control Scheme without Requiring Fault-Detection System for a Doubly Fed Induction Generator in a Wind System	Dimitrios Papagiannis, Markos Koseoglou, Evangelos Tsioumas, Nikolaos Jabbour, Athanasios Karlis, Christos Mademlis	Greece	Poster	Video Q&A Send
SD-006599	Evaluation of Parameter Variation and Torque Accuracy of IPMSM for EV Applications	Christoph Wolz	Germany	Poster	Video Q&A Send
SD-007587	An Alternative Approach for Condition Monitoring of Brushless DC Motor Drives	Dimitrios Papathanasopoulos, Epaminondas Mitronikas, Konstantinos Giannousakis, Evangelos Dermatas	Greece	Poster	Video Q&A Send
SD-012084	Large Synchronous Machines Diagnosis Based on Air-Gap and Stray Fluxes - An Overview	Bachir Kedjar, Arezki Merkhof, Kamal Al-Haddad	Canada	Poster	Video Q&A Send
SD-009377	Condition Monitoring of the Brushless Doubly-Fed Machines Based on Continuous Wavelet Transform Method	Salman Abdi, Mark Tatlow, Ehsan Abdi, Richard McMahan	United Kingdom	Poster	Video Q&A Send

TT2 Electrical Drives

Session Title	Electrical Drives Operation Issues				
Paper ID	Paper title	Authors	Country	Presenta-tion	Link
SD-008893	High Frequency Modeling of Electric Drives for EMC Analysis	Gaizka Almandoz, Sergio Zarate, Aritz Egea, Yerai Moreno, Ander Urdangarin, Roberto Moreno	Spain	Oral	Video Q&A Send

SD-008796	An Improved Model for the Common Mode Impedance in Inverter-Fed AC Machines	Michael Jaritz, Nicolas Stieger, Cornelius Jaeger, Matthias Schneider, Djordje Vukovic, Sebastian Blume, Jasmin Smajic	Switzerland	Oral	Video Q&A Send
SD-006327	Multi-drive control and condition monitoring in networked electric drives with EtherCAT	Giovanni Zanuso, Viktoria Fodor, Luca Peretti, Oskar Wallmark	Sweden	Oral	Video Q&A Send
SD-007099	Electromagnetic Noise in Concentrated Winding Permanent Magnet Synchronous Motor Driven by Voltage Source PWM Inverters	Takafumi Hara, Toshiyuki Ajima, Katsuhiko Hoshino, Akihiro Ashida	Japan	Oral	Video Q&A Send

Session Title	Synchronous Machines Drives				
Paper ID	Paper title	Authors	Country	Present-ation	Link
SD-007196	Impact of Saturation and Scaling on the Field Weakening Performance of an Interior PM Machine	Elisabet Jansson, Emma Grunditz, Torbjörn Thiringer	Sweden	Oral	Video Q&A Send
SD-005843	Periodic Speed Ripple Suppression Based on Cascade Filter of IPMSM Drive in Air-Conditioners	Rongfeng Deng, Jiaqiang Yang, Shida Zheng, Tangtang Gu, Senqing Zhuo, Fashun Li	China	Oral	Video Q&A Send
SD-003115	Copper Loss Minimization Control of IPMSM for Engine Torque Emulators	Suguru Yamanaka, Takaharu Takeshita	Japan	Oral	Video Q&A Send
SD-005339	A moving least-square approach for current slope estimation in an inverter fed IPMSM using field programmable gateway arrays	Jan P. Degel, Stefan Haehnlein, Christian Kloeffer, Martin Doppelbauer	Germany	Oral	Video Q&A Send
SD-003352	Damper Winding Harmonics Analysis of a Wound-Field Synchronous Machine at Power Converter Supply	Thomas Holzer, Johann Bacher, Annette Muetze	Austria	Oral	Video Q&A Send
SD-002976	Direct Speed Estimation of Synchronous Reluctance Machines using Model Reference Adaptive System	Tetsuya Kojima, Toshiki Suzuki, Moriyuki Hazeyama, Shinsuke Kayano	Japan	Oral	Video Q&A Send

Session Title	Electrical Drives Control				
Paper ID	Paper title	Authors	Country	Present-ation	Link
SD-001694	Robust Parallel Predictive Torque Control with Model Reference Adaptive Estimator for IM Drives	Haotian Xie, Qian Xun, Ying Tang, Fengxiang Wang, José Rodríguez, Ralph Kennel	Germany	Oral	Video Q&A Send
SD-008915	Improve Speed Estimation for Speed-Sensorless Induction Machines: A Variable Adaptation Gain and Feedforward Approach	Lei Zhou, Yebin Wang	United States	Oral	Video Q&A Send
SD-004251	A new approach to detect load sharing of dual-motors driven and controlled by a single converter using only three current sensors	Eduardo Rodriguez Montero, Markus Vogelsberger, Martin Bazant, Thomas Wolbank	Austria	Oral	Video Q&A Send

Session Title	TT Electrical Drives				
Paper ID	Paper title	Authors	Country	Present-ation	Link

SD-001597	Induction Motor Rotor Time-Constant Determination using Flux-Decay Test	Salvatore Musumeci, Aldo Boglietti, Eric Armando, Sandro Rubino	Italy	Poster	Video Q&A Send
SD-010014	Position Sensor-less Resonant Frequency Estimation Method for Linear Compressor with Assist Springs	Takahiro Suzuki, Masaki Koyama, Shuhei Nagata, Wataru Hatsuse, Masatsugu Takemoto, Satoshi Ogasawara	Japan	Poster	Video Q&A Send
SD-005037	Fast and Accurate Modeling of Squirrel Cage Induction Machines for the Transient Electromechanical Simulation of Electrified Drivetrains	Dániel Bíró, Franz Diwoy, Erich Schmidt	Austria	Poster	Video Q&A Send
SD-001031	Vibration Reduction by Segmented Continuous Variable Width Pole for Rotating Armature Permanent Magnet Motors	Zhanlu Yang, Shangming Wang, Jianfeng Hong, Chao Liu	China	Poster	Video Q&A Send
SD-002852	A Modified Predictive Current Control with Sensitivity Analysis for Permanent Magnet Synchronous Motor	Shaobin Li, Yongxiang Xu, Jibin Zou	China	Poster	Video Q&A Send
SD-001295	NVH-Simulation of Permanent Magnet Synchronous Traction Drives Including Torsional Mode Shapes	Stephan-Akash Vip, Jan Andresen, Florian Dräger, Bernd Ponick	Germany	Poster	Video Q&A Send
SD-003255	Speed control of drive-train incorporating magnetic coupling	Xiaowen Liao, Chris Bingham, Argyrios Zolotas, Qinghua Zhang, Tim Smith	China	Poster	Video Q&A Send
SD-002712	An Incremental Deadbeat Predictive Current Control Method for PMSM with Low Sensitivity to Parameter Variation	Xiahe Zhang, Xiaoyan Huang	China	Poster	Video Q&A Send
SD-003581	Performance Evaluation for an Optimized 4/2 High-speed SRM Fed by Active Front-end Rectifier	Yingjie He, Ying Tang, Haotian Xie, Fengxiang Wang, José Rodríguez, Ralph Kennel	Germany	Poster	Video Q&A Send
SD-012319	Stable adaptive estimation for speed-sensorless induction motor drives: A geometric approach	Yebin Wang, Akira Satake, Sota Sano, Shinichi Furutani	USA	Poster	Video Q&A Send
SD-002755	Comparison Between Two Fault Tolerant Deadbeat Controllers under Partial Demagnetization Faults in Permanent Magnet Synchronous Machines	Lynn Verkroost, Hendrik Vansompel, Frederik De Belie, Peter Sergeant	Belgium	Poster	Video Q&A Send
SD-012076	Implementation of an SMO-based MRAS Estimator for Sensor-less Control of RDFIG Systems	Mwana Wa Kalaga Mbukani, Nkosinathi Gule	South Africa	Poster	Video Q&A Send
SD-008389	Real-Time Simulation for Torque Ripple Minimization of BLDC motor using Low Pass Compensator	Shrutika Chaudhari, Parag Karekar, Shadab Sayed	India	Poster	Video Q&A Send
SD-006424	A Novel Analytical Model for Current Harmonics Prediction of Interior PM Machines Based on Differential Evolution Algorithm	Zhuo Chen, Xiaoyan Huang	China	Poster	Video Q&A Send
SD-004049	Decoupled Vector Control of PMSM Based on Uncertainty and Disturbance Estimator	Xinghe Fu, Hang He, Wu Chen, Jibin Zou, Xiaokun He	China	Poster	Video Q&A Send
SD-007188	Verification of Control Performance when Driving Linear Induction Motor with Superimposed Frequency	Shota Nakatani, Daichi Okamori, Toshimitsu Morizane, Hideki Omori	Japan	Poster	Video Q&A Send
SD-001716	In-vehicle identification of an induction machine model for operational torque prediction	Bart Forrier, Alexander Loth, Yves Mollet	Belgium	Poster	Video Q&A Send

SD-003395	Influence of the Stator Winding and the Forming of the End Winding on the Mechanical Eigenfrequencies and Damping of the Stator Core of Electric Machines	Martin Gerlach, Bernd Ponick	Germany	Poster	Video Q&A Send
SD-009458	Analysis and Modification of a Particle Filter Algorithm for Sensorless Control of BLDC Machine	Iman Hosseini Sabzevari, Yaser Chulaee, Salman Abdi	United Kingdom	Poster	Video Q&A Send
SD-009393	Control of the static and dynamic stiffness of feed drive axes by using an external force sensor	Sebastian Kehne, Marcel Fey, Christian Brecher	Germany	Poster	Video Q&A Send
SD-008516	Elimination of Cogging Torque for Axial Flux Permanent Magnet Motors Based on Current Harmonic Injection	Meltem Tetik Girgin, Metin Aydın	Turkey	Poster	Video Q&A Send
SD-008761	Torque Ripple Reduction in PM Synchronous Motor - FEM simulation	Martin Sumega, Marek Štulrajter, Pavol Rafajdus	Slovak Republic	Poster	Video Q&A Send

TT3 Rotating Machines

Session Title	Induction Motors				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-001902	Induction Motor Design Workflow for Variable Frequency and Constant Voltage Applications	Matteo Carbonieri, Nicola Bianchi	Italy	Oral	Video Q&A Send
SD-008311	Improved Analytical Model of Induction Machine for Digital Twin Application	Victor Mukherjee, Tatjana Martinovski, Aron Szucs, Jan Westerlund, Anouar Belahcen	Finland	Oral	Video Q&A Send
SD-008842	Twin Induction Machines Artificial Loading Without Mechanical Coupling	Adrian Martin, Tutelea Nicolae Tutelea, Ion Boldea	Romania	Oral	Video Q&A Send
SD-006475	A Stochastic Optimization Approach to the Estimation of Squirrel-Cage Induction Motor Equivalent Circuit Parameters	Andre M. Silva, Jose Alberto, Carlos Henggeler Antunes, Fernando J.T.E. Ferreira	Portugal	Oral	Video Q&A Send
SD-005576	Measurements and simulation of induction machines flux linkage characteristics adopting rotor field orientation	Diego Troncon, Matteo Carbonieri, Luigi Alberti, Nicola Bianchi	Italy	Oral	Video Q&A Send
SD-007943	Gradient-based Multi-Objective Design Optimisation Formulation of Grid-Connected Wound-Rotor Induction Motors	Mkhululi Mabhula, Maarten Kamper	South Africa	Oral	Video Q&A Send

Session Title	IPM and SyncRel Machines				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-010537	A Novel Asymmetric Interior Permanent Magnet Synchronous Machine	Yang Xiao, Ziqiang Zhu, Jintao Chen, Di Wu, Liming Gong	United Kingdom	Oral	Video Q&A Send
SD-006173	PMASynRM late design-stage rotor shape NVH optimization	Sebastian Ciceo, Fabien Chauvicourt, Bogdan Varaticeanu, Johan Gyselinck, Claudia Martis	Belgium	Oral	Video Q&A Send

SD-008591	Procedure to Define an Accurate Model for Saturation and Cross-Coupling in IPM Machines	Antonino Di Gerlando, Giovanni Maria Foglia, Roberto Perini	Italy	Oral	Video Q&A Send
SD-004561	Consideration of the Skin Effect in a Transient Model of Line-Start Synchronous Reluctance Machines	Jannik Rituper, Jan Güdelhöfer, Raimund Gottkehasch	Germany	Oral	Video Q&A Send
SD-007528	Optimization of Line-Start Synchronous Reluctance Machine Amended From an Induction Machine	Jan Barta, Ladislav Knebl, Ondrej Vitek, Gerd Bramerdorfer, Siegfried Silber	Czech Republic	Oral	Video Q&A Send

Session Title	PM Machines				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-001945	Additively Manufactured Hollow Conductors Integrated with Heat Pipes: Design Tradeoffs and Hardware Demonstration	Fan Wu, Ayman EL-Refaie	USA	Oral	Video Q&A Send
SD-012092	Short Circuit Current reduction in PMSM by introducing End Winding Magnetic Circuits	Eleftherios Karamanis, Antonios Kladas	Greece	Oral	Video Q&A Send
SD-000612	Reduction of torque ripple in synchronous machines by quasi-skew-asymmetric rotor	Ilya Petrov, Alvaro Hoffer, Juha Pyrhönen	Finland	Oral	Video Q&A Send
SD-003638	DQ0 Modelling and Parameterization of small Delta connected PM Synchronous Machines	Simon Decker, Simon Foitzik, Felix Rehm, Matthias Brodatzki, Christoph Rollbühler, Johannes Kolb, Michael Braun	Germany	Oral	Video Q&A Send
SD-002208	High Power Density and High Efficiency of High-Speed Motor	Masato Enokizono, Daisuke Wakabayashi, Naoya Soda, Yuji Tsuchida, Shohei Ueno, Mohachiro Oka	Japan	Oral	Video Q&A Send

Session Title	Synchronous Machines				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-000752	A Magnetic Equivalent Circuit to Account for Gaps Between Clamping Plate Segments in Large Synchronous Machines	Torben Fricke, Babette Schwarz, Bernd Ponick	Germany	Oral	Video Q&A Send
SD-007897	A Novel DC-Excited Doubly Salient Machine with Modular II-Shaped Stator Iron Core	Ming Guangqiang, Wu Lijian, Zhang Liu	China	Oral	Video Q&A Send
SD-003778	Analytical Modelling of Doubly Salient Electric Machines using Conformal Mapping Method	Ahmed Sidia Sidi Babe, Vincent Lanfranchi, Rachid Missoum, Stephane Vivier, Mohammed El Hadi Zaïm	France	Oral	Video Q&A Send
SD-003131	Start of a synchronous motor using rotor field polarity inversion and rotor back-emf sensing	Urban Lundin, Fredrik Evestedt, Johan Abrahamsson, José Pérez-Loya, Martin Fregelius, Jonas Nøland	Sweden	Oral	Video Q&A Send
SD-004014	Design Optimization of Synchronous Reluctance Machines for Railway Traction Application Including Assembly Process Constraints	Erin Kuci, Francois Henrotte, Christophe Geuzaine, Bruno Dehez, Christophe DeGreef, Christophe Versele, Christophe Friebl	Belgium	Oral	Video Q&A Send

SD-004154	Rotor Flux-Barrier Design for Improving Field-Weakening Capability of an Interior Permanent Magnet Synchronous Machine	Hao Zhou, Dieter Gerling	Germany	Oral	Video Q&A Send
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Session Title	Rotating Machines				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-005665	Dynamic Simulation of Unbalanced Magnetic Force in Induction Machines with Static Eccentricity	Samad Taghipour Boroujeni, Noureddine Takorabet, Smail Mezani	Iran	Poster	Video Q&A Send
SD-007153	Preliminary Electromagnetic Sizing of Axial-Flux Induction Machines	Konstantina Bitsi, Minos E. Beniakar, Oskar Wallmark, Sjoerd G. Bosga	Sweden	Poster	Video Q&A Send
SD-006009	3D Printing as a Technology Enabler for Electrical Machines: Manufacturing and Testing of a Salient Pole Rotor for SRM	Leonidas Gargalis, Vincenzo Madonna, Paolo Giangrande, Mark Hardy, Ian Ashcroft, Michael Galea, Richard Hague	United Kingdom	Poster	Video Q&A Send
SD-006432	On the Analytical Determination of the Complex Relative Permeance Function for Slotted Electrical Machines	Nada Elloumi, Mauro Bortolozzi, Alberto Tassarolo	Italy	Poster	Video Q&A Send
SD-006386	Theoretical Torque Density Limit for SPM Machines - Analytical Predictions and FE Validation	Andrea Bocchese, Jonas Kristiansen Nøland, Nicola Bianchi, Børge Noddeland, Astrid Røkke	Italy	Poster	Video Q&A Send
SD-006467	Stator Core Flux Density Analytical Determination in Slotless Machines	Nada Elloumi, Matteo Leandro, Jonas Kristiansen Noland, Alberto Tassarolo	Italy	Poster	Video Q&A Send
SD-006033	Variable Turn Rectangular Wire Winding Permanent Magnet Machine	Yu Zhao, Dawei Li, Tonghao Pei, Ronghai Qu	China	Poster	Video Q&A Send
SD-006572	On the Use of Switched Reluctance Machines in Highly Dynamic Drive Applications	Arda Tuysuz, Christoph Budde	Germany	Poster	Video Q&A Send
SD-011568	Semi-analytical Finite Element Study of the Slot Leakage Inductance of Double-Layer Windings	Lukas Bailey, Werner Jara, Carlos Madariaga, Javier Riedemann, Gerd Bramerdorfer, Andrea Cavagnino, Juan Tapia	Chile	Poster	Video Q&A Send
SD-000124	Different Traction Motor Topologies Used in E-mobility Part I: Solutions without magnet	Jahirul Islam, Shafigh Nategh, Reza R. Moghaddam, Aldo Boglietti	Sweden	Poster	Video Q&A Send
SD-005479	Design and Implementation of an Optimized Printed Circuit Board Axial-Flux Permanent Magnet Machine	Furkan Tokgoz, Gokhan Cakal, Ozan Keysan	Turkey	Poster	Video Q&A Send
SD-007846	Multi-Objective Optimization of a Hybridly Excited Asymmetric Stator Pole Doubly Salient Machine	Yishu Zhang, Wei Xu, Lei Tang, Mingjie He, Lei Ning	China	Poster	Video Q&A Send
SD-003786	Educational Test Rig for Non-Standard Electric Machines	Zdenek Frank, Jan Stepanek, Karel Hruska	Czech Republic	Poster	Video Q&A Send
SD-007102	Multi-Sector Windings Bearing Relief E-Machine: Saturation and Cross Coupling Effects	Hanafy Mahmoud, Giorgio Valente, Michele Degano, Mauro Di Nardo, Chris Gerada, Barry James	United Kingdom	Poster	Video Q&A Send
SD-000604	Different Traction Motor Topologies Used in E-Mobility Part II: Magnet-based Solutions	Reza R. Moghaddam, Shafigh Nategh, Jahirul Islam, Aldo Boglietti	Sweden	Poster	Video Q&A Send

SD-003107	A Novel Design for Notch on Rotor Surface of Double-Layered IPMSM for Reducing Cogging Torque	Marika Kobayashi, Shigeo Morimoto, Masayuki Sanada, Inoue Yukinori	Japan	Poster	Video Q&A Send
SD-004456	Investigation on Stator Mutual Inductance Factor used for Induction Machine Control	Fei Lu, Johann Mayer, Harald Graul, Johannes Gerold, Matthias Pohl, Andreas Greifelt, Dieter Gerling	Germany	Poster	Video Q&A Send
SD-005266	2-Controllable-Rotor Motor Driven by a 5-Phase Current	Hironori Suzuki, Katsuhiko Hirata, Noboru Niguchi	Japan	Poster	Video Q&A Send
SD-007919	Development of an Analytical Method for a Driving Cycle-Optimized Design of a Surface Mounted-Permanent Magnet Synchronous Machine	Alena Babl, David Filusch, Hans-Georg Herzog, Dieter Gerling	Germany	Poster	Video Q&A Send
SD-003301	Design and analysis of dual wound machine for electric ships	Boyuan Yin, Xiaoze Pei, Xianwu Zeng, Fred Eastham, Chris Hodge, Oliver Simmonds	United Kingdom	Poster	Video Q&A Send
SD-002682	Behavior Investigation of Five-Phase Induction Machine Fed by Sine Voltage Using Three-to-Five Phase Transformer	Abdelhakim Khelafi, Abdelmalik Djebli, M'hamed Ouadah, Omar Touhami, Rachid Ibtouen	Algeria	Poster	Video Q&A Send
SD-005126	Calculation of Slot Leakage Flux Using Equivalent Magnetic Circuits	Elmar Haschen, Bernd Ponick	Germany	Poster	Video Q&A Send
SD-008931	Improved analytical calculation of axial AMB by means of fringing estimation	David Rura, Jan Barta	Czech Republic	Poster	Video Q&A Send
SD-005495	Optimised Magnet Wire size and Slot winding height for minimum AC losses	Anuvav Bardalai, David Gerada, Zeyuan Xu, Christopher Gerada	United Kingdom	Poster	Video Q&A Send
SD-004901	Mechanism of Torque Ripple Generation by Time and Space Harmonic Magnetic Fields in Interior Permanent Magnet Synchronous Motors	Katsumi Yamazaki, Kento Utsunomiya	Japan	Poster	Video Q&A Send
SD-006777	Braking Torque and Time Constant in Aircraft Magneto-rheological Fluid Brake at High Temperature	Hiroki Shiga, Yoshimi Kikuchi, Hiroyuki Wakiwaka, Makoto Sonehara, Toshiro Sato	Japan	Poster	Video Q&A Send
SD-006556	Analytical Approach and Solution for Line-Start Permanent Magnet Synchronous Machines with Anisotropic Rotor Reluctance	Johann Pecho, Wilfried Hofmann	Germany	Poster	Video Q&A Send
SD-006521	Robust Control and Harmonics Modeling of a PMSG for a 1.5 MW Wind Turbine	Hayder Gallas, Sandrine Le Ballois, Helmi Aloui, Lionel Vido	France	Poster	Video Q&A Send
SD-003271	Rotor Flux Templates for Energy Efficient Dynamic Operation Of Induction Machines	Antony Dominic, Gernot Schullerus, Martin Winter	Germany	Poster	Video Q&A Send
SD-006661	Improvement of Transient Performances for Line-Start Vernier Permanent Magnet Machine	Yu Zhao, Mengxuan Lin, Dawei Li, Ronghai Qu	China	Poster	Video Q&A Send
SD-008222	Unified Sizing Model Approach for Radial and Axial Flux Permanent Magnet Machines	Theo Carpi, Maxime Bonnet, Sarah Touhami, Yvan Lefevre, Jean-Francois Llibre	France	Poster	Video Q&A Send
SD-002844	Calculation of Synchronous Torques and Radial Magnetic Forces for Pole-Changing Winding Using the 3/Y / 3/Y Method	Gábor Kovács	Hungary	Poster	Video Q&A Send

SD-006769	A Review of Multi-physics Optimization of Electric Machines: Coupling Mechanism of Multidisciplinary Submodels and Coupled Multi-physics Optimization	Yue Sun, Qingqing Ma, Ayman EL-Refaie	United States	Poster	Video Q&A Send
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TT4 Special Machines

Session Title	Special Machines				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-003476	AC Loss Analysis of 10-MW HTS Double-Stator Flux Modulation Generators and Its Reduction	Yi Cheng, Ronghai Qu, Dawei Li, Yuting Gao, Yuanzhi Zhang, Qian Wang	China	Oral	Video Q&A Send
SD-008397	Design Challenges of Direct-Drive Permanent Magnet Superconducting Wind Turbine Generators	Dong Liu, Xiaowei Song, Xuezhou Wang	China	Oral	Video Q&A Send
SD-004499	Analysis and Compensation of End Effects for Improved Force Control of Linear Machines	Sebastian Benecke, Andreas Gerlach, Roberto Leidhold	Germany	Oral	Video Q&A Send
SD-001686	Cycloidal Reluctance Electric Machine	Alireza Fatemi, Derek Lahr	United States	Oral	Video Q&A Send

Session Title	TT Special Machines				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-010383	Design and Performance Assessment of an Integrated Flywheel Energy Storage Systems based on an Inner-Rotor Large Airgap SPM	Andrea Floris, Alfonso Damiano, Alessandro Serpi	Italy	Poster	Video Q&A Send
SD-002399	Semi-Analytical Calculation of a Laminated Transverse Flux Machine	Lukas Rabenstein, Armin Dietz, Andreas Kremser, Nejila Parspour	Germany	Poster	Video Q&A Send
SD-002283	2D Reluctance Model of an Eddy Current Brake with a Magneto Isotropic Material Structure	Christoph Holtmann, Andreas Möckel	Germany	Poster	Video Q&A Send
SD-010618	Comprehensive Study of Variable Flux Memory Machines with Symmetrical Series Hybrid Permanent Magnets in Rotor Pole	J. T. Shi, R. P. Deodhar, C. Umemura, A. Pride	United Kingdom	Poster	Video Q&A Send
SD-003239	Harmonic Excitation Concepts for Wound-Rotor Synchronous Machines with Power-Electronics on the Rotor	Jan Pötter, Martin Pfost, Gernot Schullerus	Germany	Poster	Video Q&A Send
SD-010553	Dynamic Model of Segmented Stator Switched Reluctance Motor with Bypass Coils	Mladen Terzic, Bogdan Brkovic, Dragan Mihic	Serbia	Poster	Video Q&A Send
SD-010731	A Novel Three-Degree-of-Freedom Linear Resonant Actuator and Its Control Method	Gyunam Kim, Katsuhiko Hirata	Japan	Poster	Video Q&A Send
SD-005584	Dynamic Compensation Control with Adaptive Parameter	Soeren Behrens, Holger Groke, Jannik Ulbrich, Bernd Orlik	Germany	Poster	Video Q&A Send

	Correction for Transverse Flux Machines				
SD-004626	Design of A Limited-Angle Torque Motor with Magnetic Zero-Returner for Aviation Fuel Valve	You Zhou, Dawei Li, Lihao Huang, Ronghai Qu	China	Poster	Video Q&A Send
SD-005347	Six Phase Linear Drive based on new Transverse Flux Linear Machines	Jannik Ulbrich, Sören Behrens, Holger Raffel, Bernd Orlik	Germany	Poster	Video Q&A Send
SD-007927	End Magnet Optimisation for the Reduction of the Thrust Ripple of Linear Switched-Flux Machines	Imanol Eguren, Gaizka Almandoz, Aritz Egea, Sergio Zarate, Ander Urdangarin	Spain	Poster	Video Q&A Send
SD-003875	Design Strategy and Performance of Hybrid-Type Single-Phase SRMs	Grace Firsta Lukman, Kwang-Il Jeong, Janghyun Park, Jin-Woo Ahn	South Korea	Poster	Video Q&A Send
SD-004588	100-kW High-Speed Electric Motor for the Air Conditioning System of More Electric Aircrafts	Flyur Ismagilov, Viacheslav Vavilov, Valentina Ayguzina, Ilya Petrov, Juha Pyrhönen	Finland	Poster	Video Q&A Send
SD-005673	2-Degree-of-Freedom Z-Theta Actuator using 5-phase Control	Kazuaki Takahara, Katsuhiko Hirata, Noboru Niguchi	Japan	Poster	Video Q&A Send
SD-009075	Adjustable air gap machine for aerospace applications	Roggia Sara, Gimeno Anthony, Roggia Gaetano	France	Poster	Video Q&A Send
SD-011452	Design of a Dual Halbach Array Tubular Linear Motor for Long Stroke and Large Force	Valentina Consolo, Antonino Musolino, Rocco Rizzo, Luca Sani	Italy	Poster	Video Q&A Send
SD-008435	Two-Degree-of-Freedom Actuator for Robotic Eyes	Akira Heya, Yoshihiro Nakata, Hiroshi Ishiguro, Katsuhiko Hirata	Japan	Poster	Video Q&A Send
SD-010197	Double-sided Linear Induction Motors with Belt-Shaped Narrow and Thin Secondary Conductor	Itsuki Shimura, Junnosuke Nakatsugawa, Yasuaki Aoyama, Akeshi Takahashi	Japan	Poster	Video Q&A Send
SD-002747	Variable-magnetization PM-motor for Widely Variable Flux and Small Magnetizing Current	Kazuto Sakai, Shunsuke Kataoka	Japan	Poster	Video Q&A Send
SD-010375	Comparison of Two Tubular Linear Permanent Magnet Machines with Translator Eccentricity	Haidar Diab, Yacine Amara, Georges Barakat	France	Poster	Video Q&A Send
SD-003662	Planar Aligned Transverse Flux Machine with Integrated Reduction Gear	Jonathan Terfurth, Martin Schmid, Nejila Parspour	Germany	Poster	Video Q&A Send
SD-000078	2 x 2D Analytical Model of a Transverse Flux Magnetic Gear	Melaine Desvaux, Bernard Multon, Stéphane Sire, Hamid Ben Ahmed	France	Poster	Video Q&A Send
SD-003891	Design of Low-Torque-Ripple Switched Reluctance Motor for Shift-by-Wire Actuator	Grace Firsta Lukman, Nguyen Xuan Son, Kwang-Il Jeong, Jin-Woo Ahn	Korea (South)	Poster	Video Q&A Send
SD-004138	Dynamic Simulation Method of a Magnetic Gear Using its Torque Map	Noboru Niguchi, Katsuhiko Niguchi, Kazuaki Takahara, Hironori Suzuki, Hiroki Daito	Japan	Poster	Video Q&A Send

TT5 Thermal and Losses Issues, Magnetic and Insulation Materials

Session Title	Thermal Analysis				
Paper ID	Paper title	Authors	Country	Presenta-tion	Link

SD-000051	Detailed and Reduced-order LP Thermal Models for Open Self - ventilated Induction Motors Used in Traction Applications	Aldo Boglietti, Shafigh Nategh, Luca Roggio	Sweden	Oral	Video Q&A Send
SD-003557	On the Capability of Heat Dissipation in Thermally Aged Electrical Machines	Vincenzo Madonna, Paolo Giangrande, Michael Galea	United Kingdom	Oral	Video Q&A Send
SD-001899	Directly Cooled Windings in Switched Reluctance Machines	Mohamed Nabil Fathy Ibrahim, Jasper Nonneman, Abdalla Hussein Mohamed, Andries Daem, Ahmed Abdalh, Stephan Schlimpert, Michel De Paepe, Peter Sergeant	Belgium	Oral	Video Q&A Send
SD-000019	Electrical Machines Second Order Thermal Model a Viable Solution for Electrical Drives	Aldo Boglietti, Eric Armando, Enrico Carpaneto, Sandro Rubino, Devi Geetha Nair	Italy	Oral	Video Q&A Send
SD-008966	Opportunities and Challenges of Employing Heat-Pipes in Thermal Management of Electrical Machines	Rafal Wrobel, Ryan McGlen	United Kingdom	Oral	Video Q&A Send

Session Title	Losses and Efficiency Issues				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-010626	A Computationally Effective Method for Iron Loss Estimation in a Synchronous Machine from a Static Field Solution	Md Masum Billah, Floran Martin, Anouar Belahcen	Finland	Oral	Video Q&A Send
SD-002046	Losses and Thermal considerations on an IPOS structure with 20kW high-frequency planar transformers	Alessandro La Ganga, Sergen Reyhan, Roberto Re, Jeanne-Marie Dalbavie, Paolo Guglielmi	Italy	Oral	Video Q&A Send
SD-007625	Estimation of AC copper loss in electrical machine windings with consideration of end effects	Dave Winterborne, Steven Jordan, Lars Sjöberg, Glynn Atkinson	United Kingdom	Oral	Video Q&A Send
SD-008001	Methodology and measurement setup for determination of PWM influence on iron losses	Igor Sirotić, Marinko Kovačić, Stjepan Stipetić	Croatia	Oral	Video Q&A Send
SD-001961	Fully automatized PWM harmonics analysis and loss calculation in multiphase PMSM with floating start point	Bianca Klammer, Siegfried Silber, Kevin Kaspar, Wolfgang Gruber	Austria	Oral	Video Q&A Send
SD-008958	Novel method for considering AC copper losses in traction motors	Christian Noerenberg, Juergen Redlich, Bernd Ponick	Germany	Oral	Video Q&A Send

Session Title	Magnetic, Insulation and Mechanical Issues				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-001538	Inter-turn Voltage in Hairpin Winding of Traction Motors Fed by High-Switching Frequency Inverters	Grazia Berardi, Shafigh Nategh, Nicola Bianchi	Italy	Oral	Video Q&A Send
SD-004936	Transient Thermal Model for Ball Bearings in Electrical Machines	Felix Hoffmann, Donatas Silys, Martin Doppelbauer	Germany	Oral	Video Q&A Send
SD-006181	Analytical-Based Iron Loss Assessment in the SPM Slotless Machine Stator Core	Matteo Leandro, Nada Elloumi, Alberto Tessarolo, Jonas Kristiansen Nøland	Norway	Oral	Video Q&A Send

SD-012335	Influence of manufacturing processes on magnetic properties of stator cores	Lukasz Mierczak, Piotr Klimczyk, Darwin Hennies, Patrick Denke, Stefan Siebert	Germany	Oral	Video Q&A Send
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Session Title	TT Thermal and Losses Issues, Magnetic and Insulation Materials				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-004146	Conjugate Heat Transfer-CFD model of an induction motor for washdown environment applications	Aldo Boglietti, Alessandro Castagnini, Marco Seita	Italy	Poster	Video Q&A Send
SD-004022	Predicting Airflow Distribution in A Radially Air-Cooled Generator by LPTN Method	Hui Wen, Yang Shi, Lijian Wu, Yidong Du, Youtong Fang	China	Poster	Video Q&A Send
SD-010979	Evaluation of Three Cooling Concepts for an IPM Electric Vehicle Motor - LPN Modelling	Emma Arfa Grunditz, Sonja Tidblad Lundmark, Mikael Alatalo	Sweden	Poster	Video Q&A Send
SD-000744	Extended Modelling of Hairpin Winding Eddy Current Losses in High Power Density Traction Machines	David Philipp Morisco, Holger Rapp, Ioan Liviu Iepure, Andreas Möckel	Germany	Poster	Video Q&A Send
SD-001791	Determination and emulation of motor-like flux conditions for loss characterization by means of a single tooth geometry	Christoph Rollbühler, Patrick Breining, Daniel Pollak, Johannes Kolb, Martin Doppelbauer	Germany	Poster	Video Q&A Send
SD-005231	Estimation of Continuous Power of a Permanent Magnet Synchronous Machine Equipped with Direct-Liquid-Cooling Winding for Propulsion Applications	Chong Di, Ilya Petrov, Juha Pyrhönen	Finland	Poster	Video Q&A Send
SD-000779	Single Equation Clamping Plate Loss Model for Large Synchronous Machines	Torben Fricke, Babette Schwarz, Bernd Ponick	Germany	Poster	Video Q&A Send
SD-009873	Efficiency Optimization for an IPMSM Considering Eddy-Current and Hysteresis Losses	Takeo Ishikawa, Yusuke Matsumoto	Japan	Poster	Video Q&A Send
SD-010448	Time resolution dependency of core loss accuracy in finite element analysis of a PM machine	Elisabet Jansson, Torbjörn Thiringer, Emma Grunditz	Sweden	Poster	Video Q&A Send
SD-006831	A Generic Lumped-Parameter Model for Stator with Tooth-Wound Winding	Andrej Kacenka	Germany	Poster	Video Q&A Send
SD-011347	Quality Assessment of 2D FE based Lumped Parameter Electric Motor Thermal Model using 3D FE model	Jasper Nonneman, Ilya T'Jollyn, Michel De Paepe	Belgium	Poster	Video Q&A Send
SD-011355	Advantages of Redesign of Cooling System 40MW Synchronous Machine	Roman Pechanek, Lukas Veg, Lukas Sobotka, Jiri Franc	Czech Republic	Poster	Video Q&A Send
SD-009237	Low heat electric motor for variable speed human implant for a critical application	Ioan Ramos, Alexandre Giraud, Bertrand Nogarede	France	Poster	Video Q&A Send
SD-000132	Evaluation of three cooling concepts for an IPM electric vehicle motor – 3D models	Mikael Alatalo, Sonja Lundmark, Emma Grunditz	Sweden	Poster	Video Q&A Send
SD-008664	Iron-Loss Computation Using Matlab and Comsol Multiphysics	Oskar Wallmark, Konstantina Bitsi	Sweden	Poster	Video Q&A Send

SD-009229	Thermohydraulic Modelling of Microchannel Winding Cooling for Electric Machines	Ilya T'Jollyn, Jasper Nonneman, Michel De Paepe	Belgium	Poster	Video Q&A Send
SD-010057	Assessment of Energy Lost in the Winding in Road Vehicle IPM Machines, Considering Saturation, Cross Coupling, Battery State of Charge	Antonino Di Gerlando, Giovanni Maria Foglia, Roberto Perini, Bruno Massa	Italy	Poster	Video Q&A Send
SD-009148	Quantitative analysis of a short circuited laminated high speed (faulty) switching reluctance motor yoke using a multi harmonic multi zone predictive loss modeling.	Alexandre Giraud, Ioav Ramos, Reda Abdouh, Bertrand Nogarede	France	Poster	Video Q&A Send
SD-003182	Generator Loss Analysis and Comparison for a 5MW Wind Turbine System	Kenta Sugiyama, Wataru Kitagawa, Takaharu Takeshita, Torbjörn Thiringer	Japan	Poster	Video Q&A Send
SD-009067	Error Compensation in Initial Temperature Estimation of Electric Motors using a Kalman Filter	Hrishikesh Joshi, Yves Burkhardt, Markus Seilmeier, Wilfried Hofmann	Germany	Poster	Video Q&A Send
SD-005851	Multidisciplinary Analysis of Permanent Magnet Machines Considering Thermal Contact Resistance	Moritz Kuenzler, Quentin Werner, Uwe Schaefer	Germany	Poster	Video Q&A Send
SD-009334	Smart structural bonding process applied to high speed actuators: an experimental comparative characterization	Alexandre Giraud, Aurélie Leonardi, Maxime Nomdedeu, Frédéric Martin, Richard Boudineau, Bertrand Nogarede	France	Poster	Video Q&A Send
SD-007668	Applying a Novel Iron Loss Model with Experimental Validation to an Efficiency Optimized Torque Control of an Electrically Excited Synchronous Machine	Samuel Müller, Nejila Parspour	Germany	Poster	Video Q&A Send
SD-004642	Core Loss Reduction of Segment Stator Core Motor in Consideration of Rolling Direction of Electrical Steel Sheet	Naoya Soda, Naoki Hayashi, Masato Enokizono	Japan	Poster	Video Q&A Send
SD-001619	Improved Equivalent Circuit of Induction Motor considering Iron-loss Calculated by Novel Analysis Method for Flux Density Harmonics	Sung-Woo Hwang, Jae-Hyun Kim, Dong-Gyun Ahn, Myung-Seop Lim	Korea (South)	Poster	Video Q&A Send
SD-000159	Thermal evaluation of a propulsion motor for electric aircraft	Mikael Alatalo	Sweden	Poster	Video Q&A Send

TT6 Design issues

Session Title	Design Issues				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-005207	A Novel V-shape Interior Permanent Magnet Synchronous Machine with Asymmetric Spoke-type Flux Barrier	Yang Xiao, Ziqiang Zhu, Jintao Chen, Di Wu, Liming Gong	United Kingdom	Oral	Video Q&A Send
SD-007137	Force Ripple and Cogging Force Minimisation Criteria of Single-Sided Consequent-Pole Linear Vernier Hybrid Machines	Christoff D. Botha, Maarten J. Kamper, Rong-Jie Wang, Albert J. Sorgdrager	South Africa	Oral	Video Q&A Send

SD-008044	Optimal sizing method based on working cycle for High-Speed PMSM and a flywheel accumulator	Nicolas Bernard, Linh Dang, Serigne Ousmane Samb, Ryad Sadou	France	Oral	Video Q&A Send
SD-004324	Rotordynamic Assessment for an Inside Out, High Speed Permanent Magnet Synchronous Motor	Yangxue Yu, Samith Sirimanna, Kiruba Haran, Daniel Lubell, Brian Murphy	USA	Oral	Video Q&A Send
SD-002925	Computationally Efficient Analysis of Spatial and TempVideoHarmonics Content of the Magnetic Flux Distribution in a PMSM for Efficiency Maps Computation	Carlos Candelo-Zuluaga, Antonio Garcia Espinosa, Jordi-Roger Riba, Pere Tubert Blanch	Spain	Oral	Video Q&A Send
SD-011304	Design of Electrically Excited Synchronous Machines to Achieve Unity Power Factor in Field Weakening for Long-Haul Electric Trucks	Junfei Tang, Yujing Liu	Sweden	Oral	Video Q&A Send

Session Title	TT Design issues				
Paper ID	Paper title	Authors	Country	Present ation	Link
SD-000574	Optimal Rotor Bars Number in Four Pole Cage Induction Motor with 36 Stator Slots – Part I: Numerical Modeling	Gojko Joksimovic, Aldin Kajevic, Mario Mezzarobba, Alberto Tassarolo	Montenegro	Poster	Video Q&A Send
SD-004502	End Effects and Geometric Compensation in a Linear Permanent Magnet Synchronous Generator with Buried Topology	Jonathan Sjölund, Anna Frost, Mats Leijon, Sandra Eriksson	Sweden	Poster	Video Q&A Send
SD-011223	Influences of Design and Manufacturing on the Performance of Electric Traction Drives	Maximilian Halwas, Ludwig Hausmann, Felix Wirth, Jürgen Fleischer, Benedict Jux, Martin Doppelbauer	Germany	Poster	Video Q&A Send
SD-006548	A New Direct-Drive Induction Flux Modulation Motor	Vincent Fedida, Ronghai Qu	China	Poster	Video Q&A Send
SD-008974	Improved dq model and analytical parameters determination of a Permanent Magnet Assisted Synchronous Reluctance Motor (PMA-SynRM) under saturation using frozen permeability method	Jessica Neumann, Carole Hénaux, Maurice Fadel, Dany Prieto, Etienne Fournier, Mathias Tientcheu Yamdeu	France	Poster	Video Q&A Send
SD-011851	Design of a High Torque Density In-Wheel YASA AFPM Motor	Antonino Di Gerlando, Giovanni Maria Foglia, Claudio Ricca	Italy	Poster	Video Q&A Send
SD-004316	Design Optimization of Permanent Magnet Clutch	Ekaterina Andriushchenko, Ants Kallaste, Anouar Belahcen, Hamidreza Heidari, Toomas Vaimann, Anton Rassõlkin	Estonia	Poster	Video Q&A Send
SD-010685	Silent design of electric motors: optimization under constraints and parameters uncertainties	Martin Jeannerot, Jean-Baptiste Dupont, Emeline Sadoulet-Reboul, Morvan Ouisse, Vincent Lanfranchi, Pascal Bouvet	France	Poster	Video Q&A Send
SD-005134	Effects Analysis of Design Parameters on Three-phase 6/4 and Four-phase 8/6 Switched Reluctance Machines Performance	Ana Camila Ferreira Mamede, José Roberto Camacho, Rui Esteves Araújo, Geraldo Caixeta Guimarães	Brazil	Poster	Video Q&A Send
SD-000582	Optimal Rotor Bars Number in Four Pole Cage Induction Motor with 36 Stator Slots – Part II: Results	Gojko Joksimovic, Aldin Kajevic, Mario Mezzarobba, Alberto Tassarolo	Montenegro	Poster	Video Q&A Send

SD-008338	Modeling and design analysis of the Tesla Model S induction motor	Robin Thomas, Lauric Garbuio, Laurent Gerbaud, Hervé Chazal	France	Poster	Video Q&A Send
SD-002305	Reduction of Open-Circuit DC Winding Induced Voltage and Torque Pulsation in the Wound Field Switched Flux Machine by Stator Axial Pairing of Tooth-Tips	Wentao Zhang, Zhongze Wu, Wei Hua, Z. Q. Zhu	United Kingdom	Poster	Video Q&A Send
SD-003212	First estimations of stator dimensions for permanent magnet synchronous machines with tooth-coil windings and direct liquid cooling	Constantin Wohlers, Bernd Ponick	Germany	Poster	Video Q&A Send
SD-005371	Variance-Based Sensitivity Analysis of Significant Design Parameters of an Induction Machine	David Orth, Christian Alteheld, Raimund Gottkehaskamp	Germany	Poster	Video Q&A Send
SD-004898	Analysis and Examination of Eddy Current Brake for Aircraft Using Composite Disc	Daichi Mochizuki, Kentaro Hori, Yoshimi Kikuchi, Hiroyuki Wakiwaka, Makoto Sonehara, Toshiro Sato	Japan	Poster	Video Q&A Send
SD-002119	Torque Ripple Reduction of Outer Rotor Permanent Magnet Vernier Machine with Concentrated Winding	Ying Fan, Yeyi Mei, Qiushi Zhang	China	Poster	Video Q&A Send
SD-008559	Impact on Vibration of Eccentric Permanent Magnet Assisted Synchronous Reluctance Machine	Jiaqi Li, Hanafy Mahmoud, Michele Degano, Chris Gerada	United Kingdom	Poster	Video Q&A Send
SD-011614	PM BLDC Motor for Primary Flight Surface Actuator	Davide Macera, Moreno D'Andrea, Giovanni Di Domenico, Lino Di Leonardo, Marco Villani	Italy	Poster	Video Q&A Send
SD-001953	Small Permanent Magnet Vernier machines in mass production	Lionel Billet, Damien Laforge, Christophe Espanet	France	Poster	Video Q&A Send
SD-004804	An Optimization Procedure for a Synchronous Reluctance Machine with Fluid Shaped Flux Barriers	Federica Uberti, Lucia Frosini, Lorand Szabo	Italy	Poster	Video Q&A Send
SD-009024	Effects of Rotor Flux Barrier Design on Torque Ripple and High Speed Performance of Synchronous Reluctance Machines	Yusuf Basri Yilmaz, Emine Bostancı	Turkey	Poster	Video Q&A Send

SS1 Electrical Machines for Renewables

Session Title	SS Electrical Machines for Renewables				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-008605	Evaluation of PM Rotor Topologies for Impedance Matching of Small-Scale Passive DC-Connected Wind Generator Systems	Casper Labuschagne, Maarten Kamper	South Africa	Oral	Video Q&A Send
SD-004057	Optimal tooth tips design for cogging torque suppression of permanent magnet machines	Elia Brescia, Marco Palmieri, Giuseppe Cascella, Francesco Cupertino	Italy	Oral	Video Q&A Send
SD-010529	Electromechanical Dynamics Analysis of Pole-Piece Rotors in Pseudo Direct-Drive Wind Turbine Generators	Michiel Desmedt, Jianning Dong, Faisal Wani, Pavol Bauer, Henk Polinder	Netherlands	Oral	Video Q&A Send

SD-010235	Analytical Study of Rotor Eccentricity Effects on Brushless Doubly Fed Machines Vibration	Salman Abdi, Ehsan Abdi, Richard McMahon	United Kingdom	Oral	Video Q&A Send
SD-004782	Influence of Air Gap in Transverse Flux Permanent Magnet Machines for Wind Power Applications	Rajesh Kumar, Zhi Qiang Zhu, Alexander Duke, Arwyn Thomas, Richard Clark	United Kingdom	Oral	Video Q&A Send

Session Title	SS Electrical Machines for Renewables				
Paper ID	Paper title	Authors	Country	Presenta-tion	Link
SD-004553	Effect of Airgap Length on Electromagnetic Performance of Surface Mounted Permanent Magnet Vernier Machine	Dileep Kumar Kana Padinharu, Guang-Jin Li, Zi-Qiang Zhu, Richard Clark, Arwyn Thomas	United Kingdom	Poster	Video Q&A Send
SD-002348	Two New Rotor Designs with Reduced Amount of Rare-Earth Magnet Material for a Permanentmagnet Wind Generator for a 4MW Application	Alena Babl, Gurakuq Dajaku, Dieter Gerling	Germany	Poster	Video Q&A Send
SD-011207	Sizing Optimization of 15 MW Spoke-type Permanent Magnet Synchronous Generator For Wind Turbine	Amina Bensalah, Georges Barakat, Yacine Amara	France	Poster	Video Q&A Send
SD-009032	A Robust 5 MW Split-Pole Reluctance Synchronous Wind Generator	Jandre Dippenaar, Maarten J Kamper	South Africa	Poster	Video Q&A Send
SD-004731	10MW, 10rpm, 10Hz, directly-driven synchronous generator system: preliminary design with key FEM validations	Ion Boldea, Lucian Nicolae Tutelea, Ileana Torac	Romania	Poster	Video Q&A Send
SD-004928	Design and Analysis of a 2.5 MW Hybrid Excited Synchronous Wind Turbine Generator With Two Separate Rotors	Aysel Akgemci, Ozan Keysan	Turkey	Poster	Video Q&A Send
SD-001481	Low Cost Rotary To Linear Magnetic Gear	Thang Van Lang, Suleiman. M Sharkh, Jame R Anglada, Mehdi Hendijanizadeh, Mohamed. M Torbati	United Kingdom	Poster	Video Q&A Send
SD-010715	Impact of stator slot geometry on the performance of a permanent magnet synchronous generator for wave energy converters	Alexandra Tokat, Torbjörn Thiringer, Elisabet Jansson	Sweden	Poster	Video Q&A Send
SD-004871	Analysis of Modular Inverter-fed Six-Winding Transformers for WECS-Mains Interface	Antonino Di Gerlando, Khaled ElShawarby, Giovanni Maria Foglia, Roberto Perini	Italy	Poster	Video Q&A Send
SD-007803	Design optimization of a direct-drive PMSG considering the torque-speed profile Application for Offshore wind energy	Thi Nhat Linh Dang, Serigne Ousmane Samb, Nicolas Bernard	France	Poster	Video Q&A Send
SD-010936	High Voltage Direct Drive Generators with Multiphase Single Layer Fractional Slot Concentrated Windings	Michela Diana, Sonja Tidblad Lundmark, Torbjörn Thiringer	Sweden	Poster	Video Q&A Send
SD-011037	Design and optimization of a Cage+Nested loops rotor BDFM	Oreoluwa I. Olubamiwa, Nkosinathi Gule	South Africa	Poster	Video Q&A Send

SS2 High Efficiency Electrical Machines Innovative Materials, Design, Measurement and Manufacturing Techniques

Session Title	SS High Efficiency Electrical Machines Innovative Materials, Design, Measurement and Manufacturing Techniques				
Paper ID	Paper title	Authors	Country	Present-ation	Link
SD-005509	Magnetic Characterization of Stator Segments made of Soft Magnetic Composites	Patrick Breining, Christoph Rollbühler, Lars Sjöberg, Martin Doppelbauer	Germany	Oral	Video Q&A Send
SD-003174	A High Strength Rotor Structure for IPMSM with Narrow Bridges	Makoto Ito, Shinji Sugimoto, Akeshi Takahashi, Shuichi Tamiya, Takatoshi Kushida	Japan	Oral	Video Q&A Send
SD-012165	Circumferentially Segmented Rotor Architecture for PMSM Traction Machines	Fabian Lorenz, Ralf Werner, Daniel Paul, Tony Stein	Germany	Oral	Video Q&A Send
SD-007323	On the Design and Manufacturing of Small Single Phase Induction Motors toward Super Premium Efficiency Standards	Ioannis D. Chasiotis, Yannis L. Karnavas	Greece	Oral	Video Q&A Send

Session Title	SS High Efficiency Electrical Machines Innovative Materials, Design, Measurement and Manufacturing Techniques				
Paper ID	Paper title	Authors	Country	Present-ation	Link
SD-008249	Post rotor-fault operation of a Ferrite Magnet assisted Synchronous Reluctance Motor	Sascha Neusues, Andreas Binder	Germany	Poster	Video Q&A Send
SD-008494	Loss Analysis of a Traction IPM Machine in a FEA based Efficiency Map	Hiroyuki Sano, Katsuyuki Narita, Nicolas Schneider, Kazuki Semba, Koji Tani, Takashi Yamada, Ryosuke Akaki	Japan	Poster	Video Q&A Send
SD-010103	High-Efficiency Induction Motor with Small Gap Length and Magnetic Wedges	Sugimoto Shinji, Takahashi Akeshi, Endo Mikio, Tamura Tatsuhiko, Kinoshita Hiroataka	Japan	Poster	Video Q&A Send
SD-005169	Manufacturing of tooth coil winding PM machines with in-slot oil cooling	Alessandro Acquaviva, Stefan Skoog, Torbjörn Thiringer	Sweden	Poster	Video Q&A Send
SD-011363	Design of Low-Power Direct-on-Line Synchronous Reluctance Motors Based on Modified Natural-flux-Line-Curve Approach	Valerii Abramenko, Ilya Petrov, Juha Pyrhönen	Finland	Poster	Video Q&A Send
SD-002062	Iron Loss Evaluation under PWM Excitation of Ultrathin Electrical Steel Sheets for a Stator Core used in a High-speed and High-effective Motor	Mohachiro Oka, Hirofumi Kiyotake, Masato Enokizono, Daisuke Wakabayashi	Japan	Poster	Video Q&A Send
SD-003158	Effect of Magnet Materials on Designing of a High Power-Low Voltage Permanent Magnet Flux Switching Motor for Automotive Applications	Mohamed Taha, Amr Saleh	Egypt	Poster	Video Q&A Send
SD-012173	Overmodulation opportunity in 48 V three-phase PMSM with open-ended windings	Stefan Skoog	Sweden	Poster	Video Q&A Send
SD-002178	Design Method by Vector Magnetic Characteristic Analysis for upgrading Efficiency of Motor	Masato Enokizon	Japan	Poster	Video Q&A Send

SD-005606	Review of Segmented Stator and Rotor Designs for AC Electric Machines	Anmol Aggarwal, Elias Strangas, Athanasios Karlis	USA	Poster	Video Q&A Send
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SS3 High Speed Electrical Machines

Session Title	SS High Speed Electrical Machines				
Paper ID	Paper title	Authors	Country	Present ation	Link
SD-004634	Applicability of CNT materials in present-day and future electrical machines	Juha J. Pyrhönen, Marcin Otto, Valentina V. Ayguzina, Ilya Petrov, Julia Vauterin, Flyur R. Ismagilov, Viacheslav E. Vavilov	Finland	Oral	Video Q&A Send
SD-005789	A Novel High-Speed Permanent Magnet Machine with Dual Semi-Cage Winding	Shaofeng Jia, Yongtao Liang, Deliang Liang, Shuaijun Chu, Yang Liang	China	Oral	Video Q&A Send
SD-006602	Torque analysis of high-speed switched reluctance motor with amorphous alloy core	Feng Chai, Zongyang Li, Jing Ou, Yanlei Yu	China	Oral	Video Q&A Send
SD-008079	Hybrid model for AC Losses in High Speed PMSM for arbitrary flux density waveforms	Taha El Hajji, Sami Hlioui, François Louf, Guillaume Mermaz-Rollet, M'Hamed Belhadi, Mohamed Gabsi	France	Oral	Video Q&A Send
SD-003204	High-Speed Synchronous Reluctance Motor for Electric-Spindle Application	Emanuel Castagnaro, Nicola Bianchi	Italy	Oral	Video Q&A Send

Session Title	SS High Speed Electrical Machines				
SD-009849	Combined Electromechanical-thermal model of a high-speed flywheel energy storage system	Mauro Andriollo, Andrea Tortella, Roberto Benato, Lorenzo Bellini	Italy	Poster	Video Q&A Send
SD-006785	A novel rotor bar shape for enhancing the torque density of high-speed induction motor	Silba Mathew, Ram Kumar R. M., B. G. Fernandes	India	Poster	Video Q&A Send
SD-002887	Performance Evaluation of a High-Speed Permanent Magnet Synchronous Machine with Hairpin Winding Technology	Sridhar Balasubramanian, Markus Henke	Germany	Poster	Video Q&A Send
SD-008532	No-Load Loss Separation of High-Speed Electric Motors for Electrically-Assisted Turbochargers	Adrien Gilson, Ralph Sindjui, Baptiste Chareyron, Misa Milosavljevic	France	Poster	Video Q&A Send
SD-004103	Comparison of Stator Winding Technologies for High-Speed Motors in Electric Propulsion Systems	Théophane Dimier, Marco Cossale, Tobias Wellerdieck	Switzerland	Poster	Video Q&A Send
SD-011924	Analytical Model of Open-Circuit Air Gap Flux Density in High Speed Permanent Magnet Machines Accounting for Winding Eddy Current Reaction	Xin Xu, Zhiquan Deng, Zhongming Zhang, Zelin Wang	China	Poster	Video Q&A Send
SD-008168	Discrete Current Regulator Design with Sensorless Drive for High-Speed Permanent Magnet Synchronous Machine	Yang Liang, Deliang Liang, Shaofeng Jia, Shuaijun Chu, Yongtao Liang	China	Poster	Video Q&A Send
SD-010901	Modeling and Axial Reluctance Force Analysis of Bearingless Switched Reluctance Motor	Zelin Wang, Xin Cao, Zhiquan Deng	China	Poster	Video Q&A Send

SD-010898	Average control strategy of 3-DOF bearingless switched reluctance motor considering coupling	Zelin Wang, Zhiquan Deng, Xin Cao	China	Poster	Video Q&A Send
SD-011533	Comparison of Designs Utilizing Dual Phase Magnetic Material in High Specific Power Electrical Machines for Aerospace Applications	Rasul Hemmati, Sina Vahid, Ayman El-Refaie	United States	Poster	Video Q&A Send
SD-002909	Unbalanced Magnetic Pull Analysis for Rotordynamics of Induction Motors	Heesoo Kim, Janne Nerg, Tuhin Choudhury, Jussi Sopanen	Finland	Poster	Video Q&A Send
SD-010707	Robust DC-Link Voltage Control and Discrete-Time Sensorless Control for High-Speed Flywheel Energy Storage System	Yang Liang, Deliang Liang, Shaofeng Jia, Shuaijun Chu, Yongtao Liang	China	Poster	Video Q&A Send
SD-001929	A novel low control frequency control strategy of high switching frequency inverter for high speed PMSM current control	Jin-Dong Zhang, Fei Peng, Yun-Kai Huang, Yu Yao, Zi-Chong Zhu	China	Poster	Video Q&A Send
SD-011282	Research and Analysis on Design Characteristics of High Temperature and High-Speed Permanent Magnet Motor	Shuaijun Chu, Deliang Liang, Shaofeng Jia, Yang Liang	China	Poster	Video Q&A Send

SS4 Innovative magnetic materials for electromagnetic devices

Session Title	SS Innovative magnetic materials for electromagnetic devices				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-005223	Design of a Novel High Power Density Single Sided Axial Flux Motor Using SMC Materials	Andreas Echle, Urs Pecha, Nejila Parspour, Christian Gruener	Germany	Oral	Video Q&A Send
SD-008877	Reduction in Hysteresis Loss of Binder Jet Printed Iron Silicon	Thang Q. Pham, Hawke Suen, Patrick Kwon, Shanelle N. Foster	United States	Oral	Video Q&A Send
SD-011835	Study of the Adoption of Different Bonded Magnets in Assisted Reluctance Machines	Emir Poskovic, Luca Ferraris, Nicola Bianchi, Fausto Franchini	Italy	Oral	Video Q&A Send
SD-006343	Comparison between Halbach Array Rotors with Discrete and Continuous Magnets for Aeronautic Applications	Benjamin Daguse, Sabrina Ayat	France	Oral	Video Q&A Send
SD-012009	Multiple Layer Magnetic Materials for Variable Flux PM Machines	Mostafa Ahmadi Darmani, Emir Pošković, Fausto Franchini, Luca Ferraris, Andrea Cavagnino	Italy	Oral	Video Q&A Send
SD-004286	Hysteresis Loss Evaluation of Additively Manufactured Soft Magnetic Core	Hans Tiismus, Ants Kallaste, Anouar Belahcen, Toomas Vaimann, Anton Rassolkin	Estonia	Oral	Video Q&A Send

Session Title	SS Innovative magnetic materials for electromagnetic devices				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-006726	Development Policy of SMC to Improve Efficiency of Axial Gap Motor Employing Coreless Rotor Structure	Ren Tsunata, Masatsugu Takemoto, Satoshi Ogasawara, Tatsuya Saitoh, Yuta Enokizono, Tomoyuki Ueno	Japan	Poster	Video Q&A Send

SD-003123	Fundamental Study of Eddy Current Brakes by Using Magnetic Clad Material	Kentaro Hori, Daichi Mochizuki, Yosimi Kikuchi, Hiroyuki Wakiwaka, Makoto Sonehara, Toshiro Sato	Japan	Poster	Video Q&A Send
SD-010723	Additive Manufacturing of Non-homogeneous Magnetic Cores for Electrical Machines - Opportunities and Challenges	Thang Pham, Shanelle Foster	United States	Poster	Video Q&A Send

SS5 Large synchronous generators

Session Title	SS Large synchronous generators				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-004189	Numerical Study of Windage Power Loss for One Salient Pole Generator	Sinisa Majer, Zeljko Tukovic	Croatia (Hrvatska)	Oral	Video Q&A Send
SD-005142	Hydrogenerator Calculation Software for Recalculation Purpose	Georg Traxler-Samek, Andreas Binder, Maximilian Bartosch	Germany	Oral	Video Q&A Send
SD-003166	Impact of Design Aspects on the Vibrational Behaviour of the Stator End-Winding Region of Large Turbogenerators	Sebastian Lange, Martin Pfof	Germany	Oral	Video Q&A Send
SD-004464	Determination of the electromagnetic forces of the synchronous electric generator for the asymmetric load condition by measurements	Miroslav Petrinic, Stjepan Tvoric, Eduard Plavec, Bono Zratic	Croatia (Hrvatska)	Oral	Video Q&A Send
SD-009059	Pattern Recognition of Inter-Turn Short Circuit Fault in Wound Field Synchronous Generator via Stray Flux Monitoring	Hossein Ehya, Arne Nysveen, Robert Nilssen	Norway	Oral	Video Q&A Send
SD-012041	Time Periodic 2D FE electromagnetic simulation of large Hydro Generators	Thomas Lugand, Alexander Schwery	Switzerland	Oral	Video Q&A Send

Session Title	SS Large synchronous generators				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-004677	PM Vernier Machine for Utility Scale Wind Generator Applications: Design and Evaluation	Pushman Tlali, Rong-Jie Wang	South Africa	Poster	Video Q&A Send
SD-003484	Rotor Yoke Effect on Core Losses of a Non-Overlap Wound Rotor Synchronous Machine	Karen Garner, Maarten Kamper	South Africa	Poster	Video Q&A Send
SD-011126	Concentrated Windings for Wind Generators with Solid Rotor Iron and Redundant Feeding	Nicolas Erd, Andreas Binder	Germany	Poster	Video Q&A Send
SD-008982	Detailed Magnetic Field Monitoring of Short Circuit Defects of Excitation Winding in Hydro-generator	Hossein Ehya, Arne Nysveen, Ingrid Linnea Groth, Bruce A. Mork	Norway	Poster	Video Q&A Send
SD-007145	Wireless Supervision of a Rotating High-Speed De-excitation System for Brushless SM	Emilio Rebollo, Carlos A. Platero	Spain	Poster	Video Q&A Send

SD-009008	A Practical Approach for Static Eccentricity Fault Diagnosis of Hydro-Generators	Hossein Ehya, Arne Nysveen, Robert Nilssen	Norway	Poster	Video Q&A Send
SD-003441	Calculation of Circulating Currents in Parallel Branches of Salient Pole Synchronous Machines	Constantin Schepe, Elmar Haschen, Bernd Ponick	Germany	Poster	Video Q&A Send
SD-005312	Analytical Method to Diagnose Large Salient Poles Through Frequency Response Analysis	Asier Mugarra, Carlos A. Platero	Spain	Poster	Video Q&A Send
SD-002003	Challenges in Multi-Phase Winding Design for Large Hydro-Generators	Georg Traxler-Samek, Michael Lecker	Switzerland	Poster	Video Q&A Send
SD-003816	Synchronous Generator Rotor Thermal Bow, Diagnostics and Correction	Peter Popaleny, Piotr Mialkowski	Slovak Republic	Poster	Cancelled

SS6 Motor and Generator Windings Design, Performance and Manufacturing

Session Title	SS Motor and Generator Windings Design, Performance and Manufacturing				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-004537	Algebraic Design of Symmetrical Windings for AC Machines	Johannes Germishuizen, Andreas Kremser	Germany	Oral	Video Q&A Send
SD-004197	The Tingley's Box Method to Construct the Stator Winding Matrix	J. Johnny Rocha E., Edson Bortoni, Paulo Silva, Bernardo Alvarenga	Brazil	Oral	Video Q&A Send
SD-005363	An Analytical Approach for the Design of Innovative Hairpin Winding Layouts	Andrea Arzillo, Stefano Nuzzo, Pietro Braglia, Giovanni Franceschini, Davide Barater, David Gerada, Chris Gerada	Italy	Oral	Video Q&A Send
SD-009342	Two-Slot Coil Pitch For Five-Phase Integrated Permanent Magnet Synchronous Machine	Romain Cousseau, Raphael Romary, Remus Pusca, Eric Semail	France	Oral	Video Q&A Send
SD-012017	Sensitivity Analysis on the Voltage Distribution within Windings of Electrical Machines fed by WBG Converters	Marco Pastura, Stefano Nuzzo, Giovanni Franceschini, Giacomo Sala, Mario Kohler, Davide Barater	Italy	Oral	Video Q&A Send
SD-004669	The influence of saturation on eddy currents in form-wound windings of electrical machines	Sebastian Moros, Stephan Tenner, Joachim Kempkes, Uwe Schäfer	Germany	Oral	Video Q&A Send

Session Title	SS Motor and Generator Windings Design, Performance and Manufacturing				
Paper ID	Paper title	Authors	Country	Present ation	Link
SD-005797	Design of Shaped-Profile Electrical Machine Windings for Multi-Material Additive Manufacture	Sabrina Ayat, Nick Simpson, Benjamin Dagusé, Johannes Rudolph, Fabian Lorenz, David Drury	France	Poster	Video Q&A Send
SD-009814	Saturation-Related Losses in Induction Motors for Star and Delta Connection Modes	Fernando J. T. E. Ferreira, José Alberto, André M. Silva, Aníbal T. de Almeida	Portugal	Poster	Video Q&A Send
SD-010227	Investigation of Cooling Solutions for Hairpin Winding in Traction Application	Giada Venturini, Giuseppe Volpe, Marco Villani, Mircea Popescu	United Kingdom	Poster	Video Q&A Send
SD-010782	Comparison of Single- and Double-Layer Windings in Spoke-type	Shouhui Ni, Uwe Schäfer	Germany	Poster	Video Q&A

	Synchronous Motors with Ferrite Magnets				Send
SD-005711	Ceramic-like Composite Systems for Winding Insulation of Electrical Machines	Sören Miersch, Ralph Schubert, Thomas Schuhmann, Uwe Schuffenhauer, Markus Buddenbohm, Markus Beyreuther, Jeannette Kuhn, Mathias Lindner, Bernd Cebulski, Jakob Jung	Germany	Poster	Video Q&A Send
SD-007773	Peak Voltage Stress on Stator Winding in PWM Inverter Fed Drives	Shubham Sundeep, Jiabin Wang, Antonio Griffio, Fernando Alvarez-Gonzalez	United Kingdom	Poster	Video Q&A Send
SD-007498	High-torque Ferrite Assisted Reluctance Machine Winding Comparison	Ladislav Knebl, Jan Barta, Cestmir Ondrusek, Ondrej Vitek	Czech Rep.	Poster	Video Q&A Send
SD-007463	Experimental Study on the Impact of MMF Spatial Harmonics in the Mechanical Vibration of a Three-Phase Induction Motor	Alexandre Correia, André Silva, Fernando J. T. E. Ferreira	Portugal	Poster	Video Q&A Send
SD-004944	A boundary element analysis for electric apparatus considering electric loading	Shoichiro Nagata	Japan	Poster	Video Q&A Send

SS7 Multiphase Machines Design and Control

Session Title	SS Multiphase Machines Design and Control				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-002879	Torque Ripple Minimization in Exoskeleton Drives with Multiphase Electrical Machines by Current Harmonic Injection	Marcel Waldhof, Nejila Parspour	Germany	Oral	Video Q&A Send
SD-001643	Modeling and Control of a Dual Three-Phase Permanent Magnet Machine Accounting for Asymmetry between Two Winding Sets	Mingjin Hu, Wei Hua, Hengliang Zhang, Guishu Zhao, Guangtong Ma, Shuai Xu	China	Oral	Video Q&A Send
SD-011134	Control of the Torque and Rotor Power in a Five-Phase Wound-Rotor Induction Motor Drive For Rotary Assembly Platforms	Gabriele Rizzoli, Michele Mengoni, Giacomo Sala, Luca Zarri, Angelo Tani	Italy	Oral	Video Q&A Send
SD-003492	A Direct Energy Control Technique for Torque Ripple and DC-link Voltage Ripple Reduction in Switched Reluctance Drive Systems	Xu Deng, Barrie Mecrow	United Kingdom	Oral	Video Q&A Send
SD-007501	A Transient Model of WICSC and ISCAD Machines Based on Permeance Networks	Oskar Wallmark, Konstantina Bitsi, Sjoerd Bosga	Sweden	Oral	Video Q&A Send
SD-010162	Design of a Six-Phase Squirrel Cage Induction Motor with Pseudo-Concentrated Windings	Ghasem Rezazadeh, Farzad Tahami, Gérard-André Capolino, Zahra Nasiri-Gheidari, Humberto Henao, Amine Yazidi, Mehdi Sahebazamani	France	Oral	Video Q&A Send

Session Title	SS Multiphase Machines Design and Control				
Paper ID	Paper title	Authors	Country	Present ation	Link
SD-012033	Multi-Phase Winding with In-Conductor Direct Cooling Capability for a 48V Traction Drive Design	Stefan Haller, Johan Persson, Peng Cheng, Kent Bertilsson	Sweden	Poster	Video Q&A Send

SD-008281	Analysis of Dual Three-Phase Synchronous Reluctance Motor by Winding Function Theory	Chaelim Jeong, Junkyu Park, Nicola Bianchi	Italy	Poster	Video Q&A Send
SD-007064	Comparative Analysis of Single-Star and Dual-Star Permanent-Magnet Synchronous Machines	Abdolmajid Abedini Mohammadi, Sebastian Ciceo, Yves Mollet, Adrian-Cornel Pop, Johan Gyselinck	Belgium	Poster	Video Q&A Send
SD-003697	Analysis of Vibration Characteristics of Twelve-Phase Permanent Magnet Synchronous Motor Under Different Fault Tolerance Strategies	Bingnan Zhang, Bochao Du, Tianxu Zhao, Shumei Cui	China	Poster	Video Q&A Send
SD-005703	A Novel Sequential Direct Torque Control Scheme for Multiphase Motors	Guanghui Yang, Jiaqiang Yang, Yan Wang, Haseeb Hussain, Rongfeng Deng, Liang Yan, Sheng Li	China	Poster	Video Q&A Send
SD-001511	Replacing Stator of Existing Three-phase Synchronous Reluctance Machines towards Improved Multiphase Machines Performance	Kotb Albassioni, Mohamed Nabil, Elwy Elkholy, Peter Sergeant	Belgium	Poster	Video Q&A Send
SD-007641	Comparison of Dual Three-Phase Synchronous Reluctance Motor under Half-Control Mode according to Winding Configurations	Junkyu Park, Riccardo Zavagnin, Andrea Tortella, Nicola Bianchi	Italy	Poster	Video Q&A Send
SD-004839	Predictive High Dynamic Current Control of Dual Three-Phase PMSMs	Maximilian Hepp, Dzevad Imamovic, Wolfgang Wondrak, Nejila Parspour	Germany	Poster	Video Q&A Send
SD-006017	Open-Circuit Fault-Tolerant Control of Five-Phase PM Synchronous Motor using Control Variable Method	Guidan Li, Yuxia Zhao, Bin Li	China	Poster	Video Q&A Send
SD-008028	Feasibility of Permanent Magnet Fault Tolerant Machines for Aircraft Starter Generator Systems	Bo Wang, Ye Liu, Gaurang Vakil, Tao Yang, Zhuoran Zhang	United Kingdom	Poster	Video Q&A Send
SD-005614	Torque-Speed Characteristic Improvement in Nineteen-phase Induction Machine with Special Phase Connection	Abdelhak Mekahlia, Eric Semail, Franck Scuiller, Hussein Zahr	France	Poster	Video Q&A Send
SD-007005	Nine-Phase Induction motor with Harmonic Injection and Different Winding Topology	Radek Čermák, Zdeněk Frank, Vladimír Kindl, Jan Laksar, Tomáš Komrská	Czech Republic	Poster	Video Q&A Send
SD-009369	Control of Five-Phase Induction Machine with Three-Phase Inverter via Three-To-Five Phase Transformer	Abdelhakim Khelafi, Abdelmalik Djebli, M'hamed Ouadah, Omar Touhami, Rachid Ibtouen	Algeria	Poster	Video Q&A Send

SS8 Novel Flux Modulation Machines and Control

Session Title	SS Novel Flux Modulation Machines and Control				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-003999	Flux Modulation Magnet Coupler for Wind Generation System	Li Fang, Dawei Li, Tianjie Zou, Ronghai Qu	China	Oral	Video Q&A Send
SD-005762	Enhanced Flux Modulation of FSCW Consequent Pole PM Machine Employing Stator Slot Halbach PM	Shaofeng Jia, Deliang Liang, Ziqiang Zhu	China	Oral	Video Q&A Send
SD-012246	Presentation of Novel High Torque Density Dual-Stator Wound-Field Flux Modulation Machines	Udochukwu B. Akuru, Maarten J. Kamper	South Africa	Oral	Video Q&A Send

SD-004774	Comparative Analysis of Double Flux Modulation Flux Reversal Machines with PMs on Both Stator and Rotor	Yuting Gao, Martin Doppelbauer	Germany	Oral	Video Q&A Send
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Session Title	SS Novel Flux Modulation Machines and Control				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-001287	Modeling and Current Control Method for Linear Vernier Permanent Magnet Machine including Longitudinal End Effects	Zhi Chen, Rui Li, Wubin Kong, Ronghai Qu, Vincent Fedida	China	Poster	Video Q&A Send
SD-005746	Analysis of Operation Modes and Control for a Multiple Torque Component Single Air Gap Magnetless Machine	Shaofeng Jia, Xiaozhuang Dong, Deliang Liang, Shuai Feng	China	Poster	Video Q&A Send
SD-004863	Design Process of Spoke-Array Brushless Dual-Electrical-Port Dual-Mechanical-Port Machine	Ziyi Liang, Xiang Ren, Dawei Li, Ronghai Qu	China	Poster	Video Q&A Send
SD-003433	A Novel Flux Switching Permanent Magnet Planar Machine with Natural Decoupling of Two Orthogonal Motions	Mengfei Zheng, Qinfen Lu	China	Poster	Video Q&A Send
SD-001937	Minimum Copper Loss Control Strategy for dc-biased Vernier Reluctance Machines based on Speed Variation	Zixiang Yu, Wubin Kong, Ronghai Qu	China	Poster	Video Q&A Send
SD-008184	Comparison of Cogging Torque Compensation Methods for a Flux-Switching Permanent Magnet Motor by Harmonic Current Injection and Iterative Learning Control	Wentao Huang, Wei Hua, Xiaofeng Zhu, Ying Fan, Ming Cheng	China	Poster	Video Q&A Send
SD-006971	PM losses Comparisons of Permanent Magnet Vernier Motors With Different Stator Topologies	Yanlei Yu, Feng Chai, Yulong Pei	China	Poster	Video Q&A Send
SD-009946	Performance Analysis of Tubular Flux-Reversal Linear Machine with Different Slot/Pole Combination	Qinfen Lu, Ruiheng Wu, Lei Zhao	China	Poster	Video Q&A Send

SS9 Software Based Design of Machines Present and Perspectives

Session Title	SS Software Based Design of Machines Present and Perspectives				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-011096	Electrical machine design by optimization for e-motor application: a drive cycle approach	Juliana F. Cardoso, Christian Chillet, Laurent Gerbaud, Lamya Abdeljalil Belhaj	France	Oral	Video Q&A Send
SD-010278	Efficient Multiphysics Design Workflow of Synchronous Reluctance Motors	Paolo Ragazzo, Simone Ferrari, Nicolas Rivière, Mircea Popescu, Gianmario Pellegrino	Italy	Oral	Video Q&A Send
SD-008907	Computational Analysis of Air Gap Field in Electrical Machines by Fourier Coefficient Matrices	Nicolas Erd, Robin Koester, Andreas Binder	Germany	Oral	Video Q&A Send
SD-009571	Design Optimization of a Synchronous Reluctance Motor Based on Operating Cycle	Andrea Credo, Paolo Pescetto	Italy	Oral	Video Q&A Send

SD-008052	Vibration Analysis of a PMSM through FEM Multiphysics Simulation with Experimental Validation	Alejandro L. Rodriguez, Limin Huang, Patrick Lombard, Vincent Leconte, Irma Villar	France	Oral	Video Q&A Send
SD-007471	Investigation of Maximum Torque per Ampere and Maximum Efficiency Control Strategies of a Transverse Flux Machine	Julian Fischer, Martin Schmid, Nejila Parspour	Germany	Oral	Video Q&A Send

Session Title	SS Software Based Design of Machines Present and Perspectives				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-007765	Traction Motor Optimization Using Mesh Reshaping for Gradient Evaluation	Stiaan Gerber, Rong-Jie Wang	South Africa	Poster	Video Q&A Send
SD-009431	Transient Modeling of Induction Motors considering Space Harmonics	Lino Di Leonardo, Mircea Popescu, Marco Tursini, Franco Parasiliti, Matteo Carbonieri	Italy	Poster	Video Q&A Send
SD-005894	Multi-Objective Design of an Interior Permanent Magnet Machine with Robust Consideration	Yuan Cheng, Ling Ding, Xiaowei Ju, Shumei Cui, Shouliang Han	China	Poster	Video Q&A Send
SD-011061	Numerical load-point calculation method for synchronous machines	Matthias Centner	Germany	Poster	Video Q&A Send
SD-003247	Effect of Mesh-to-Mesh Projection on the Magnetic Tooth Forces Calculation in Electrical Machines	Raphaël Pile, Guillaume Parent, Yvonnick Le Menach, Jean Le Besnerais, Thomas Henneron, Jean-Philippe Leconte	France	Poster	Video Q&A Send
SD-008451	Finite Element Analysis of a VR Resolver Considering the Leakage Flux from a PMSM	Hiroyuki Sano, Nicolas Schneider, Kazuki Semba, Koji Tani, Takashi Yamada	Japan	Poster	Video Q&A Send
SD-003689	Design optimization of innovative electrical machines topologies based on Pylecan open-source object-oriented software	Pierre Bonneel, Jean Le Besnerais, Emile Devillers, Cédric Marinel, Raphaël Pile	France	Poster	Video Q&A Send

SS10 The Electric Platform as Means for Green Shipping

Session Title	SS The Electric Platform as Means for Green Shipping				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-007536	Azimuth Thruster PMSM Optimization using Symbiotic Organisms Search Algorithm	Yannis L. Karnavas, Ioannis D. Chasiotis, Maria S. C. Pechlivanidou, Eleytherios K. Karamanis, Antonios G. Kladas	Greece	Poster	Video Q&A Send
SD-004227	Multi-Three-Phase Propulsion System for Fault-Tolerant Naval Rim-Driven Propeller	Ciro Alosa, Fabio Immovilli, Emilio Lorenzani	Italy	Poster	Video Q&A Send
SD-009881	Optimized Efficiency Predictive Controller for Induction Motor Drives in Electric Ships	Dimitrios Raptis, Athanasios Karlis, Antonios Kladas	Greece	Poster	Video Q&A Send

SS11 Thermal Analysis of Electrical Machines Operating Under Harsh Conditions

Session Title	SS Thermal Analysis of Electrical Machines Operating Under Harsh Conditions				
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Paper ID	Paper title	Authors	Country	Presentation	Link
SD-004723	Thermal Analysis of Salient Pole Synchronous Machines by Multiple Model Planes Approach	Payam Shams Ghahfarokhi, Ants Kallaste, Andrejs Podgornovs, Anouar Belahcen, Toomas Vaimann, Oleg Kudrjavev	Latvia	Poster	Video Q&A Send
SD-009997	Additively Manufactured Hollow Conductors with Integrated Cooling for High Specific Power Electrical Machines	Fan Wu, Ayman EL-Refae	USA	Poster	Video Q&A Send
SD-002143	Dependency of Efficiency on Stator Temperature in Permanent Magnet Synchronous Machines	Svenja Kalt, Philipp Neuhaus, Karl Ludwig Stolle, Matthias Steinsträter, Markus Lienkamp	Germany	Poster	Video Q&A Send
SD-001759	A New Approach for Determining the Conductive Thermal Resistances in Lumped Parameter Thermal Networks of Electric Machines Using Conduction Shape Coefficients	Christoph Schmidt, Thomas Schabbach, Martin Doppelbauer	Germany	Poster	Video Q&A Send

SS12 Topology, Modelling, Control, and Reliable Operation of Energy Conversion Systems Based on MultiPort Electrical Machines

Session Title	SS Topology, Modelling, Control, and Reliable Operation of Energy Conversion Systems Based on MultiPort Electrical Machines				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-006335	Torque Ripple Minimization of Seven-Phase Induction Motor under More than Two Phase Fault	Shan He, Xin Sui, Dao Zhou, Frede Blaabjerg	Denmark	Oral	Video Q&A Send
SD-001252	Dynamic Performance Improvement Control of Brushless Dual-electrical-port Dual-mechanical-port Machine with Integrated Winding	Xu Liu, Wubin Kong, Ronghai Qu, Xun Han	China	Oral	Video Q&A Send
SD-002275	Novel Modeling Approach for Voltage Distribution within Automotive Electrical Machines	Lucas Hanisch, Mingyuan Sun, Markus Henke	Germany	Oral	Video Q&A Send
SD-003026	Sensorless position control based on active power MRAS for ship shaft stand-alone BDFIGs	Mohamed G. Hussien, Yi Liu, Wei Xu	China	Oral	Video Q&A Send
SD-004758	Electrical Variable Transmission for Hybrid Off-highway Vehicles	Thomas Vandenhove, Ahmed A-E. Abdallah, Florian Verbelen, Mats Vande Cavey, Jeroen Stuyts	Belgium	Oral	Video Q&A Send

Session Title	SS Topology, Modelling, Control, and Reliable Operation of Energy Conversion Systems Based on MultiPort Electrical Machines				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-010391	Sensorless MRAS Control of Brushless Doubly-Fed Reluctance Generators for Wind Turbines	M. R. Agha Kashkooli, Milutin Jovanovic	United Kingdom	Poster	Video Q&A Send
SD-006882	Influence of the Rotor Circuit on Characteristics of Brushless Doubly-Fed Induction Machines	Hossein Bagheri Naghneh, Samad Taghipour Boroujeni, Nouredine Takorabet	Iran	Poster	Video Q&A Send
SD-002984	Nonparametric predictive current control for standalone brushless doubly-fed induction generators	Junjie Chen, Yi Liu, Wei Xu	China	Poster	Video Q&A Send

SD-003824	Simplified Voltage Behind Reactance model for the Six-phase Open-End Salient Pole PMSM	Jose Aller, Jose Restrepo, Julio Viola, Rhett Mayor	Ecuador	Poster	Video Q&A Send
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SS13 Applications of Electrical Machines in Modern Electric Vehicles

Session Title	SS Applications of Electrical Machines in Modern Electric Vehicles				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-005819	Potential of Dual Three-Phase PMSM in High Performance Automotive Powertrains	Daniel Keller, Moritz Kuenzler, Akif Karayel, Quentin Werner, Nejila Parspour	Germany	Oral	Video Q&A Send
SD-002658	Design and Optimization of Synchronous Reluctance Machine for actuation of Electric Multi-purpose Vehicle Power Take-Off	Branko Ban, Stjepan Stipetic	Croatia	Oral	Video Q&A Send
SD-011339	Performance Evaluation of Electrically Excited Synchronous Machine compared to PMSM for High-Power Traction Drives	Georgios Mademlis, Yujing Liu, Junfei Tang, Luca Boscaglia, Nimananda Sharma	Sweden	Oral	Video Q&A Send
SD-005622	Design of a Permanent Magnet assisted Synchronous Reluctance motor using Ferrites	Andre Nasr, Baptiste Chareyron, Abdenour Abdelli, Misa Milosavljevic	France	Oral	Video Q&A Send
SD-010421	Structural Topology Optimization of High-Speed Permanent Magnet Machine Rotor	Aino Manninen, Janne Keränen, Jenni Pippuri-Mäkeläinen, Damijan Miljavec, Selma ČOrović, Alen Alič, Urban Rupnik, Mehrnaz Farzam Far, Timo Avikainen	Finland	Oral	Video Q&A Send

Session Title	SS Applications of Electrical Machines in Modern Electric Vehicles				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-003387	Current and Average Temperature Calculation for Electrically Excited Synchronous Machines in Case of Contactless Energy Supply	Björn Berweiler, Bernd Ponick	Germany	Poster	Video Q&A Send
SD-003646	Effect of uneven magnetization on magnetic noise and vibrations in PMSM – application to EV HEV electric motor NVH	Emile Devillers, Paul Gning, Jean Le Besnerais	France	Poster	Video Q&A Send
SD-007455	Computationally Cost-efficient Characteristics Analysis of EV Traction Motor considering AC Copper Loss based on 2-D Magneto-Static Analysis	Jun-Woo Chin, Young-Hoon Jung, Jun-Yeol Ryu, Min-Ro Park, Myung-Seop Lim	Korea (South)	Poster	Video Q&A Send
SD-001767	A high-precision Analytical Method for Fast Calculation of Motor Vibration Based on Tooth Modeling	Jianfeng Hong, Shanming Wang, Yuguang Sun, Haixiang Cao	China	Poster	Video Q&A Send
SD-012068	Review and Trends in Electric Traction Motors for Battery Electric and Hybrid Vehicles	Andreas Krings, Christian Monissen	Germany	Poster	Video Q&A Send
SD-002194	Analysis and Design of Multi-Pole High-Speed IPMSM with SiC Based Inverters for EVs	Xiaowei Ju, Yuan Cheng, Ling Ding, Shumei Cui	China	Poster	Video Q&A Send
SD-007617	Comparison of Methodologies for Calculation of Inductances in Direct and Quadrature Axis	Mario Vukotić, Danilo Makuc, Alen Alič, Damijan Miljavec	Slovenia	Poster	Video Q&A Send

SD-004219	Testing of an in-wheel halbach array motor	Iago Martinez Ocaña, Nick J. Baker, Barrie C. Mecrow, Chengwei Gan, Chris Hilton, Simon Brockway	United Kingdom	Poster	Video Q&A Send
SD-007781	Low-Voltage Electric Motor for the Motorization of an Electric Tractor.	Philippe Enrici, Nadhem Boubaker, Daniel Matt	France	Poster	Video Q&A Send
SD-008508	Design of a surface-mounted PM motor for improved flux weakening performance	Stavros Pastellides, Stiaan Gerber, Rong-Jie Wang, Maarten Kamper	South Africa	Poster	Video Q&A Send
SD-011827	Dynamic Current Control to Compensate for Magnetic Mutual Coupling in Electrically Excited Synchronous Machines	Junfei Tang, Yujing Liu	Sweden	Poster	Video Q&A Send
SD-010774	Design of a Power Hardware-in-the-Loop Test Bench for a Traction Permanent Magnet Synchronous Machine Drive	Nimananda Sharma, Yujing Liu, Georgios Mademlis, Xiaoliang Huang	Sweden	Poster	Video Q&A Send
SD-010243	A Comparison between Axial and Radial Flux Permanent Magnet In-Wheel Motors for Electric Vehicle	Feng Chai, Yunlong Bi, Lei Chen	China	Poster	Video Q&A Send
SD-011002	Design and Analysis of V-Shaped IPM Motor for EV Application Considering Irreversible Demagnetization	Farshid Mahmouditabar, Abolfazl Vahedi, Nouredine Takorabet	Iran	Poster	Video Q&A Send
SD-009555	An Overview of PM Synchronous Machine Design Solutions for Enhanced Traction Performance	Buddhika De Silva Guruwatta Vidanalage, Shruthi Mukundan, Wenlong Li, Narayan C. Kar	Canada	Poster	Video Q&A Send
SD-002763	Switched Reluctance Motor for a Trolleybus Traction Application: Design and Modeling	Victor N. Antipov, Andrey D. Grozov, Anna V. Ivanova	Russian Federation	Poster	Video Q&A Send
SD-012025	Cylindrical Wound-Rotor Synchronous Machines for Traction Applications	Federica Graffeo, Silvio Vaschetto, Marco Cossale, Michael Kerschbaumer, Edson Bortoni, Andrea Cavagnino	Italy	Poster	Video Q&A Send

SS14 Electrical Machines Fault Diagnosis During Transient Operation

Session Title	SS Electrical Machines Fault Diagnosis During Transient Operation				
Paper ID	Paper title	Authors	Country	Presentation	Link
SD-002038	Stray-flux and Current Analyses under Starting for the Detection of Damper Failures in Cylindrical Rotor Synchronous Machines	Habib Castro-Coronado, Jose Antonino-Daviu, Alfredo Quijano-Lopez, Pedro Llovera-Segovia, Vicente Fuster-Roig	Spain	Poster	Video Q&A Send
SD-010006	Induction Motors Torque Analysis via Frequency Extraction for Reliable Broken Rotor Bar Detection	Konstantinos N. Gyftakis, Dionysios V. Spyropoulos, Ioannis Arvanitakis, Panagiotis A. Panagiotou, Epaminondas D. Mitronikas	United Kingdom	Poster	Video Q&A Send
SD-003409	Improved Quadratic Time-Frequency Distributions for Fault Detection in Transient States	Sveinung Attestog, Huynh Van Khang, Kjell Gunnar Robbersmyr	Norway	Poster	Video Q&A Send
SD-001996	The Low Voltage Start-up Test of Induction Motor for the Detection of Broken Bars	Bilal Asad, Toomas Vaimann, Anouar Belahcen, Ants Kallaste, Anton Rassolkin, Hamidreza Heidari	Pakistan	Poster	Video Q&A Send

Student Forum

In the table you can find the links to [CVs](#) and video [presentations](#) of the students who want to share their work and achievements. You can use Questions and Answers sheet “[Q&A](#)” and “[Send](#)” to communicate with the students.

Student name	Country	CV Link	Video Link	Q&A Link
Taha El Hajji	France	CV	Presentation	Q&A, Send
Pushman Michael Tlali	South Africa	CV	Presentation	Q&A, Send
Marcello Minervini	Italy	CV	Presentation	Q&A, Send
Konstantina Bitsi	Sweden	CV	Presentation	Q&A, Send
Hossein Ehya	Norway	CV	Presentation	Q&A, Send
Andrea Credo	Italy	CV	Presentation	Q&A, Send
Furkan Tokgöz	Turkey	CV	Presentation	Q&A, Send
Gökhan ÇAKAL	Turkey	CV	Presentation	Q&A, Send

The three best student presentations will receive the ICEM “Jorma Luomi Student Forum Award” during the closing ceremony.

Sponsored Webinar-1:

Thursday, 27th August 2020, 09:00-10:00 CEST.



[Click for Webinar information and registration](#)

Modelling of Electric Machines

Name: **Björn Bragé and Cesare Tozzo**
Company: COMSOL
E-mail: Cesare.Tozzo@comsol.com

Abstract:

Tune into this live webinar to learn more about the modeling of electrical machines in COMSOL. You will see a mix of presentations and live demos in COMSOL. During the webinar, we will explore how to use COMSOL's modeling best practices and the power of multiphysics in COMSOL. Some examples of what we will present are:

- Electric drive's torque and power
- Extend electromagnetic modeling of motors with Acoustics, Structural, Heat Transfer, and Multiphysics
- Effect of different load cases on rotor durability
- Parametrize, optimize and make your models easy distributed

Welcome!

Sponsored Webinar-2:

Thursday, 27th August 2020, 10:00-11:00 CEST.



Click to join (Webinar ID: xxxxx, Passcode: xxxx)

Electric Drive System- meet up with the system chief engineer

Name: **Andreas Ireholm**
Company: VOLVO Buses
E-mail: andreas.ireholm@volvo.com

Abstract:

Volvo Buses (Volvo Bus Corporation / formal name: Volvo Bussar AB) (stylized as VOLVO) is a subsidiary and a business area the Volvo Group, which is one of the world's leading manufacturers of trucks, buses, construction equipment as well as marine and industrial engines. Volvo Buses product range includes complete buses and coaches as well as chassis combined with a comprehensive range of services. The bus operation has a global presence, with production in Europe, North and South America, Asia and Australia.

In this webinar, you will be provided with an introduction to Volvo Buses, and their electrification. The webinar ends with a Q/A session with the System chief engineer for motor drive systems.

Sponsored Webinar-3:

Thursday, 27th August 2020, 11:00-12:00 CEST.



[Click for Webinar information and registration](#)

Introducing JMAG-Designer Ver.19.1

Name: **Yves Thiolere** – Expert of JMAG Software
Company: Powersys
E-mail: y.thiolere@powersys.fr

Abstract:

In JMAG-Designer Ver.19.1, the analysis parameter view and dashboard which was implemented in the previous version have been updated for easier use. While continuing to enhancement the solver and mesher the base of the FEA engines, we have also added and enhanced functions for optimization and the creation of efficiency maps. Please enjoy taking full advantage of it.

Biography:

Yves has more than 10 years' experience in electric machine design using the FE method with JMAG. He has given numerous training courses and is also daily supporting JMAG users in electric machines design and other areas.