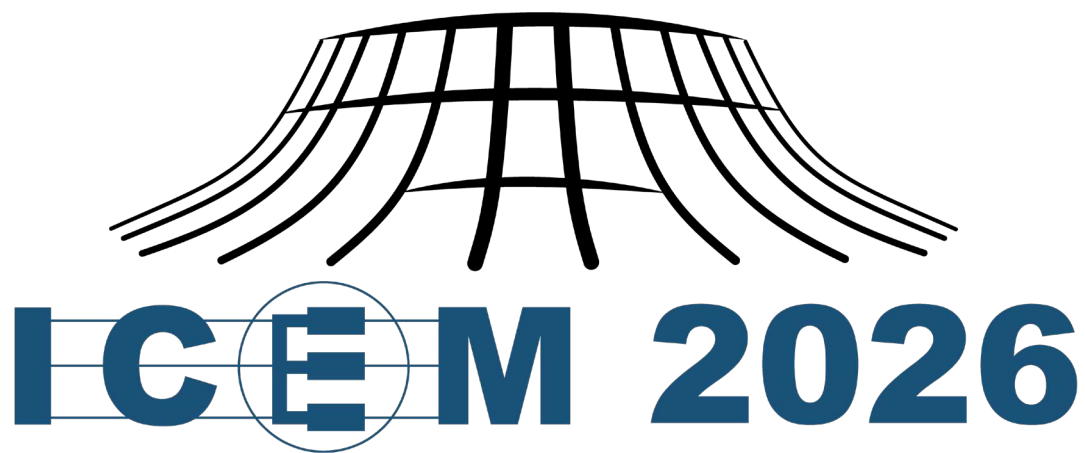


Technical Program



27th International Conference on Electrical Machines

Funchal, Madeira, Portugal | September 6-9, 2026

Organizer



Technical Co-Sponsors



ICEM NPO



Table of Contents

Table of Contents.....	2
Welcome Message from the General Chair	3
Sponsors & Exhibition Space	4
ICEM 2026 Committees	6
General Information.....	7
Instructions for Authors	12
Social Events	13
Program at a Glance	15
Plenary Session Keynote Speakers	16
Scientific Program.....	18

Welcome Message from the General Chair

Dear Colleagues and Friends,

It is with great pleasure that I welcome you to the 27th International Conference on Electrical Machines – ICEM 2026.

On behalf of the Organizing Committee, it is an honour to welcome you to Funchal, Madeira, Portugal, from 6 to 9 September 2026, for this important gathering of the international community working in the field of electrical machines and drives.

ICEM has long been recognized as one of the leading international conferences in this field, bringing together researchers, academics, industry professionals and students to share knowledge, discuss recent developments and explore future challenges. ICEM 2026 provides an excellent opportunity to exchange ideas, present new research results, strengthen existing collaborations and establish new connections.

The technical programme reflects the diversity and dynamism of our field, covering a broad range of topics and bringing together contributions from researchers and professionals from around the world. In addition to the technical programme, we hope that the social events will provide opportunities to meet colleagues, renew friendships and develop new professional relationships in a more informal and enjoyable setting.

Organizing an international conference of this scale is only possible through the dedication and support of many people. I would therefore like to express my sincere gratitude to all members of the Organizing Committee, the Technical Program Committee, the session and tutorial organizers, and the reviewers, as well as our sponsors, partners and all those who have contributed to making ICEM 2026 possible. I would also like to thank all authors, speakers and participants for their valuable contributions and for being part of ICEM 2026.

We are delighted to welcome you to Madeira, an island known for its natural beauty, culture and hospitality. We hope that, alongside a stimulating and rewarding technical programme, you will also have the opportunity to enjoy the unique atmosphere of our host destination.

Thank you for joining us at ICEM 2026. I wish you all an inspiring, productive and enjoyable conference, and I hope that your time in Madeira will be both professionally rewarding and personally memorable.

Welcome to ICEM 2026!

Antonio J. Marques Cardoso
General Chair, ICEM 2026



Sponsors & Exhibition Space

The ICEM 2026 Exhibition brings together our sponsors, industry partners and scientific publishing partners, offering participants an opportunity to discover innovative technologies, products, services and resources related to electrical machines, drives and the broader research community.

We invite you to visit the exhibition area throughout the conference, meet our sponsors and partners, explore their products and services, learn about scientific publishing opportunities, and exchange ideas with representatives from industry and academia.

The exhibition provides an important meeting point between research, industry and scientific publishing, creating opportunities for knowledge exchange, collaboration and new professional connections.

We sincerely thank all our sponsors and partners for their valuable support and for contributing to the success of ICEM 2026.

Gold Sponsor



Silver Sponsors



Bronze Sponsors



Other Sponsors



See grid stability in action



Register now
by scanning
the QR Code.



Join an exclusive behind-the-scenes visit to the **Electricidade da Madeira** grid-strengthening project and discover how a **Flywheel-Assisted Synchronous Condenser** is helping increase system strength and resilience in a power network with a high penetration of inverter-based resources.

Meet the experts behind the project, explore the installation, and gain practical insights beyond the conference paper presentation.

Technical visit & networking dinner

7 September 2026

- Departure: 17:00
- Site visit: 18:00 – 19:00
- Networking dinner: 20:00

Maximum 20 participants

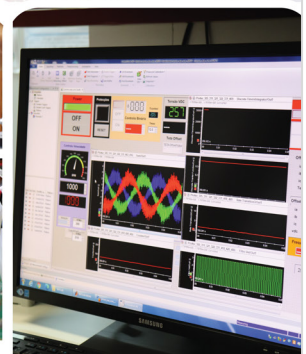
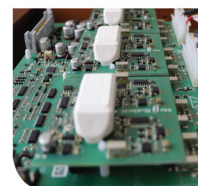
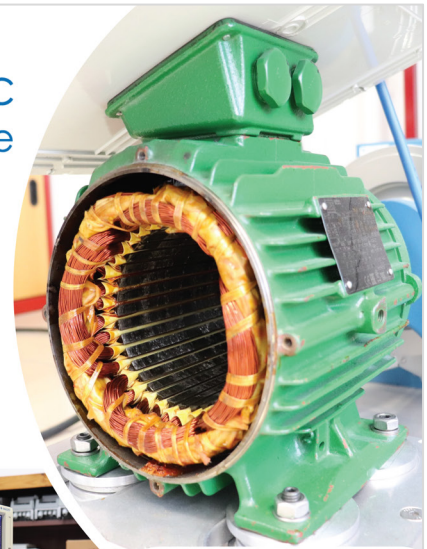


Electromechatronic
Systems Research Centre

Advancing Research in Reliable and Sustainable Electromechatronic Systems

CISE brings together research in electrical, mechanical, electronic and industrial engineering to advance know-how in electromechatronic systems.

-  Electrical Machines & Drives
-  Transportation Electrification
-  Fault Diagnosis & Fault Tolerance
-  Control & Modelling
-  Renewable Energy Systems
-  Testing & Maintenance



<https://www.cise.ubi.pt>

cise@ubi.pt

ICEM 2026 Committees

GENERAL CHAIR

Antonio J. Marques Cardoso (Portugal)

TUTORIALS CO-CHAIRS

Ayman El-Refaie (USA)

Davide Fonseca (Portugal)

Fabrizio Marignetti (Italy)

SPECIAL SESSIONS CO-CHAIRS

Babak Nahid-Mobarakeh (Canada)

Fernando Ferreira (Portugal)

Konstantinos Gyftakis (Greece)

STUDENT FORUM CO-CHAIRS

Epaminondas Mitronikas (Greece)

José Alberto (Portugal)

Rosario Miceli (Italy)

EXHIBITION CO-CHAIRS

Agostinho da Silva (Portugal)

Ioannis P. Tsoumas (Switzerland)

PAPER SUBMISSION AND PUBLICATION CO-CHAIRS

Fernando Bento (Portugal)

Sylvie Almeida Santos (Portugal)

PUBLICITY CO-CHAIRS

Braz Cardoso Filho (Brazil)

Carlos Figueiredo Ramos (Portugal)

Luís Oliveira (Portugal)

TECHNICAL PROGRAM CO-CHAIRS

Gérard-André Capolino (France)

Giulio De Donato (Italy)

Thomas Wolbank (Austria)

TRACK CO-CHAIRS

TT1. Rotating Machines

David Díaz Reigosa (Spain)

Davide Barater (Italy)

Davide Fonseca (Portugal)

Ronghai Qu (China)

Rukmi Dutta (Australia)

TT2. Design Issues (Optimization, Modeling and Simulation)

Andrea Credo (Italy)

Anouar Belahcen (Finland)

Gerd Bramerdorfer (Austria)

Nicola Bianchi (Italy)

Silvio Vaschetto (Italy)

TT3. Special Machines, Linear Machines, Actuators and Sensors

Fernando Bento (Portugal)

Hossain Mohammadi (USA)

José Alberto (Portugal)

Michael Galea (Malta)

TT4. Thermal and Losses Issues (Magnetic and Insulation Materials)

Gilsu Choi (South Korea)

Luca Ferraris (Italy)

Nick Simpson (UK)

Rafal Wrobel (UK)

TT5. Electrical Drives

Emmanuel Agamloh (USA)

Luca Zarri (Italy)

Oliver Wallscheid (Germany)

Petros Karamanakos (Finland)

Sandro Rubino (Italy)

TT6. Diagnostics and Condition Monitoring

José Antonino Daviu (Spain)

Karolina Kudelina (Estonia)

Konstantinos Gyftakis (Greece)

Lucia Frosini (Italy)

Raphael Romary (France)

TT7. Electrical Machines and Drives for Sustainable Transportation

Francisco J. Márquez-Fernández (Sweden)

Giuseppe Fabri (Italy)

Ignacio González Prieto (Spain)

Payam Shams Ghahfarokhi (Finland)

Stefano Nuzzo (Italy)

TT8. Electrical Machines and Drives for Renewable Energy Generation

Athanasios Karlis (Greece)

Christoph Hackl (Germany)

Fernando Ferreira (Portugal)

Giacomo Scelba (Italy)

General Information

Conference Venue - Pestana Casino Park



ICEM 2026 will bring together specialists from industry and academia at Pestana Casino Park, Madeira Island (Funchal), Portugal, on September 6-9, 2026.

The **Pestana Casino Park** is a hotel and entertainment complex located next to the cruise port in Funchal Bay, in the

heart of the city of Funchal, just a few minutes from the city center and the epicenter of the city's social and cultural life.

The complex designed by the master of architecture, Óscar Niemeyer, comprises the 5-star Pestana Casino Park Hotel, the Madeira Congress Centre ("Centro de Congressos da Madeira") and the Madeira Casino ("Casino da Madeira").

Conference Facilities

With the exception of the Keynote Lectures, which will take place in the Auditorium of the Madeira Congress Centre, all Tutorials, Oral and Poster Sessions will be held at the Pestana Casino Park Hotel.



Floor plans showing the location of the conference rooms and facilities on each floor are provided to help participants navigate the venue.

Address:

Pestana Casino Park

R. Imperatriz Dona Amelia

São Martinho

9004-513 Funchal

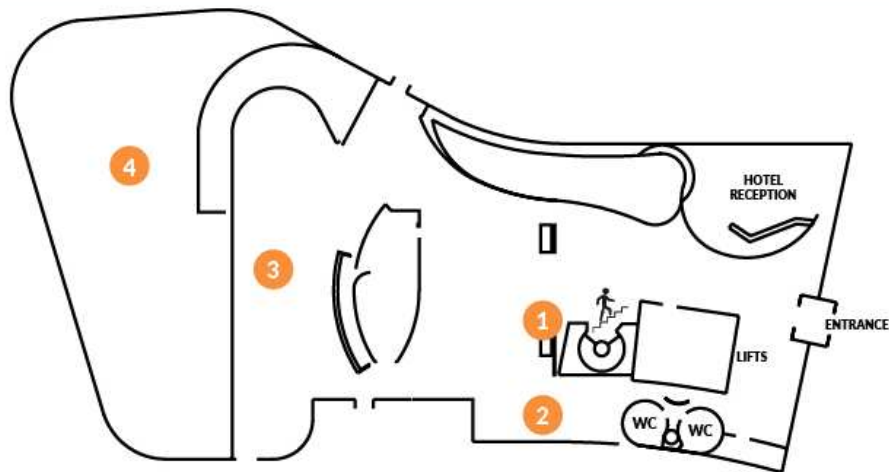
([Google Maps Location](#))

Opening Ceremony / Keynote Sessions



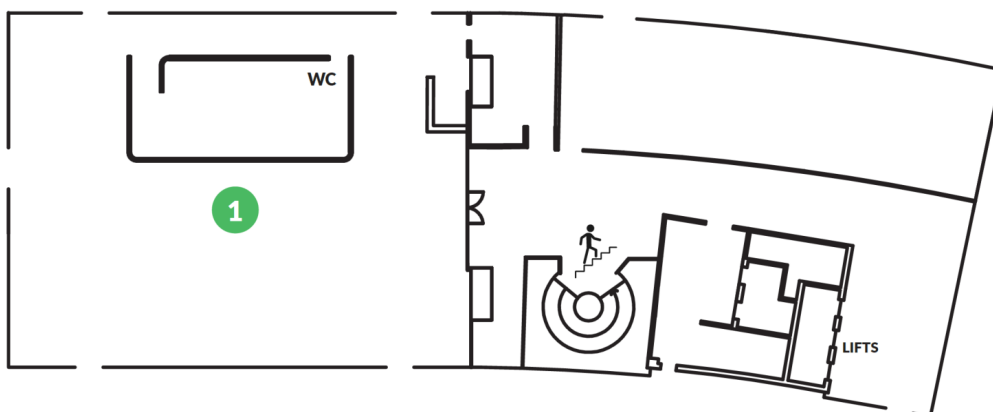
- 1 Pestana Casino Park Hotel
(Conference Venue)
- 2 Centro de Congressos da Madeira
(Opening Ceremony)
- 3 Casino da Madeira

Ground Floor



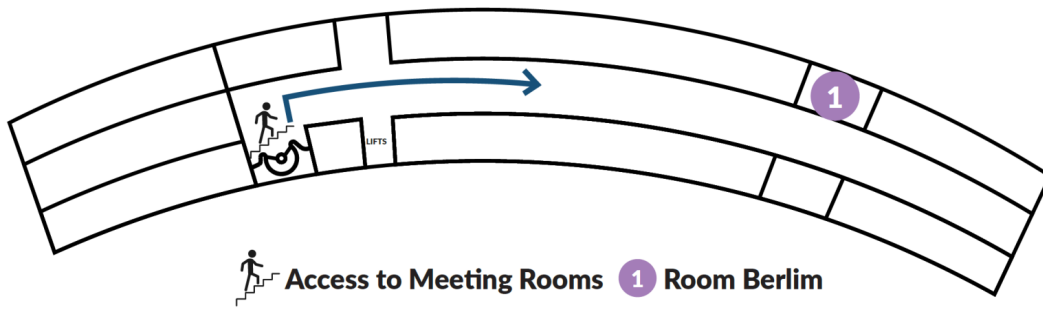
- Access to Meeting Rooms
- 1 Registration Desk
- 2 Exhibition
- 3 Sunset (Coffee Breaks / Posters)
- 4 Lunch / Restaurant

Conference Floor – Room Funchal

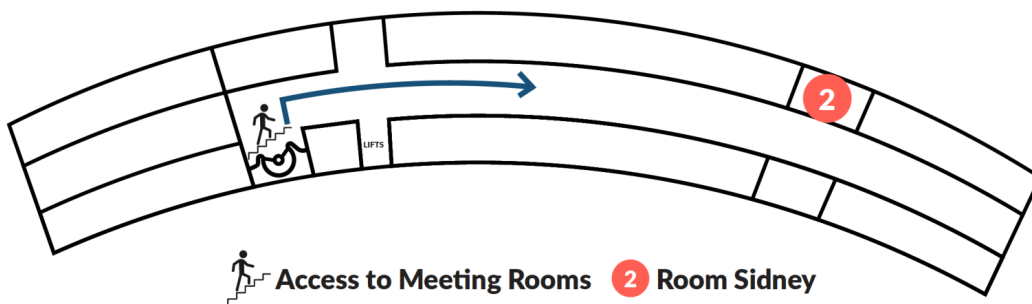


- Access to Meeting Rooms
- 1 Room Funchal

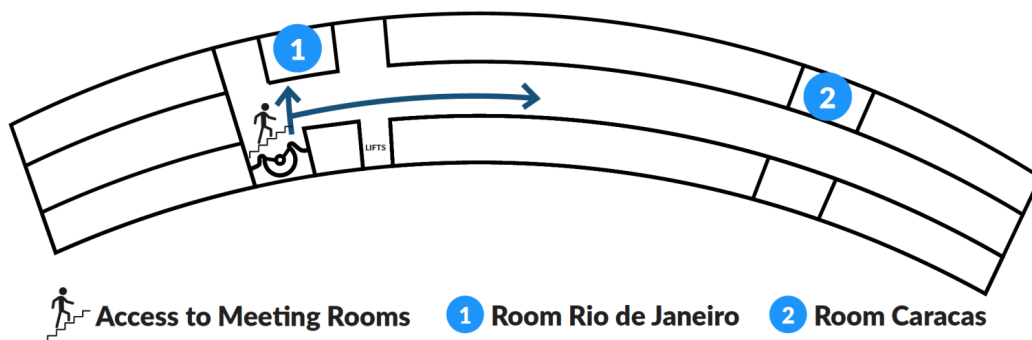
1st Floor – Room Berlim



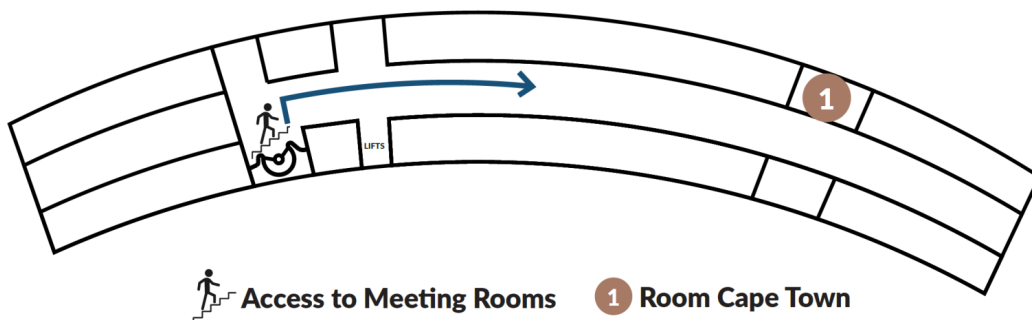
2nd Floor – Room Sidney



4th Floor – Room Rio de Janeiro & Room Caracas



5th Floor – Room Cape Town



Registration and Badge Collection

Please bring a **printed or digital copy of the registration confirmation email** you received. This email contains your unique **barcode**, which will be scanned at the Registration Desk to print your badge and provide you with your conference materials.

The conference kit can be collected at the Registration Desk, located on the **Ground Floor of Pestana Casino Park Hotel**, according to the following schedule:

Date	Opening Hours
Sunday, 6 September 2026	08:00 - 18:00
Monday, 7 September 2026	08:00 - 18:00
Tuesday, 8 September 2026	08:00 - 18:00
Wednesday, 9 September 2026	08:00 - 18:00

Wi-Fi

Wi-Fi is available throughout the meeting spaces, foyers and exhibition area.

Open Wi-Fi network: Pestana_Guest

ICEM 2026 Mobile App

Download the ICEM 2026 mobile app to access all things related to the conference, including session information, exhibitors and locations, floor plans, timely notifications, and more!



ICEM 2026

27th International Conference on Electrical Machines

- 1 Scan the QR Code and download "My Event App"
- 2 Enter the event code "ICEM2026"
- 3 Log in using the email and password you received in your email.

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Photography, Video and Recording Notice

Please note that photographs, video recordings, audio recordings and other multimedia content may be captured during the 27th International Conference on Electrical Machines (ICEM 2026), including technical sessions, tutorials, poster sessions, social events and other conference-related activities.

By attending ICEM 2026, participants acknowledge that their image, voice and/or presentation may be photographed, recorded or otherwise captured by or on behalf of the ICEM 2026 Organizing Committee.

Such material may be used for purposes related to the conference, including communication, promotion, reporting, documentation and archival purposes, and may be published or shared through the ICEM 2026 website, social media channels, printed and digital publications, and other communication channels of the conference organizers and associated organizations.

Participants who do not wish to appear in photographs or recordings are kindly requested to inform the ICEM 2026 Organizing Committee in advance and, where reasonably possible, to make themselves known to the photographer or recording staff during the event.

The ICEM 2026 Organizing Committee will take reasonable steps to ensure that any use of such material is appropriate and consistent with the purposes described above.

Instructions for Authors

Please review and follow all the guidelines provided below.

Oral Presentation Guidelines

Presentation Upload

Speakers must report to the session room **at least 15 minutes** before their session begins, to upload their presentation, with the assistance of the technical and conference staff.

Presentations must be provided in PowerPoint (PPT/PPTX) or PDF format on a USB flash drive. The use of personal laptops during the presentation will not be permitted in order to avoid delays and technical issues.

Presentation Guidelines

Presenters are given a 15-minute time frame to present. A 5-minute Q&A will follow each presentation. Please double-check the conference program for your session day and time and arrive early to check in with your session co-chairs.

Presenting authors are requested to provide the session co-chairs with a printed short biography (maximum 10 lines) before the beginning of the session.

Since sessions are tightly scheduled, the allotted time for presentation must be strictly observed.

Poster Presentation Guidelines

Poster Guidelines

The poster must be in **A0 portrait format** (118.9 cm × 84.1 cm). Please ensure that these dimensions are strictly respected.

Authors are responsible for mounting their posters on the display boards assigned by the conference organizers, using the materials provided by the support staff in the poster area.

Presentation Length

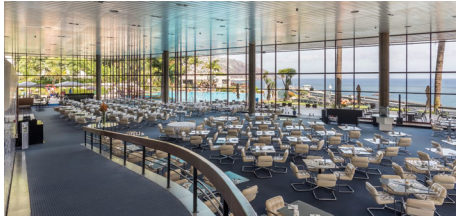
The poster session will last one hour. Throughout the session, at least one poster presenter must remain at the poster to answer questions and interact with participants. Poster presenters may briefly step away to get coffee or food, but should return to their poster promptly to ensure that someone is available to engage with participants throughout the session.

Please note that simply displaying a printed copy of the conference paper is not permitted/allowed.

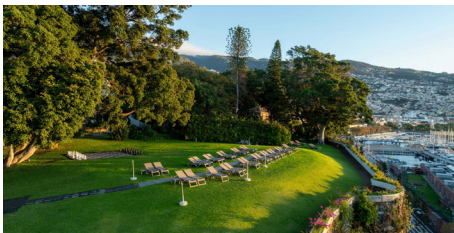
Social Events

Lunch & Coffee Breaks

Lunch will be served at the “Panorâmico” Restaurant, located on the garden floor, while coffee breaks will be served at Sunset, located on the Ground Floor. Both venues are located within the Pestana Casino Park Hotel.



Welcome Reception



The Welcome Reception will take place on Sunday, 6 September 2026, from 19:30 to 20:30, in the gardens of the Pestana Casino Park Hotel.

It will be a great opportunity to meet old friends and colleagues, as well as make new connections.

Admission is limited to conference badge holders and guests holding a Welcome Reception ticket.

Gala Dinner



The Gala Dinner will take place on Tuesday, 8 September 2026, between 20h00 and 23:30, at Casino da Madeira.

Admission to the Gala Dinner is limited to holders of Gala Dinner Tickets.

Gala Dinner – Important Information

Identification: As the event will take place at the Casino, all attendees are **required to carry a valid identification document (ID card or passport)**. This document may be requested for identification purposes to enter the venue.

Dress Code: Guests are encouraged to dress formally for the Gala Dinner, whenever possible.

Gala Dinner – How to access

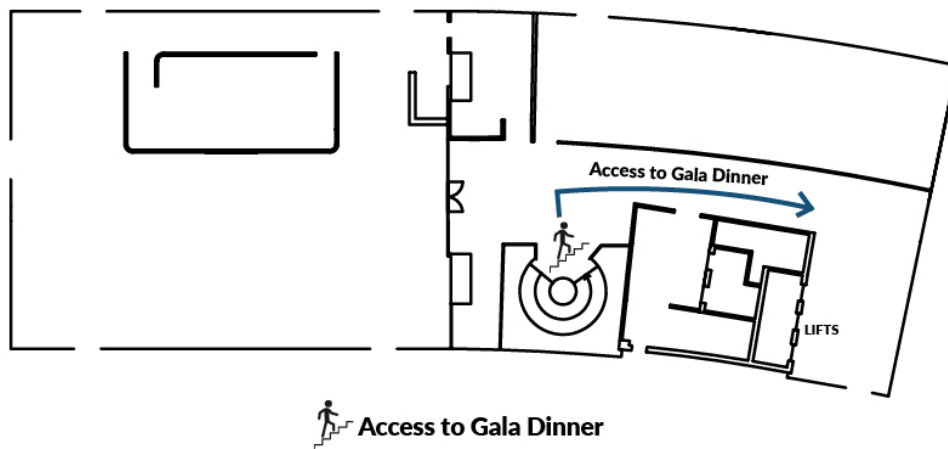


The Casino da Madeira and the Pestana Casino Park Hotel are located close to one another, being physically linked by a curved, elevated walkway, that bridges the superior floors of the two buildings.

Access to the Gala Dinner at Casino da Madeira will be via the **Conference Floor** of the Pestana Casino Park Hotel.

Please refer to the floor plan below to access to the elevated walkway.

Conference Floor – Access to Gala Dinner



Program at a Glance

Time	Sunday, 6 September 2026	Monday 7 September 2026	Tuesday 8 September 2026	Wednesday 9 September 2026
08:30		08:30–09:00 Opening Ceremony		
09:00			08:30–10:10 Oral Sessions	08:30–10:10 Oral Sessions
09:30				
10:00				
10:30	09:30–12:00 Tutorials I–III	09:00–12:30 Keynotes	10:10–11:10 Poster Session II & Coffee Break	10:10–11:10 Poster Session IV, Student Forum & Coffee Break
11:00				
11:30				
12:00			11:10–12:50 Oral Sessions	11:10–12:50 Oral Sessions
12:30	12:00–13:30 Free time for lunch			
13:00		12:30–14:00 Lunch	12:50–14:00 Lunch	12:50–14:00 Lunch
13:30				
14:00				
14:30	13:30–16:00 Tutorials IV–VI	14:00–15:40 Oral Sessions	14:00–15:40 Oral Sessions	14:00–15:40 Oral Sessions
15:00				
15:30				
16:00	16:00–16:15 Coffee Break	15:40–16:40 Poster Session I & Coffee Break	15:40–16:40 Poster Session III & Coffee Break	15:40–16:10 Coffee Break
16:30				
17:00	16:15–18:45 Tutorials VII–IX	16:40–18:20 Oral Sessions	16:40–18:20 Oral Sessions	16:10–17:50 Oral Sessions
17:30				
18:00				
18:30				18:00–19:00 Awards & Closing Ceremony
18:45–19:30 MDPI Machines Meeting		18:30–19:30 EMTC Meeting	18:30–19:30 ICEM NPO General Assembly Meeting	
19:30	19:30–20:30 Welcome Reception			
20:00			20:00 Gala Dinner	
20:30				

Plenary Session | Keynote Speakers



SEBASTIÃO LAURO NAU

*Technological Innovation Manager
WEG, Brazil*

Keynote 1: Technologies of High Efficiency Electric Motors

Sebastião Lauro Nau holds a degree in Electrical Engineering from the Federal University of Santa Catarina (UFSC), Brazil, as well as Master's and Doctoral degrees in Electrical Engineering from the same institution.

He joined WEG in 1985 in the Research, Development and Innovation area and has held several positions as researcher and manager.

He is currently responsible for Technological Innovation Management, including knowledge management, intellectual property and open innovation activities.



PANAGIOTIS KAKOSIMOS

*R&D Senior Principal Scientist
ABB Corporate Research, Sweden*

Keynote 2: Digitalization of Electric Powertrains for Enhanced Reliability and Condition Monitoring

Panagiotis Kakosimos received the B.Eng. and M.Sc. degrees in Electrical Engineering from Aristotle University of Thessaloniki in 2009, and the Ph.D. degree from the National Technical University of Athens in 2013.

He held research appointments as a Postdoctoral Researcher at the University of Manchester and as an Assistant Research Scientist at Texas A&M University at Qatar before joining ABB Corporate Research in Sweden, where he is currently an R&D Senior Principal Scientist.

His work focuses on the digitalization of electrical powertrains, combining advanced control, embedded systems, thermal modeling, condition monitoring, and data-driven analytics for industrial applications. He has led cross-functional research and technology-development activities connecting electric machines and drives with machine learning, digital twins, and domain knowledge. His current interests include physics-aware AI, predictive maintenance, condition monitoring, and scalable digital solutions for next-generation reliable powertrain systems.



NUNO FREIRE

*Manager of Generator Control Technology & Software
Siemens Gamesa Renewable Energy, Portugal*

Keynote 3: Generator Control for Direct-Drive Wind Turbines

Nuno M. A. Freire was born in Coimbra, Portugal in 1987. He received the MSc and PhD degrees in electrical engineering from the University of Coimbra, Portugal, in 2010 and 2014.

From 2013 to 2022, he was with Siemens Wind Power and Siemens Gamesa Renewable Energy in Denmark. Since 2023, he has been with Siemens Gamesa Renewable Energy in Portugal, being manager of generator control technology and software.

His research interests include control and condition monitoring of electric drives applied to wind energy conversion systems.

Scientific Program

Sunday, 6 September 2026

08:00-18:00 REGISTRATION

Ground Floor - Pestana Casino Park Hotel

09:30-12:00 TUTORIALS

Room Berlim

Tutorial I | Rare-Earth Minimized High-Speed Electric Machine and Wide Bandgap Drive Designs and Trends for Electric Transportation

Iqbal Husain¹ and Junyeong Jung¹

¹ FREEDM Systems Center, USA

Room Sydney

Tutorial II | Insulation Friendly Drives for Permanent Magnet Synchronous Machines

Jianning Dong¹, Fei Peng² and Yu Yao²

¹ Delft University of Technology, Netherlands

² Southeast University, China

Room Caracas

Tutorial III | Direct Flux Control: Emerging Torque Controllers for Traction and Propulsion Motors

Sandro Rubino¹ and Radu Bojoi¹

¹ Politecnico di Torino, Italy

12:00-13:30 Free time for lunch

13:30-16:00 TUTORIALS

Room Berlim

Tutorial IV | Hands-on Design and Optimization of IPM Traction Motors with SyR-e

Simone Ferrari¹ and Gianmario Pellegrino¹

¹ Politecnico di Torino, Italy

Room Sydney

Tutorial V | Thermal Management of Electrical Machines - Fundamentals and Advancements

Rafal Wrobel¹

¹ Newcastle University, UK

Room Caracas**Tutorial VI | Material Tradeoff for Sustainable Electrical Machines in Demanding Applications**Ahmed Selema¹, Nick Simpson² and Ayman El-Refaie³¹ Drive13 BV, Belgium² University of Bristol, UK³ Marquette University, USA**16:00-16:15 Coffee Break*****The coffee break will be served in the foyer outside the tutorial rooms***16:15-18:45 TUTORIALS****Room Berlim****Tutorial VII | Variable Flux Synchronous Machines: Design Compromises and State-of-the-Art Machine Topologies**Gerd Bramerdorfer¹, Gabriel Weissitsch¹ and David Klink²¹ Johannes Kepler University Linz, Austria² Monash University, Australia**Room Sydney****Tutorial VIII | State-of-the-Art Assessment of Additive Manufactured Soft Magnetic Materials for Electrical Machines through Comprehensive Characterization**Stefano Nuzzo¹, Lukasz Mierczak² and Paolo Bolognesi³¹ University of Modena and Reggio Emilia, Italy² Brockhaus Measurements, Poland³ University of Pisa, Italy**Room Caracas****Tutorial IX | High-Speed PMSM Design and Drive: Sizing and Feasibility, Multiphysics Optimisation, and Minimum Loss Control**Rukmi Dutta¹, Guoyu Chu¹ and Faz Rahman¹¹ UNSW Sydney, Australia**18:45-19:30 MDPI Machines Meeting****Room Berlim****19:30-20:30 Welcome Reception****Gardens of Pestana Casino Park Hotel**

Monday, 7 September 2026

08:00-18:00 REGISTRATION

Ground Floor - Pestana Casino Park Hotel

08:30-09:00 OPENING CEREMONY

Room: Auditorium (Centro de Congressos da Madeira)

09:00-12:30 KEYNOTES

Room: Auditorium (Centro de Congressos da Madeira)

Chair: Antonio J. Marques Cardoso, *CISE* / *University of Beira Interior*

09:00-10:00 Keynote 1 | Technologies of High Efficiency Electric Motors

Sebastião Lauro Nau
WEG, Brazil

10:00-10:30 Coffee Break

10:30-11:30 Keynote 2 | Digitalization of Electric Powertrains for Enhanced Reliability and Condition Monitoring

Panagiotis Kakosimos
ABB Corporate Research, Sweden

11:30-12:30 Keynote 3 | Generator Control for Direct-Drive Wind Turbines

Nuno Freire
Siemens Gamesa Renewable Energy, Portugal

12:30-14:00 Lunch

14:00-15:40 ORAL SESSIONS

Electrical Drives 1

Room Funchal

Chairs: Andy Knight, *University of Calgary*
Panagiotis Kakosimos, *ABB Corporate Research*

14:00 ICEM26-000438 | A Comparative Study between Network Analysis and Modal Analysis for Predicting the Wave Propagation in Hairpin Windings under Common-Mode Excitation

Cara-Nastasja Behrendt¹, Allan de Barros¹, Bernd Ponick¹
¹ *Leibniz University Hannover, Germany*

14:20 ICEM26-000587 | Switching Frequency Signal Injection Sensorless Control for Synchronous Motors via Flux Linkage Demodulation

Federico Centi¹, Eleftherios Kontodinas², Andrea Credo¹, Floran Martin², Marko Hinkkanen²

¹ University of L'Aquila, Italy

² Aalto University, Finland

14:40 ICEM26-000415 | Robust Inductance Estimation for SPMSM Drives from Unperturbed Operational Data with Informed Monte Carlo Uncertainty Assessment

Elia Brescia¹, Luigi Pio Savastio¹, Nicola Saltarelli¹, Angelo Carrieri¹, Giuseppe Leonardo Cascella¹, Francesco Cupertino¹

¹ Politecnico di Bari, Italy

15:00 ICEM26-000010 | A Hybrid Adaptive Observer for Rotor Current Estimation in Six-Phase Induction Motors

João Serra¹, Rafaela Bento¹, Fernando Bento¹, Antonio J. Marques Cardoso¹

¹ CISE | University of Beira Interior, Portugal

15:20 ICEM26-000561 | Position-Dependent Current Optimization for Synchronous Reluctance Machines

Samar Alhaj Hassan¹, Vincent Lechappe¹, Romain Delpoux¹, Xavier Brun¹

¹ INSA Lyon, France

Design and Thermal Management of High-Specific-Power Electrical Machines

Room Berlim

Chairs: Hüseyin Tayyer Canseven, LUT University

Ilya Petrov, LUT University

14:00 ICEM26-000497 | Thermal Investigation and Validation of Litz Wire Hollow Conductors for Electrical Machines

Folke Schwinning¹, Jana Ihrens¹, Thorsten Alexander Kern¹

¹ Hamburg University of Technology, Germany

14:20 ICEM26-000367 | Performance of Liquid-Cooled Hollow Conductors for High Torque Density Electric Motors

Lino Di Leonardo¹, Edoardo Sech¹, Daniele Di Gregorio¹, Francesco Tripaldi¹, Samuele Nizzardo¹, Antonio Rossi², Alberto Benato¹, Anna Stoppato¹, Nicola Bianchi¹

¹ University of Padova, Italy

² AddToShape, Italy

14:40 ICEM26-000291 | Experimental determination of thermal contact conductance between laminated cores and housings in electrical machines

Tobias Heidrich¹, Andreas Möckel¹

¹ Technische Universität Ilmenau, Germany

15:00 ICEM26-000065 | Direct Liquid Cooling Technology Development for Traction Motors

Pratik Bisale¹, Hüseyin Canseven¹, Juha Pyrhönen¹, Lassi Aarniovuori¹, Dong Liu¹, Juho Montonen²

¹ LUT University, Finland

² Danfoss Editron, Finland

15:20 ICEM26-000585 | Impact of Cooling Channel Shape on the Performance of Hollow Hairpin Windings

Hüseyin Canseven¹, Pratik Bisale¹, Ilya Petrov¹, Lassi Aarniovuori¹, Juho Montonen², Juha Pyrhönen¹

¹ LUT University, Finland

² Danfoss Editron, Finland

Design Issues (Optimization, Modeling and Simulation) 1

Room Sydney

Chairs: Frederik De Belie, *Ghent University*

Yujing Liu, *Chalmers University of Technology*

14:00 ICEM26-000469 | Quasi-3D Finite-Element Analysis of Eddy Currents in the Segmented Permanent Magnets of Permanent-Magnet Synchronous Machines

Herbert De Gersem¹, Cecilia Pagnozzi do Nascimento¹, Karsten Müller², Andreas Wanke², Yves Burkhardt³

¹ TEMF - TU Darmstadt, Germany

² Mercedes-Benz AG, Germany

³ EAS - TU Darmstadt, Germany

14:20 ICEM26-000238 | Comparative Study for Demagnetization of an Axial Flux PMSM using 3D and Quasi-3D models

Rutger Gysen¹, Mohamed Ibrahim¹, Peter Sergeant¹

¹ Ghent University, Belgium

14:40 ICEM26-000113 | Slip Coupler Static Finite Element Harmonic Analysis for Wind Turbine Applications

Ryno Gerber¹, Maarten Kamper¹

¹ Stellenbosch University, South Africa

15:00 ICEM26-000650 | Impedance Calculation of Windings at High Frequencies Using 3-D Full-Wave Finite Element Models

Themistoklis D. Kefalas¹, Antero Marjamäki¹, Lari Skyttä¹, Joonas Vesa², Timo Tarhasaari¹, Paavo Rasilo¹

¹ Tampere University, Finland

² Hokkaido University, Japan

15:20 ICEM26-000020 | Copper Conductor Fusion Modelling in Electrical Machines Under Fault Currents

Hadi Naderiallaf¹, Kuldeep Singh¹, Muhammad Khowja¹, Gaurang Vakil¹, Michele Degano¹, Christopher Gerada¹

¹ University of Nottingham, UK

Diagnostics and Condition Monitoring 1

Room Caracas

Chairs: Luca Zarri, *University of Bologna*

Thomas Wolbank, *Vienna University of Technology*

14:00 ICEM26-000394 | A Systematic Detection, Segregation, and Quantification of Spectral Components in a Grid and Inverter-fed Induction Motor Spectra

Mehroz Fatima¹, Toomas Vaimann¹, Bilal Asad¹, Ants Kallaste¹, Muhammad Usman Naseer¹, Sumeet Khalid¹, Waqas Sarwar¹

¹ Tallinn University of Technology, Estonia

14:20 ICEM26-000089 | Stray flux based Identification of Rotor Faults for VFD-fed Induction Motors under Speed and Load Transients

Suhong Jeong¹, Muhammad Faizan Shaikh², Seungmin Shin¹, Jose E. Ruiz-Sarrio³, Jose Antonino Daviu³, Sang Bin Lee¹

¹ Korea University, Republic of Korea

² Samsung Electronics, Republic of Korea

³ Universitat Politècnica de València, Spain

14:40 ICEM26-000200 | The Impact of Loading On the Detectability of Rotor Electrical Faults by Harmonic Isolation

Zihao Song¹, Ioannis Arvanitakis², Jonathan Mayo-Maldonado³, Konstantinos Gyftakis⁴, Zi-Qiang Zhu¹, Panagiotis Panagiotou¹

¹ University of Sheffield, UK

² Coventry University, UK

³ University of Southampton, UK

⁴ Technical University of Crete, Greece

15:00 ICEM26-000550 | Evaluation of Insulation System Degradation Caused by High-Frequency Stress in Hairpin Windings

Sebastian Lengsfeld¹, Katharina Thiemann², Matthias Kalla¹, Marco Jung²

¹ Fraunhofer IEE, Germany

² Bonn-Rhein-Sieg University of Applied Sciences, Germany

15:20 ICEM26-000457 | Bimodal Flux-Vibration Analysis for Reliable Bearing Fault Detection in Induction Motors

Gloria Sarahi Aguayo-Tapia¹, Gerardo Avalos Almazan¹, Jose Rangel-Magdaleno¹, Jose Antonino Daviu², Jose E. Ruiz-Sarrio², Larisa Dunai²

¹ INAOE, Mexico

² Universitat Politècnica de Valencia, Spain

Electrical Machines and Drives for Sustainable Transportation 1

Room Cape Town

Chairs: Narayan Kar, *University of Windsor*

Stefano Nuzzo, *University of Modena and Reggio Emilia*

14:00 ICEM26-000086 | Design and Performance Analysis of a Wound-Field Brushless Exciter for 125 kW Aircraft Integrated Starter Generator

Tuan Nguyen¹, Tae-Kyoung Bang¹, Thi-Ly Vu¹, Jae-beom Kang¹, Hyeong-Jin Kim¹, Ji-Young Lee¹

¹ Korea Electrotechnology Research Institute, Republic of Korea

14:20 ICEM26-000198 | Design of HRE-free Traction Motors Considering a Mixed Fault-Reaction Strategy

Gustavo Garbelini de Menezes¹, Jamie Washington², Steven Jordan³, Simone Ferrari¹, Silvio Vaschetto¹, Gianmario Pellegrino¹

¹ Politecnico di Torino, Italy

² Garrett Motion France S.A.S., France

³ Garrett Motion Czech Republic S.R.O., Czechia

- 14:40 **ICEM26-000553 | Preliminary Design of EESMs using the (x,b) Plane**
Edoardo Lagorio¹, Simone Ferrari¹, Federica Graffeo¹, Silvio Vaschetto¹, Gianmario Pellegrino¹
¹ Politecnico di Torino, Italy
- 15:00 **ICEM26-000406 | Design and Comprehensive Comparison of CFRP-Wrapped IPM Motors for Electric Vehicle Traction**
Ryoma Zuki¹, Kenji Nakamura¹, Hideaki Goto², Takaki Itaya², Akeshi Takahashi²
¹ Tohoku University, Japan
² Astemo, Ltd., Japan
- 15:20 **ICEM26-000247 | Fail Safe Steering System for the Autonomous Electric Off-Road Mobile Machinery**
Mostafa Elhofy¹, Mikko Huova¹, Tatiana Minav¹
¹ Tampere University, Finland

Next-Generation Electrified Transport: Advances in Electric Drive System

Room Rio de Janeiro

Chairs: Metin Aydin, *Kocaeli University*

Torbjörn Thiringer, *Chalmers University of Technology*

- 14:00 **ICEM26-000268 | Range-Selected Multi-Objective Optimization for Outer-Rotor Flat-Wire In-Wheel Machines With AC Loss Correction**
Haolin Li¹, Zhongze Wu¹, Wei Hua¹
¹ Southeast University, China
- 14:20 **ICEM26-000592 | Optimization and Comparison of 3-D Flux PMSMs Based on an Equivalent 2-D Finite Element Method**
Zhaokai Li¹, Juri Tessaro¹, Matteo Felice Iacchetti^{1,2}, Alexander Smith², Juntao Shi³, Shota Hirose⁴
¹ Politecnico di Milano, Italy
² University of Manchester, UK
³ IMRA-Europe S.A.S., UK
⁴ Aisin Co. Ltd., Japan
- 14:40 **ICEM26-000269 | A Deep Learning Based Magnetic Field Surrogate Modeling Method for Interior Permanent Magnet Machine in EVs**
Wentao Zhang¹, Zhongze Wu¹, Wei Hua¹
¹ Southeast University, China
- 15:00 **ICEM26-000369 | Impact of Zero Sequence Currents on Unbalanced Magnetic Force in Dual Three-Phase PMSMs with Modular Star-Delta Windings**
Yuwen Xu¹, Mehdi Baghdadi¹, Shun Cai², Libin Cui³
¹ University College London, UK
² Zhejiang University, China
³ Southwest Jiaotong University, China
- 15:20 **ICEM26-000233 | Performance and Mechanical Integrity of a Printed Circuit Board-Based Brushless Excitation System for Electrically Excited Synchronous Machines**
Andreas Baehr¹, Lukas Elbracht¹, Felix Burkard¹, Nejila Parspour¹
¹ University of Stuttgart, Germany

15:40-16:40 POSTER SESSION I & COFFEE BREAK

Room: Sunset

Chairs: Frederik De Belie, *Ghent University*
Ilya Petrov, *LUT University*
Markus Henke, *Technische Universität Braunschweig*
Panagiotis Panagiotou, *University of Sheffield*
Torbjörn Thiringer, *Chalmers University of Technology*

ICEM26-000131 | Magneto-Mechanical Assessment of Hot Isostatic Pressed Multi-Material Structures with Application to High-Speed Rotors for Synchronous Reluctance Machine

Maksim Sitnikov¹, Julien Taurines², Anouar Belahcen¹

¹ *Aalto University, Finland*

² *Univ. Grenoble Alpes, France*

ICEM26-000156 | Design and Measurement Analysis of an Additively Manufactured Synchronous Reluctance Motor

Marius Behrendt¹, Michael Haase², Bernd Ponick¹

¹ *Leibniz University Hannover, Germany*

² *Paderborn University, Germany*

ICEM26-000353 | Design of a Permanent Magnet Transverse Flux Machine Featuring a Additively Manufactured Claw-type FeSi3 Stator

Tomas Paveza¹, Michal Freisleben¹, Roman Pechanek¹

¹ *University of West Bohemia, Czechia*

ICEM26-000160 | Numerical Investigation of Gas-Liquid Two-Phase Flow and Heat Transfer Characteristics in Fully Immersed Cryogenic Pump Motors

Zhenglin Li¹, Yuanzhi Zhang¹, Yang Nie¹, Fulang Liu¹, Dawei Li¹, Ronghai Qu¹, Yi Cheng², Hao Chen³, Linshan Jin³

¹ *Huazhong University of Science and Technology, China*

² *Aero Engine Control System Institute of AECC, China*

³ *Taihang National Laboratory, China*

ICEM26-000288 | Selection and Analysis of Superconducting Machine Concepts with Stationary Cryogenic Windings for Electric Aircraft Applications

Pratik Bisale¹, Dong Liu¹, Lassi Aarniovuori¹, Juha Pyrhönen¹

¹ *LUT University, Finland*

ICEM26-000033 | A Simple Sine² Half-wave Radial Force Shaping Strategy for NVH Improvement in Switched Reluctance Motors

Barrie Mecrow¹, Jiashuai Li¹, Xu Deng¹

¹ *Newcastle University, UK*

ICEM26-000447 | Mechanical Design and Structural Validation for Oil Spray Cooled High-Speed Motors

Georgios Assi Xylogiannis¹, Georgios Sakkas¹, Antonios Kladas¹

¹ *National Technical University of Athens, Greece*

ICEM26-000612 | Experimental Study of Effective Oil Percentage in the Airgap of an Oil-Jet-Cooled Electrical Machine

Xuebei Zhang¹, Zeyuan Xu¹, Fengyu Zhang¹, Chris Gerada¹, David Gerada¹

¹ *University of Nottingham, UK*

ICEM26-000032 | Dielectric Dissipation Factor Measurement on Rotating Machine Complete Windings – A Use Case Collection

Fabian Öttl¹, Michael Krueger², Tomasz Bednarczyk³

¹ OMICRON technologies GmbH, Italy

² OMICRON electronics GmbH, Austria

³ OMICRON Energy Solutions Polska, Poland

ICEM26-000267 | Parameter and Topology Optimization for Interior Permanent Magnet Synchronous Motor with Mixed Discrete and Continuous Variables Using Deep Reinforcement Learning and CMA-ES

Hiroki Kohari¹, Hidenori Sasaki¹, Daisuke Nakagawa², Masanori Watahiki², Tomoya Ueda²

¹ Hosei University, Japan

² Nidec Corporation, Japan

ICEM26-000287 | Finite-Control-Set Model Predictive Control Strategy for Five-Phase Series-End Winding Drives

Pedro de Lucas Garcia-Garcia¹, Rafael Lara López¹, Juan Carrillo-Rios¹, Raúl Sánchez-González¹, Ignacio González-Prieto¹, Mario Duran¹

¹ University of Malaga, Spain

ICEM26-000487 | Control of an Open-End Winding Six-Phase Induction Motor Drive Using a Floating Capacitor Bridge

Michele Mengoni¹, Gabriele Rizzoli¹, Luca Zarri¹, Angelo Tani¹

¹ University of Bologna, Italy

ICEM26-000545 | Modeling and Analysis of a High-Power-Density Fault-Tolerant Dual-Star Five-Phase Generator

Parfait Sanni¹, Thierry Lubin¹, Smail Mezani¹, Ehsan Jamshidpour¹

¹ Université de Lorraine, France

ICEM26-000464 | Analytical Design Framework for Synchronous Reluctance Motors for Urban Air Mobility

Francesco Tripaldi¹, Nicola Bianchi¹

¹ University of Padova, Italy

ICEM26-000575 | Air-Cooled In-Wheel Motors with a Novel Rotary-Fin Structure for Motorcycles

Tetsuya Suto¹, Akeshi Takahashi¹

¹ Astemo, Ltd., Japan

ICEM26-000419 | Transfer Learning – Based Diagnosis of Rotor Cage Bars and Stator Windings Using Unipolar Flux Signal

Mateusz Krzysztofia¹, Jakub Zielonka², Maciej Skowron¹, Maciej Sulowicz²

¹ Wrocław University of Science and Technology, Poland

² Cracow University of Technology, Poland

ICEM26-000102 | Reinforcement Learning-based Operating Point Selection for Torque Control of Permanent Magnet Synchronous Motors

Maximilian Schenke¹

¹ Paderborn University, Germany

ICEM26-000589 | Experimental Investigation of Oil Spray Cooling for Electric Machine End Windings

Payam Shams Ghahfarokhi¹, Antonio J. Marques Cardoso², Paavo Rasilo¹

¹ Tampere University, Finland

² CISE | University of Beira Interior, Portugal

ICEM26-000446 | A New Hybrid Permanent Magnet Spoke-type Rotor with Arc-Shaped Ferrite Magnets

Akbar Mohammadi Ajamloo¹, Frederik Desmet², Joachim Druant³, Steven Vanhee², Mohamed Ibrahim¹, Peter Sergeant¹

¹ Ghent University, Belgium

² Allison Off-Highway Drive and Motion Systems, Belgium

³ DRV Solutions, Belgium

ICEM26-000519 | Comparative Study on Data-Driven Surrogate Models for Permanent Magnet Motors

Xiubo Jiang¹, Qiushi Xu¹, Hengliang Zhang¹, Wei Hua¹

¹ Southeast University, China

ICEM26-000309 | Analysis and Design of a Spoke-Type Axial-Flux Permanent-Magnet Machine with Ferrite Magnets for Direct-Drive Applications

Rujian Guo¹, Wilfried Hofmann¹

¹ Dresden University of Technology, Germany

ICEM26-000317 | Experimental Investigation and Loss Analysis of a Permanent Magnet Synchronous Motor with Distributed Tooth-Coil Winding

Daniel Dieterich¹, Katrin Schake¹, Marco Garbe¹, Sven Urschel¹

¹ Kaiserslautern University of Applied Sciences, Germany

ICEM26-000344 | Benefits of Adopting Bridge-less Rotor with Carbon Fiber Reinforcement in High-Speed IPM Motors

Lino Di Leonardo¹, Ludovico Ortombina¹, Fabio Tinazzi¹, Nicola Bianchi¹, Andrea Credo², Federico Centi², Francesco Parasiliti², Giuseppe Fabri², Marco Villani²

¹ University of Padova, Italy

² University of L'Aquila, Italy

ICEM26-000468 | Design of a Synchronous Condenser for Maintenance of Bus Voltage Stability

Michael Murray-Smith¹, Karen Garner¹

¹ Stellenbosch University, South Africa

ICEM26-000507 | Experimental High-Speed Characterisation and Performance Evaluation of a Synchronous Reluctance Machine with Mechanical Limit Analysis

Nijan Yogal¹, Andreas Zörnig¹

¹ VEM Motors GmbH, Germany

ICEM26-000622 | Thermal Feasibility of a High Speed Solid Rotor Induction Machine Using LPTN and CFD Method

Tokzhan Toleukaiyr¹, Felipe Ortiz-Bustos¹, Aki Grönman¹, Pia Lindh¹, Teemu Turunen-Saaresti¹, Janne Nerg¹

¹ LUT University, Finland

ICEM26-000670 | Optimization of a Slitted-Rotor Core Synchronous Reluctance Motor with an Auxiliary Stator Capacitive Winding

Samuel Adjei-Frimpong, Mbika Muteba

¹ University of Johannesburg, South Africa

ICEM26-000079 | Impact of Axial Magnetic Flux Density on the Acoustic Behavior of Rotor Skewed PMSMs

Sijie Ni¹, Karine Degrendele¹, Lucas Podvin¹

¹ Dassault Systèmes, France

ICEM26-000134 | Design, Optimization and Experimental Investigation of Small-Scale Multiphase Axial-Flux Machines with Asymmetric Magnetic Circuit

Felix Pöschl¹, Tobias Schillinger¹, Ralf Tautenhahn², Tobias Zaiczek¹, Thomas Schuhmann¹

¹ HTWD – Univ. Appl. Sciences Faculty Electrical Engineering, Germany

² Thomas Magnete GmbH, Germany

ICEM26-000272 | Parameter Estimation of Electric Machines Using The Equivalent Circuit Method: A Review

Polina Legzdina¹, Roman Pechanek¹

¹ University of West Bohemia, Czechia

ICEM26-000359 | A Hybrid Approach for Efficiency Map Generation of a Small Induction Motor

Martin Světlík¹, Jakub Rosendorf¹, Lassi Aarniovuori², Martin Mach¹, Gerd Bramerdorfer³, Jan Barta¹

¹ Brno University of Technology, Czechia

² LUT University, Finland

³ Johannes Kepler University, Austria

ICEM26-000383 | Rotor design challenges for the dual-stator axial flux electrical machine topology

Gyorgy Kulcsar¹, Robert Kulcsar¹, Ioan-Claudiu Cotovanu¹, Matei Salomie¹, Abderrahmane Rebhaoui², Bogdan Butnariu³, Ioan Deac², Valerian Vigier², Maximilian Ruf⁴

¹ 4MULTIPHYSICS SRL, Romania

² Nidec PSA E-motors SAS, France

³ Technical University of Cluj-Napoca, Romania

⁴ MIMplus Technologies GmbH & Co, Germany

ICEM26-000409 | An Accurate Hybrid Analytical Model for Strand-Level Winding Loss Prediction in Surface-Mounted PM Machines Considering Magnetic Saturation

Wenting Wang¹, Tianjie Zou¹, Hao Yin², Dmitry Golovanov¹, Lijian Wu³, David Gerada¹, Michele Degano¹, Chris Gerada¹

¹ University of Nottingham, UK

² Zhejiang Electric Power Design Institute Co., Ltd., China

³ Zhejiang University, China

ICEM26-000528 | Optimization Design of Interior Permanent Magnet Motors Considering Inductance Variations

Lijia Yang¹, Chunbing Wang², Ze Jiang², Xiaoyan Huang¹, Jianxin Shen¹, Huan Yang¹

¹ Zhejiang University, China

² Wolong Electric Group Co., Ltd., China

ICEM26-000551 | A Multi-Objective Bayesian Optimization for Machine Design with Constraints on Designs

Lukáš Adam¹, Jan Laksar¹, Polina Legzdina¹, Haitao Zhu¹, Vaclav Šmíd¹, Zdeněk Peroutka¹

¹ University of West Bohemia, Czechia

ICEM26-000598 | Energy Consumption Estimation of Pump System with VFD for Reverse Osmosis Desalination

Levon Gevorgov¹, José Luis Domínguez-García¹, Lluís Trilla¹

¹ Institute for Energy Research (IREC), Spain

ICEM26-000637 | Saturation effects in Axial Flux Electrically Excited Synchronous Machines

Christian Du-Bar¹, Sonja Karin Tidblad Lundmark², Per Forsberg³

¹ OptiDrive AB, Sweden

² Chalmers University of Technology, Sweden

³ AB Forsberg Mechanics, Sweden

ICEM26-000683 | A Novel Oil-Flooded Stator Cooling Topology Without Air-Gap Oil-separating sleeve

Jinyan Lin¹, Haiyang Fang¹, Hantao Shen¹, Fulang Liu¹, Dawei Li¹, Ronghai Qu¹

¹ Huazhong University of Science and Technology, China

ICEM26-000225 | Design Modification of Hydraulic-Magnetic Actuator for Enhanced Torque Generation

Trung Duong¹, Fabian Frech¹, Arda Tueysuez¹, Matthias Biskoping¹

¹ ABB Corporate Research Center, Germany

ICEM26-000278 | Experimental Verification of Orthogonal-Core-Type Variable Inductor with Soft Magnetic Composites and Feasibility Study for Reactive Power Compensator

Hayato Hatakeyama¹, Kenji Nakamura¹, Kenji Arimatsu²

¹ Tohoku University, Japan

² Tohoku Electric Power Co., Inc., Japan

ICEM26-000279 | Optimization of Slot Geometry and Amplitude Index in a Multi-Turn Toroidal Resolver Using the Magnetic Equivalent Circuit Method

Fateme Zare¹, Salman Abdi Jalebi²

¹ Isfahan University of Technology, Iran

² University of East Anglia (UEA), UK

ICEM26-000122 | Coil Immersion Oil Cooling Technology for Improving Continuous Output

Takaki Itaya¹, Akihito Toya¹, Hideaki Goto¹, Akeshi Takahashi¹

¹ Astemo, Ltd., Japan

ICEM26-000621 | Circuit Modeling of Nanocrystalline Transformers under Square-Wave Excitation

Vittorio Bertolini¹, Michele Quercio², Lorenzo Sabino², Marco Stella¹, Antonio Faba¹, Francesco Riganti Fulginei², Fabio Crescimbeni², Ermanno Cardelli¹

¹ Università degli Studi di Perugia, Italy

² Università degli Studi Roma Tre, Italy

ICEM26-000663 | Closed-Loop Thermal Boosting Control for Accelerated Calorimetric Loss Measurements of Electric Machines

Jasper Nonneman¹, Ilya T'Jollyn², Jeroen De Kooning¹, Michel De Paepe¹

¹ Ghent University, Belgium

² University of Antwerp, Belgium

ICEM26-000044 | Electromechanical torque ripple minimization for SynRel machines based on adaptive cancellation scheme

Maxime Grosso¹, Samar Alhaj Hassan¹, Romain Delpoux¹, Vincent Lechappe¹, Xavier Brun¹

¹ INSA Lyon, France

ICEM26-000098 | Control and Optimization of a Wound Rotor Synchronous Machine-Based Integrated Charger for Electric Vehicles

Malik Qamar Abbas¹, Gabriele Rizzoli¹, Michele Mengoni¹, Luca Vancini¹, Luca Zarri¹, Angelo Tani¹

¹ University of Bologna, Italy

ICEM26-000168 | Development and Optimization of stator notches as NVH mitigation technique for an axial flux machine in YASA design

Karsten Müller¹, Fabian Schulz¹, Martin Bremer², Martin Doppelbauer², Herbert De Gersem³, Yves Burkhardt³

¹ Mercedes-Benz AG, Germany

² Karlsruhe Institute of Technology, Germany

³ Technical University of Darmstadt, Germany

ICEM26-000289 | Control Strategies to Reduce Torque Pulsation in Electrically Excited Synchronous Machines

Leander Eschenmann¹, Jonas Jansen¹, Christian Nörenberg², Bernd Ponick¹

¹ Leibniz Universität Hannover, Germany

² Audi AG, Germany

ICEM26-000380 | Hyperparameter Optimization for Differentiable Predictive Torque Control of Permanent Magnet Synchronous Motors

Ali Hassan Ali Abdelwanis¹, Oliver Wallscheid¹

¹ University of Siegen, Germany

ICEM26-000659 | Real-Time DC-Link Fault Detection in Induction Motor Drives

Rafaela Bento, João Serra, Fernando Bento, Antonio J. Marques Cardoso

¹ CISE | University of Beira Interior, Portugal

ICEM26-000675 | Comparative Analysis of a Bearingless Permanent Magnet Synchronous Machine Fed by ANPC Three-Level and Two-Level Inverter

Maximilian Weigelt¹, Fabian Lorenz¹, Thomas Schuhmann¹

¹ Chemnitz University of Technology, Germany

ICEM26-000129 | Detection of Shaft Misalignment in Synchronous Reluctance Machines by Utilizing its Signatures in Current and Vibration Spectra

Konstantinos Ptochos¹, Konstantinos Koutrakos¹, Epameinondas Mitronikas¹

¹ University of Patras, Greece

ICEM26-000285 | Zero-shot Unsupervised Anomaly Detection in Induction Motor Bearings Using Stator Current and Time-Series Foundation Models

Luigi Gianpio Di Maggio¹, Jose E. Ruiz-Sarrio², Jose Antonino Daviu²

¹ Politecnico di Torino, Italy

² Universitat Politècnica de València, Spain

ICEM26-000315 | Air Gap and Stray Flux-Based Monitoring for Early Diagnosis of Rotor Winding Faults in Hydroelectric Generators

Simon Bernier¹, Arezki Merkhoul¹, Kamal Al-Haddad², Olivier Kokoko¹

¹ Hydro-Québec, Canada

² École de Technologie Supérieure Montréal, Canada

ICEM26-000424 | A Novel ITSC Fault Detection and Severity Evaluation Method for Doubly Fed Induction Generators Based on Recursive Estimation of Electrical Parameters

Ben-Hur Montel¹, Mateus Giesbrecht¹

¹ University of Campinas (UNICAMP), Brazil

ICEM26-000679 | Robust Rotor Fault Diagnosis in Induction Motors Using Stray-Flux Spectral Power Integration and Median-Based Statistics

Leonardo Burgos¹, Carlos Madariaga¹, Jose E. Ruiz-Sarrio², César Gallardo³, Juan Tapia¹, Jose Antonino Daviu²

¹ University of Concepcion, Chile

² Universitat Politècnica de Valencia, Spain

³ University of Nottingham, UK

ICEM26-000564 | Comparative Evaluation of PM-Assisted Reluctance and Spoke-Type Rotors for Axial-Flux Motor

Nan Guo¹, Xiaozhe Pei¹, Xianwu Zeng¹

¹ University of Bath, UK

ICEM26-000576 | Benchmarking REE-and-Magnet-Free Traction Electric Machines Against PMSM for EV Applications

Meng-Ju Hsieh¹, Emma Arfa Grunditz¹, Torbjörn Thiringer¹, Joachim Lindström², Rishabh Raj², Marcelo Silva³

¹ Chalmers University of Technology, Sweden

² Volvo Cars, Sweden

³ Uppsala University, Sweden

ICEM26-000671 | Accelerated Multi-Physics Design Optimization Framework for EV Traction Motors Based on Ensemble Surrogate Modeling with Active Learning

Robin Wilson¹, Praveen Kumar¹, Ayman EL-Refaie¹

¹ Marquette University, USA

ICEM26-000655 | First approaches to retrofitting small wind turbine AFPM generators for active rectification

Marek Tarasiewicz¹, Adrien Prevost¹, Benoit Delinchant¹, Kostas Latoufis²

¹ Univ. Grenoble Alpes, France

² National and Technical University of Athens, Greece

16:40-18:20 ORAL SESSIONS

Electrical Drives 2

Room Funchal

Chairs: Luca Zarri, *University of Bologna*
Marko Hinkkanen, *Aalto University*

16:40 ICEM26-000228 | Active Compensation of Radial Mode 2p Vibration using Harmonic Current Injection within a Permanent Magnet Synchronous Machine

Meike Jopert¹, Jonas Jansen¹, Sebastian Klappert¹, Axel Mertens¹

¹ Leibniz University Hanover, Germany

17:00 ICEM26-000136 | Rotor Position Estimation for a Wound Rotor Synchronous Machine Using Gradient Observers With and Without Flux Estimation

Ahmad Akrad¹, Rabia Sehab¹, Chenyun Wu¹, Javier Ojeda²

¹ ESTACA-Lab, France

² ENS Paris-Saclay, CNRS, SATIE University Paris-Saclay, France

17:20 ICEM26-000275 | Comparison of Zero-Sequence Current Mitigation Strategies in Dual-Inverter Open-End Winding PMSM Drives with Common DC-Link

Emanuele Fedele¹, Luca Di Cristo¹, Bernard Steyaert², Matthias Preindl², Santolo Meo¹, Renato Rizzo¹

¹ University of Naples Federico II, Italy

² Columbia University, USA

17:40 ICEM26-000039 | Vibration Suppression Method for Three-Mass Electric Drive System Based on Identified System Response

Xiaofeng Xu¹, Panagiotis Kakosimos², Luca Peretti¹

¹ KTH Royal Institute of Technology, Sweden

² ABB AB Corporate Research Center, Sweden

18:00 ICEM26-000330 | Control Framework for Active Harmonic Damping Considering Converter - PM Machine Coupling

Antonios Sideris¹, Athanasios Sarigiannidis¹, Antonios Kladas¹

¹ National Technical University of Athens, Greece

Rotating Machines 1

Room Berlim

Chairs: Davide Barater, *University of Modena and Reggio Emilia*
Gilsu Choi, *Inha University*

16:40 ICEM26-000418 | Design and Analysis of a Ribless Synchronous Reluctance Machine with Dovetail Mortise-Tenon Joints

Junhao Li¹, Chen Zhang¹, Mingyang Bao², Jifeng Cao³, Yawei Wang¹, Ronghai Qu¹, Nicola Bianchi⁴

¹ Huazhong University of Science and Technology, China

² University of Nottingham, UK

³ Suzhou Zhipu Intelligent Motor Co. Ltd., China

⁴ Università di Padova, Italy

17:00 ICEM26-000053 | Stator MMF Harmonic Selective Elimination for Pole-Frequency Vibration Suppression in Fractional-Slot PMSMs

Miao Wang¹, Haiyang Fang¹, Hao Hu¹, Dawei Li¹, Ronghai Qu¹

¹ Huazhong University of Science and Technology, China

17:20 ICEM26-000172 | The development of the 100kW fully superconducting axial flux motor: HTS rotor design, charging, and testing

Roshan Parajuli¹, Alexander Shchukin¹, Ercan Ertekin¹, Hengpei Liao¹, Weijia Yuan², Min Zhang¹

¹ University of Strathclyde, UK

² Siemens Healthineers Magnet Technology, UK

17:40 ICEM26-000427 | Analytical Calculation of Winding Eddy Current Losses using a Magnetic Equivalent Circuit

Antonio Fiorito¹, Oğuz Korman¹, Mukhammed Murataliyev¹, Mauro Di Nardo², Michele Degano¹, Tianjie Zou¹, Christopher Gerada¹

¹ University of Nottingham, UK

² Politecnico di Bari, Italy

18:00 ICEM26-000532 | Performance Evaluation of a PM Assisted-Synchronous Reluctance Machine with a Gouged-Rotor Core Design for Electric Vehicles

Mbika Muteba¹

¹ University of Johannesburg, South Africa

Design Issues (Optimization, Modeling and Simulation) 2

Room Sydney

Chairs: Ayman EL-Refaie, *Marquette University*
Sebastião Lauro Nau, *WEG*

- 16:40 ICEM26-000341 | Stator Tooth Arc Oriented Optimization for Low-Pole Ratio Permanent Magnet Vernier Motors Based on a Generalized Analytical Model**
Yiyang Xu¹, Hao Chen¹, Xin Gu², Tingna Shi¹
¹ Zhejiang University, China
² Zhejiang University Advanced Electrical Equipment Innovation Center, China
- 17:00 ICEM26-000358 | 2D Equivalent Network Modeling of Axial Flux Permanent Magnet Devices**
Claudia Simonelli¹, Nicolò Gori¹, Luca Sani¹, Rocco Rizzo¹, Hao Chen²
¹ University of Pisa, Italy
² China University of Mining and Technology, China
- 17:20 ICEM26-000619 | Multi-objective Optimization of Modular Permanent Magnet Synchronous Machines Considering Module-specific Geometric Parameters**
Joaquín Andrés Valenzuela Herrera¹, Julio Jara¹, Werner Jara¹, Alvaro Hoffer², Javier Riedemann³
¹ Pontificia Universidad Católica de Valparaíso, Chile
² Universidad San Sebastián, Chile
³ Enoda Ltd, UK
- 17:40 ICEM26-000163 | System-Level Geometric and Control Co-optimization with Stator Pole Tapering for High-Precision Switched Reluctance Motor Drives**
Aristotelis Tzouvaras¹, Nikolaos Fesakis¹, Athanasios Karlis¹
¹ Democritus University of Thrace, Greece
- 18:00 ICEM26-000668 | Multi-Objective Design Optimization of Rotor Slot Geometry in Dual-Cage Induction Motors Considering Hybrid Bar Materials for Electric Vehicles**
Felipe Santacruz¹, Carlos Madariaga¹, Konstantin Vostrov², César Gallardo³, Juan Tapia¹
¹ University of Concepcion, Chile
² LUT University, Finland
³ University of Nottingham, UK

Diagnostics and Condition Monitoring 2

Room Caracas

Chairs: Nuno Freire, *Siemens Gamesa Renewable Energy*
Raphael Romary, *Artois University*

- 16:40 ICEM26-000453 | A Review on Electrical Submersible Pump Failures and Diagnosis Methods in Deep Water Wells**
Víctor Ballestín-Bernad¹, Jorge Bonet Jara¹, Joan Pons-Llinares¹
¹ Universitat Politècnica de València, Spain
- 17:00 ICEM26-000530 | Inter-Turn Short Circuit Fault Diagnosis in a C-GEN Axial-Flux PMSG Using a Single Circumferential Search Coil**
Alexandros Sergakis¹, Nikolaos Gkiolekas¹, Markus Mueller², Konstantinos Gyftakis¹
¹ Technical University of Crete, Greece
² University of Edinburgh, UK
- 17:20 ICEM26-000428 | High-Frequency Impedance Parametric Modeling and Partial Discharge Validation for RUL Estimation of Thermally Aged Stator Insulation**
Muhammad Usman Sardar¹, Toomas Vaimann¹, Lauri Kütt¹, Bilal Asad¹, Ants Kallaste¹, Hujun Peng², Simon Steentjes²

¹ Tallinn University of Technology, Estonia

² RWTH Aachen University, Germany

17:40 ICEM26-000674 | Lifetime modeling of round and flat enameled wires used in low-voltage motors under multiple stress factors

Kim Long Tran¹, David Malec¹, Pascal Maussion¹

¹ LAPLACE, University of Toulouse, France

18:00 ICEM26-000488 | Unbalance and Misalignment Fault Diagnosis in Induction Motors Under Oscillating Load Using Vibration Orbit-Orientation Variance

Jose Pablo Pacheco Guerrero¹, Israel Zamudio¹, Larisa Dunai², Jose Antonino Daviu²

¹ Universidad Autónoma de Querétaro, Mexico

² Universitat Politècnica de Valencia, Spain

Electrical Machines and Drives for Renewable Energy Generation 1

Room Cape Town

Chairs: Christoph Hackl, *Hochschule Muenchen University of Applied Sciences*
Giacomo Scelba, *University of Catania*

16:40 ICEM26-000284 | Designing for Trapezoidal Electromotive Force in Multi-Megawatt Scale Direct-Drive Wind Turbine Generators

Fergus Hall¹, Alasdair McDonald¹

¹ University of Edinburgh, UK

17:00 ICEM26-000147 | Performance Assessment of a 5-MW Dual-Speed Direct Grid-Connected Wind Generator

Ryno Gerber¹, Maarten Kamper¹

¹ Stellenbosch University, South Africa

17:20 ICEM26-000104 | Development of a High-Speed Permanent-Magnet Electrical Machine for Fuel Cell Air Compressor Application

Yingjian Xing¹, Lin Tao¹, Mengying Shu¹, Chaojie Liu¹, Xizhen Huang¹, Jiecheng Chi¹

¹ Xeca Turbo, China

17:40 ICEM26-000387 | A Comparative Analysis of Permanent Magnet Synchronous Generator Topologies for Small-Scale Wind Turbines

Reynaldo Iracheta Cortez¹, Joyce López Gómez¹, Ana Karen López González¹

¹ Universidad del Istmo, Mexico

18:00 ICEM26-000651 | Design Optimization and Comparison of NdFeB and Ferrite Magnets in a PCB Stator AFPM Generator

Haris Abrar¹, Rong-Jie Wang¹, Maarten Kamper¹

¹ Stellenbosch University, South Africa

Towards Sustainable Electrical Machines: From Materials and Design to Circularity and Life-Cycle Impact

Room Rio de Janeiro

Chairs: David Boillat, *ABB Switzerland Ltd.*
Hendrik Vansompel, *Ghent University*

16:40 ICEM26-000150 | Evaluation of Expandable Slot Liners for Reversible, Adhesive-Free Magnet Fixation in Electric Motors

Roman Hahn¹, Simon Stauber¹, Tobias Zürrlein¹, Anja Preitschaft¹, Thorsten Ihne¹, Jörg Franke¹, Florian Risch¹

¹ FAPS - Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

17:00 ICEM26-000461 | A Voxel Based MEC Method to Simulate the Recyclable Soft Magnetic Materials of the Future

Adrian Schäfer¹, Parisa Rezapour¹, Mojgan Zare², Mathias Liewald², Nejila Parspour¹

¹ Institute of Electrical Energy Conversion - University of Stuttgart, Germany

² Institute for Metal Forming Technology - University of Stuttgart, Germany

17:20 ICEM26-000110 | Beyond Wet Processes: Sustainable Insulation Materials and End-of-Life Strategies for Electrical Machines

Umair Paracha¹, Richard McMahon¹, Sul Ademi¹

¹ WMG - University of Warwick, UK

17:40 ICEM26-000112 | Recovery potential of Rare Earth Elements from Permanent Magnet Synchronous Motors

Andrija Jeknić¹, Roman Manko¹, Selma Čorović¹, Alen Alić¹, Danijel Rodić², Urban Rupnik¹, Mario Vukotić¹, Damijan Miljavec¹

¹ University of Ljubljana, Slovenia

² Domel d.o.o., Slovenia

18:00 ICEM26-000632 | Traction to Turbine: A Circular Economy Approach to Decentralized Wind Energy in Sub-Saharan Africa

Oreoluwa Olubamiwa¹, Stefan Botha², Nkosinathi Gule², Udochukwu Akuru¹

¹ Tshwane University, South Africa

² Stellenbosch University, South Africa

18:30-19:30 IES Electrical Machines Technical Committee Meeting

Room Funchal

Tuesday, 8 September 2026

08:00-18:00 REGISTRATION

Ground Floor - Pestana Casino Park Hotel

08:30-10:10 ORAL SESSIONS

Rotating Machines 2

Room Funchal

Chairs: Gianmario Pellegrino, *Politecnico di Torino*
Rukmi Dutta, *UNSW Sydney*

08:30 ICEM26-000379 | Inaccuracy in Pulse-Width-Modulated Power Measurement and its Effect on Motor Loss Determination

Matias Tiihonen¹, Hannu Kärkkäinen¹, Lassi Aarniovuori¹, Markku Niemelä¹, Radu Bojoi², Aldo Boglietti²

¹ LUT University, Finland

² Politecnico di Torino, Italy

08:50 ICEM26-000199 | Development of Highly Reliable Rotor Structure of Electric Motor for Electrified Aircraft

Zhi Wang¹, Ryo Ueta¹, Ryoichi Takahata¹, Junnosuke Nakatsugawa¹, Naoyuki Oohata¹, Sota Kimura¹

¹ Hitachi, Ltd, Japan

09:10 ICEM26-000407 | Implications of the GENTPJ-Modified Saturation Function for Power System Dynamics

Quincy Wang¹, Song Wang²

¹ EPE Consulting Ltd., Canada

² Portland General Electric, USA

09:30 ICEM26-000047 | A Fast Design Method of Maximizing Torque Weight Density for Axial Flux Segmented Wound Field Flux Switching Motor

Yudai Koishi¹, Hiroki Goto¹

¹ Utsunomiya University, Japan

09:50 ICEM26-000429 | Performance Comparison of Rare-Earth-Free Machine Topologies and Permanent Magnet Synchronous Machine

Eric Danese¹, David Melly¹, Stephan Kenzelmann¹, Samuel Chevailler¹

¹ HES-SO Valais-Wallis, Switzerland

Additive Manufacturing of Electrical Machines

Room Berlim

Chairs: Ants Kallaste, *Tallinn University of Technology*
Roman Pechanek, *University of West Bohemia*

08:30 ICEM26-000075 | Electrical Conductivity of AA1350 Produced by Additive Manufacturing for Electrical Machine Applications

Alexander Goodall¹, Felicity Freeman¹, Nick Simpson², Anna Ermakova², George Maddison¹

¹ University of Sheffield, UK

² University of Bristol, UK

08:50 ICEM26-000494 | Alternative Solid-Transposed Conductor Geometries enabled by Additive Manufacturing

Nick Simpson¹, Dominic North¹, Philip Mellor¹, Richard Pollock²

¹ University of Bristol, UK

² Technelec Ltd., UK

09:10 ICEM26-000493 | Contoured Air-gap Topology: A Promising Strategy for Enhancing Axial Flux Machine Performance

Muhammad Usman Naseer¹, Ants Kallaste¹, Bilal Asad¹, Shahid Hussain¹, Martin Sarap¹, Toomas Vaimann¹

¹ Tallinn University of Technology, Estonia

09:30 ICEM26-000508 | Additive manufacturing of NdFeB bonded magnets via desktop-scale Fused Granulate Fabrication

Waqas Ahmed Sarwar¹, Hans Tiismus¹, Ants Kallaste¹, Joosep Link², Toomas Vaimann¹, Mehroz Fatima¹, Sumeet Khalid¹, Raivo Stern²

¹ Tallinn University of Technology, Estonia

² National Institute of Chemical Physics and Biophysics, Estonia

09:50 ICEM26-000686 | Axially Laminated Synchronous Reluctance Motor With Nonuniform Layer Thickness

Valerii Abramenko¹, Ilya Petrov¹, Tuomas Jokiahho², Jenni Pippuri-Mäkeläinen², Juha Pyrhönen¹

¹ LUT University, Finland

² VTT Technical Research Centre of Finland Ltd, Finland

Design Issues (Optimization, Modeling and Simulation) 3

Room Sydney

Chairs: Antonino Di Gerlando, *Politecnico di Milano*

Silvio Vaschetto, *Politecnico di Torino*

08:30 ICEM26-000484 | Parametric data-driven system-level model of 3-phase PMSMs used for performance analysis

Sebastian Ciceo¹, Salomé Ferru², Andrey Hesse¹, Maria Raluca Raia³

¹ Siemens Digital Industry Software, Belgium

² Centrale Méditerranée, France

³ Siemens Digital Industry Software, Romania

08:50 ICEM26-000513 | Per-Phase Equivalent Circuit Model for Steady-State Performance Simulation of Line-Start Synchronous Reluctance Motors

Fernando J. T. E. Ferreira¹

¹ ISR - University of Coimbra, Portugal

09:10 ICEM26-000342 | Dynamic Analysis of Magnetic Gear – SR Motor Drive System based on Reluctance Network Analysis and Its Experimental Validation

Sogo Nohara¹, Keigo Iwaki¹, Kenji Nakamura¹

¹ *Tohoku University, Japan*

09:30 ICEM26-000586 | Mechanical and Electromagnetic Tradeoffs in High-Speed Synchronous Reluctance Motors

Andrea Credo¹, Federico Centi¹, Giuseppe Fabri¹, Marco Villani¹, Francesco Parasiliti¹, Lino Di Leonardo², Nicola Bianchi²

¹ *University of L'Aquila, Italy*

² *University of Padova, Italy*

09:50 ICEM26-000662 | EMC-Based Geometric Scaling Method for Axial Flux Permanent Magnet Motors

Min Woo Jang¹, Chan-Woo Kim¹, Seong-Won Jeong¹, Min-Ro Park², Soo-Hwan Park¹

¹ *Dongguk University, Republic of Korea*

² *Soonchunhyang University, Republic of Korea*

Electrical Drives 3

Room Caracas

Chairs: Marko Hinkkanen, *Aalto University*
Nuno Freire, *Siemens Gamesa Renewable Energy*

08:30 ICEM26-000613 | High-Performance Sensorless Control for High-Speed PMSM with Current Source Inverters

Nail Tosun¹, Devinda Molligoda¹, Xu Deng¹, Barrie Mecrow¹

¹ *Newcastle University, UK*

08:50 ICEM26-000542 | Experimental Validation of a Generalized Overlap-Time Compensation Method for CSI-Fed Induction Motor Drives

Salvatore Morello Baganella¹, Luigi Danilo Tornello¹, Giacomo Scelba¹, Antonio Testa¹

¹ *University of Catania, Italy*

09:10 ICEM26-000540 | Assessment of a Sine-Wave Filter for a GaN-based ANPC Motor Drive

Angelo Di Cataldo¹, Luigi Danilo Tornello¹, Giacomo Scelba¹, Shafiq Odhano², Mario Cacciato¹, Andrea Cavagnino³

¹ *University of Catania, Italy*

² *Newcastle University, UK*

³ *Politecnico di Torino, Italy*

09:30 ICEM26-000676 | Model Predictive Pulse Pattern Control for Multilevel Cascaded H-Bridge Medium Voltage Drives

Ioannis Tsoumas¹, David Boillat¹, Krzysztof Kóska²

¹ *ABB Switzerland Ltd., Switzerland*

² *ABB Corporate Technology Center, Poland*

09:50 ICEM26-000158 | Dual Control Design for Velocity Tracking Implemented on Dual-Drive Systems Under Friction Variations

Shafaq Gul¹, Ruben De Croo¹, Frederik De Belie¹

¹ *Ghent University, Belgium*

Diagnostics and Condition Monitoring 3

Room Cape Town

Chairs: Konstantinos Gyftakis, *Technical University of Crete*
Sang Bin Lee, *Korea University*

08:30 ICEM26-000019 | PDIV and PDEV of PEEK-Insulated Hairpin Wires under AC and PWM Excitations for Automotive and Aerospace Applications

Hadi Naderiallaf¹, Michele Degano¹, David Gerada¹, Tao Yang¹, Christopher Gerada¹

¹ *University of Nottingham, UK*

08:50 ICEM26-000013 | Early Detection of Intermittent Stator Ground Faults in High Impedance Grounded Generators

Nader Safari-Shad¹, Adama Sawadogo¹, James Jensen¹, Mason Kobliska¹

¹ *University of Wisconsin-Platteville, USA*

09:10 ICEM26-000187 | Fault-Tolerant Operation of PMSM-Based Elevator Systems Using Intelligent Condition Monitoring

Vasileios Vlachou¹, Theoklitos Karakatsanis², Antonios Kladas¹

¹ *National Technical University of Athens, Greece*

² *Democritus University of Thrace, Greece*

09:30 ICEM26-000370 | Torque-Based Analysis of Demagnetization Faults in Permanent Magnet Synchronous Machines: Analytical and Finite Element Approaches

Ahmed Belkhadir¹, Remus Pusca¹, Raphael Romary¹, Driss Belkhatat², Youssef Zidani²

¹ *Artois University, France*

² *Cadi Ayyad University, Morocco*

09:50 ICEM26-000346 | Detection of Rotor Faults in Synchronous Machines: Review of Online Methods, Applications and Trends

Hossein Ehya¹, Arne Nysveen¹, Bilal Akin², Jose Antonino Daviu³

¹ *Norwegian University of Science and Technology, Norway*

² *University of Texas at Dallas, USA*

³ *Universitat Politècnica de Valencia, Spain*

Multi-Physics Data-Driven Design for Advanced Propulsion Machine Drives

Room Rio de Janeiro

Chairs: Jan Barta, *Brno University of Technology*
Shafigh Nategh, *Li Auto*

08:30 ICEM26-000332 | Electromagnetic-Thermal Analysis of Dual-Stator Permanent magnet Motors for Humanoid Robot Joint Applications Based on the Lumped Parameter Thermal Network Method

Aohua Wang¹, Tianran He¹, Hanqin Hu¹, Wei Li¹

¹ *Tongji University, China*

08:50 ICEM26-000194 | Thermal Rise Calculation of Variable-section Centralized Flat-wire Winding PMSM based on Lumped Parameter Thermal Network

Jing Ou¹, Yanyun Liu¹, Haida Xue¹, Chenyi Yang¹, Yingzhen Liu¹, Dawei Liang¹, Dianguo Xu¹

¹ *Harbin Institute of Technology, China*

09:10 ICEM26-000092 | Multi-Objective Optimization and Comparison of High-Torque Direct-Drives and High-Speed Geared Drives for High-Performance Electric Vehicles

Maximilian Clauer¹, Jens Hoffmann¹, David Bauer¹, Nejila Parspour²

¹ Porsche AG, Germany

² University of Stuttgart, Germany

09:30 ICEM26-000236 | Temperature Prediction of Hairpin Winding Conductor Layers Using a Computationally Efficient Hybrid Multiphysics Model

Ali Zarghani¹, Peter Sergeant¹, Ivo Couckuyt¹, Mohamed Ibrahim¹

¹ Ghent University, Belgium

09:50 ICEM26-000556 | Data-Driven Multi-physics and Multi-Objective Optimization for High-Speed Aviation Electric Machines: A Review

Xingqi Lyu¹, Ruichi Wang², Harold Ruiz¹, Meng Xia³, Bing Ji¹, Yang Xiao¹

¹ University of Leicester, UK

² Loughborough University, UK

³ Hangzhou City University, China

10:10-11:10 POSTER SESSION II & COFFEE BREAK

Room: Sunset

Chairs: Adrian Martin, *University Politehnica Timisoara*
Dieter Gerling, *Bundeswehr University Munich*
Gerd Bramerdorfer, *Johannes Kepler University Linz*
Giacomo Sala, *University of Bologna*
Sonja Lundmark, *Chalmers University of Technology*

ICEM26-000533 | Torque Optimization of Interior Permanent Magnet Synchronous Motors Based on Active Learning and XGBoost Surrogate Model

Bowei Chen¹, Tianxiong Lu², Yilin Ma¹, Jianzhi Zhu¹, Huan Yang¹, Rongxiang Zhao¹

¹ Zhejiang University, China

² Hangzhou Maxwell Network Technology Co. Ltd., China

ICEM26-000051 | Geometry of Additively Manufactured Specimens for Electrical Property Characterisation

Anna Ermakova¹, Nick Simpson¹

¹ University of Bristol, UK

ICEM26-000444 | Eddy Current Loss Reduction in Additively Manufactured FeSi Parts using Space Filling Curves

Mauro Di Nardo¹, Gianvito Gallicchio¹, Francesco Cupertino¹, Elena Bassoli², Stefano Nuzzo²

¹ Politecnico di Bari, Italy

² Università di Modena e Reggio Emilia, Italy

ICEM26-000397 | Modeling High Temperature Superconducting Electrical Machines Using the Volume Integral Equations

Hocine Menana¹

¹ University of Lorraine, France

ICEM26-000430 | Control-Oriented Equivalent Circuit Modeling of Air-Core Superconducting Synchronous Motors

Tao Xu¹, Mingzhe Sang¹, Hongye Zhang¹, Mark Husband², Sebastián Neira¹, Markus Mueller¹

¹ *University of Edinburgh, UK*

² *GKN Aerospace, UK*

ICEM26-000666 | Analysis of IPMSM for Direct-Drive Compander Considering Temperature-Gradient in Axial Direction

YoungJu Seo¹, Jae-Yoon Kim¹, Chan-Woo Kim¹, Seo-Hyun Hong¹, Soo-Hwan Park¹

¹ *Dongguk University, Republic of Korea*

ICEM26-000654 | Analytical Determination of Optimal Harmonic Current Ratio for Torque Ripple Minimization in Switched Reluctance Motors

Muhammad Fabio¹, Shou Qiu¹, Kyohei Kiyota¹

¹ *Institute of Science Tokyo, Japan*

ICEM26-000058 | CFD-based Conjugate Heat-Transfer Analysis of a Stator-Immersed Oil-Cooled Electric Motor with Hairpin Windings

Steven Vanhee¹, Jasper Nonneman¹, Michel De Paepe¹, Fabrice Boon²

¹ *Ghent University, Belgium*

² *Dana Belgium NV, Belgium*

ICEM26-000374 | E-Winding Lab - A Comprehensive AC Winding Design Platform for Both Stranded and Hairpin Windings

Mingyang Bao¹, Hailin Huang², Tianjie Zou¹, Mengmeng Cui¹, Michele Degano¹, Chris Gerada¹

¹ *University of Nottingham, UK*

² *University of Nottingham, China*

ICEM26-000396 | Study on Performance Improvement of Dual Axial Gap Induction Motor by Structural Modification

Issei Yamamoto¹, Naoya Soda¹, Daisuke Wakabayashi², Mohachiro Oka², Masato Enokizono², Mitsuru Takai³, Kozo Okamoto⁴

¹ *Ibaraki University, Japan*

² *Nippon Bunri University, Japan*

³ *Nippon Kinzoku Co. Ltd, Japan*

⁴ *Tokuden Co. Ltd, Japan*

ICEM26-000378 | Control-Oriented Nonlinear Modeling of Dual Three-Phase PMSMs with Saturation and Loss Effects

Reda Alili¹, Gregoire Le Goff¹, Maurice Fadel¹, Mathias Tientcheu Yamdeu², Dany Prieto²

¹ *LAPLACE, University of Toulouse, France*

² *Nidec Leroy-Somer, France*

ICEM26-000531 | Enhanced Model Predictive Control for Six-Phase Induction Motors Using Virtual Voltage Vectors in Three-Level Inverters

João Serra¹, Joao Dinis¹, Fernando Bento¹, Antonio J. Marques Cardoso¹

¹ *CISE | University of Beira Interior, Portugal*

ICEM26-000638 | Systematic Evaluation of Slot-Pole Combinations in Multi-Phase Permanent Magnet Synchronous Motors for High Power Traction Applications

Yucel Demir¹, Metin Aydin²

¹ *MDS Motor, Turkey*

² *Kocaeli University, Turkey*

ICEM26-000495 | Multiphysics Design Optimization of High-Speed Induction Machines for Aircraft Applications

Abdelhak Mekahlia¹, Christophe Viguiere¹, Sergi Riba², Xavier Longère²

¹ Safran Tech, France

² Safran Ventilation Systems, France

ICEM26-000226 | Application-oriented Fault Identification on Rotating Machines Using Frequency Response Analysis

Sandra Ploetz¹, Stephanie Uhrig¹, Fabian Öttl², Michael Kühneger³

¹ Munich University of Applied Sciences, Germany

² OMICRON Technologies GmbH, Italy

³ voestalpine Stahl GmbH, Austria

ICEM26-000652 | Design Approach of Continuous and Semi-Continuous Hairpin Winding in Traction Motor Applications

Shaohong Zhu¹, Krzysztof Paciura¹

¹ Cummins Inc., UK

ICEM26-000381 | Port-Hamiltonian based modeling of nonlinear synchronous machines without electrical excitation

Christoph Hackl¹

¹ Hochschule München University of Applied Sciences, Germany

ICEM26-000408 | Torque Ripple Suppression in Synchronous Machine Drives by Frequency-Adaptive PIR Current Control

Niklas Monzen¹, Pascal Seitter¹, Christoph Hackl¹

¹ Hochschule München (HM) University of Applied Sciences, Germany

ICEM26-000182 | A Motorette-Based Experimental Comparison of Air Cooling Concepts with Water-Mist Enhancement

Samuel Estenlund¹, Lei Wang¹, Viktor Josefsson², Conny Högmark³

¹ Lund University, Sweden

² Polestar, Sweden

³ BEVI AB, Sweden

ICEM26-000382 | Comparative Evaluation of Furan-Based Degree of Polymerization Estimation Models for Power Transformers

Hernan Alonso Bravo Vaquero¹, Hernan Alonso Bravo Urrea¹, Diego Fernando Garcia¹

¹ Universidad del Valle, Colombia

ICEM26-000018 | Analysis of Flux Modulation Effect in AFPM YASA Machine Having Stator Dummy Slots

Kaibo Wang¹, Lingyun Shao¹, Zhuoran Zhang¹, Zhongze Wu², Wei Hua², Wentao Zhang²

¹ Nanjing University of Aeronautics and Astronautics, China

² Southeast University, China

ICEM26-000197 | The Optimization of Key Cooling Structures in Oil-Cooled Hairpin-Winding PM Motors

Qiushi Xu¹, Xiubo Jiang¹, Hengliang Zhang¹, Wei Hua¹

¹ Southeast University, China

ICEM26-000015 | Efficiency Improvement of Memory Motor with Spoke-based Inversed Triangle Magnet

Ryonosuke Otsuka¹, Yuki Hidaka²

¹ Nagaoka University of Technology, Japan

² Ritsumeikan University, Japan

ICEM26-000054 | A Start-up of a Slotless Single Phase Brushless DC Motor

Mario Vukotić¹, Urban Rupnik¹, Alen Alić¹, Andrija Jeknić¹, Roman Manko¹, Selma Čorović¹, Damijan Miljavec¹

¹ University of Ljubljana, Slovenia

ICEM26-000271 | A Multi-Pole Transverse-Flux-type Switched Reluctance Motor Utilizing Soft Magnetic Composite

Ayaka Nagatsuji¹, Hayato Iwasaki¹, Ayumi Nagai², Kenji Nakamura², Takuya Takashita³, Naofumi Takatori³

¹ National Institute of Technology (KOSEN), Nara College, Japan

² Tohoku University, Japan

³ JFE Steel Corporation, Japan

ICEM26-000398 | Comparative Study of the Dual three-phase PMA-SynRMs with Different Winding Configurations under Fault-Tolerant Operation

Yeming Zheng¹, Yawei Wang¹, Yinjie He¹, Dayi Li¹, Ronghai Qu¹

¹ Huazhong University of Science and Technology, China

ICEM26-000580 | Impact of Strand Number and Shape on the Slot AC Resistance due to Skin Effect in Electrical Machines

Giorgos Skarmoutsos¹, Edward Stone², Panagiotis Panagiotou²

¹ Hellenic Cables S.A., Greece

² University of Sheffield, UK

ICEM26-000069 | Analytical Modeling of Spatio-Temporal Air-Gap Flux Density in Wound-Rotor Synchronous Machines

Angelo Ferreri¹, Jamal Alsawalhi¹

¹ Khalifa University, UAE

ICEM26-000094 | Reduction of Permanent Magnet Usage in Flux-Modulated-type Magnetic Gears by 3D Trapezoidal Magnets

Takanori Sumi¹, Akira Kudo¹, Kenji Nakamura¹

¹ Tohoku University, Japan

ICEM26-000152 | Nonlinear Model Recovery Anti-Windup Control of Non-Salient Pole Permanent Magnet Synchronous Motor

Maxime Béchu¹, Matthew Turner², Pedro Jesus Rodriguez Ayerbe¹, Giorgio Valmorbida¹

¹ Centrale Supélec, France

² University of Southampton, UK

ICEM26-000192 | Optimization Design of High-Efficiency Traction Motors Based on Operating Condition Spectrum

Linliang Zhao¹, Dong Li¹, Zhiming Geng¹, Dongwu Luo², Huanghui Wun³, Junci Cao¹, Xinyi He¹

¹ Beijing Jiaotong University, China

² Guangxi LiuGong Machinery Co., Ltd, China

³ Hunan CRRC Shangqu Electric Co., Ltd, China

ICEM26-000306 | Part I: Performance Investigation of Asymmetric V- and U-Shape PMSM Rotors for Traction Applications

Jacob Nilsson¹, Andreas Carlsson², Christian Sandström²

¹ Chalmers University of Technology, Sweden

² Polestar Performance AB, Sweden

ICEM26-000308 | Part II: Efficiency and Cost Investigation of Asymmetric V- and U-Shape PMSM Rotors for Traction Applications

Jacob Nilsson¹, Andreas Carlsson², Christian Sandström²

¹ Chalmers University of Technology, Sweden

² Polestar Performance AB, Sweden

ICEM26-000312 | Analytical Optimization for Concentrated Winding Machines for Marine Application

Giada Sala¹, Claudio Bianchini¹, Michael Galea², Ambra Torreggiani³

¹ *University of Modena and Reggio Emilia, Italy*

² *University of Malta, Malta*

³ *Raw Power Srl, Italy*

ICEM26-000340 | Generic Stator Tooth Shaping for Reducing Vibration Force in SPM and IPM Machines

Shiyun Li¹, Zi-Qiang Zhu¹, Dinghua Zhang², Yue Liu³, Hui Wu³, Ruiren Luo⁴

¹ *Hong Kong Polytechnic University, China*

² *CRRC SMD Ltd., China*

³ *CRRC Times Electric, UK*

⁴ *CRRC Times Electric, China*

ICEM26-000350 | The usability of various numerical methods for calculating transient heat transfer in PMSMs using LPTN

Lukas Sobotka¹, Roman Pechanek¹, Martin Skalicky¹, Lukas Veg¹

¹ *University of West Bohemia, Czechia*

ICEM26-000388 | An AI-Assisted Method for PMSM Sizing

Réda Fatmi¹, Laurent Gerbaud¹, Quentin Debray², Sylvain Perez², Guy Jerome², Vincent Imard¹

¹ *Université Grenoble Alpes, France*

² *Siemens, France*

ICEM26-000509 | Step-skewing in Squirrel Cage Induction Motors and its Influence on Machine Performance

Matteo Olivo¹, Alberto Tessarolo¹

¹ *University of Trieste, Italy*

ICEM26-000684 | A Fast Design Approach for Wound-Field Synchronous Motors for Heavy Electrical Vehicles

Henrik Grop^{1,2}, Adam Walker¹, Fengyu Zhang¹, Christopher Gerada¹, Erik Nordlund³, Stefan Wicki⁴

¹ *University of Nottingham, UK*

² *ABB Corporate Research, Sweden*

³ *ABB AB, IEC LV Motors, Sweden*

⁴ *ABB Switzerland Ltd, Traction, Switzerland*

ICEM26-000629 | A Radial–Axial (RAXIAL) Flux PMSM Concept For A Compact Prosthetic Actuator

Md Monirul Kadir¹, Reiko Raute¹, Cedric Caruana¹

¹ *University of Malta, Malta*

ICEM26-000243 | Heat Transfer Enhancement in an In-Wheel Electric Machine Used in Micromobility Applications

Ali Sadeghianjahromi¹, Yaohui Gai¹, Richard McMahon¹

¹ *University of Warwick, UK*

ICEM26-000273 | A direct iron loss measurement bench for electrical machine stator yokes for validation of iron loss models

Alexandre Giraud¹, Arnaud Cariou², Sergi Riba³, Franck Vangraefschep¹

¹ *IRT Saint-Exupéry, France*

² *Liebherr-Aerospace, France*

³ *Safran Ventilation Systems, France*

ICEM26-000640 | Impact from Winding Loss and Inverter Switching Frequency on Insulation Temperature and Lifetime in Hairpin Windings

Emil Lind¹, Sandra Eriksson¹

¹ *Uppsala University, Sweden*

ICEM26-000025 | Fault-Tolerant Control of PMSM Drives Based on Hall Transition-Sequence Diagnosis and Adaptive Notch FilteringJiye Zhang¹, Ruiqing Ma¹, Yue Li¹, Ling Luo¹, Yichen Cui¹¹ Northwestern Polytechnical University, China**ICEM26-000045 | Improved Angle-Dependent Field-Oriented Current Control for Electric Motors**Stefan Haehnlein¹, Jan Philipp Degel¹, Lars Boschert¹, Philipp Mueller¹, Christian Kloeffer¹, Martin Doppelbauer²¹ Offenburg University of Applied Sciences, Germany² Karlsruhe Institute of Technologie KIT, Germany**ICEM26-000322 | Sensorless Direct Torque Control of IPMSM in Block Commutation at Low Speed**Philipp Schmidt¹, Norbert Klaes¹, Georg Möhlenkamp²¹ HTW Berlin, University of Applied Sciences, Germany² Brandenburg University of Technology Cottbus-Senftenberg, Germany**ICEM26-000326 | Experimental Investigations of Model Free Predictive Control For PMSM Drives Using Different Voltage Vector Application Strategies**Ahmad Darabi¹, Chunyan Lai¹¹ Concordia University, Canada**ICEM26-000459 | Oversampling Switching-Frequency-Constrained Finite-Control-Set Reinforcement Learning-based Torque Control for Synchronous Machine Drives**Mario Pena¹, Darius Jakobeit¹, Oliver Wallscheid²¹ Paderborn University, Germany² University of Siegen, Germany**ICEM26-000007 | Supervised Robust Deep Cluster Learning for Open Set Classification in the Context of Bearing Faults**Michel Lehmann¹, Andreas Möckel¹¹ TU Ilmenau, Germany**ICEM26-000026 | Interpretable Physics-Informed Multimodal Deep Learning for Eccentricity-Severity Estimation of Induction Machines**Hanqi Su¹, Dehong Liu², Hiroshi Inoue³, Yebin Wang²¹ University of Maryland College Park, USA² Mitsubishi Electric Research Laboratories, USA³ Mitsubishi Electric Corporation, Japan**ICEM26-000028 | Experimental Investigation on the Effect of Inter-turn Short Circuit Fault on Vibration of a PMSM**Amir Kermanizadeh¹, Pragasen Pillay¹¹ Concordia University, Canada**ICEM26-000128 | Comparison of Vibration, Current and Stray flux for Shaft Misalignment and Mass Unbalance Fault Diagnosis in PMSM under Non-Stationary Load and Speed Conditions**Konstantinos Koutrakos¹, Epameinondas Mitronikas¹, Christof Michenthaler²¹ University Of Patras, Greece² Infineon Technologies Austria AG, Austria**ICEM26-000262 | Simulation of a Commutator DC Motor for Fault Condition Monitoring**Mbali Mayisela¹, David Dorrell²¹ Transnet Freight Rail PTA, South Africa² University of Turku, Finland

ICEM26-000451 | A Zero-Sequence Flux Approach for Detecting Inter-Turn Short-Circuit Faults in a Permanent Magnet Generator - Parallel Connected Stator Coils

Nikolaos Gkiolekas¹, Alexandros Sergakis¹, Markus Mueller², Konstantinos Gyftakis¹

¹ Technical University of Crete, Greece

² University of Edinburgh, UK

ICEM26-000604 | Thrust Bearing Wear Detection in Induction Motors Through Magnetizing Inductance Estimation from Voltage and Current Measurements

Joan Pons-Llinares¹, Jorge Bonet Jara¹

¹ Universitat Politècnica de València, Spain

ICEM26-000250 | High-Resolution Integrated Flux Sensing Array for Position Sensor Replacement in Synchronous Machines

Lukas Maas^{1,2}, Felix Burkard¹, Stefan Mönch¹, Michael Saur²

¹ University of Stuttgart, Germany

² Mercedes-Benz AG, Germany

ICEM26-000352 | Initial Design of a Variable Pole Induction Machine for EV Applications

Mudassir Raza Siddiqi¹, Joachim Härsjö², Luca Peretti¹

¹ KTH Royal Institute of Technology, Sweden

² Volvo Cars, Sweden

ICEM26-000439 | Fault-Tolerant Reconfigurable Winding Strategy for Interior Permanent Magnet Synchronous Machine Drive in eVTOL

Shuze Huang¹, Pedram Asefi¹, Fardan Aryamehr¹

¹ University College London, UK

ICEM26-000474 | A Study on Different Electric Machine Topologies for Auxiliary Applications

Shafiq Nategi¹, David Deurell², Joahn Åström²

¹ SEDRIVE AB, Sweden

² AROS Electronics, Sweden

ICEM26-000639 | Design Challenges of a High-Speed Wound Rotor Synchronous Machine for Electric Vehicle Application

Luka Kostić¹, Žarko Koprivica¹, Marko Milošević², Mladen Terzić¹

¹ University of Belgrade, Serbia

² TIM-Invest DOO, Serbia

ICEM26-000636 | Parasitic Capacitances Analysis in a Low-Speed PMSG with Optimized Asymmetric Geometry for Wind Power Applications

Konstantin Vostrov¹, Felipe Ortiz-Bustos¹, Alvaro Hoffer², Matias Jimenez³

¹ LUT University, Finland

² Universidad San Sebastián, Chile

³ Politecnico di Torino, Italy

11:10-12:50 ORAL SESSIONS

Design Issues (Optimization, Modeling and Simulation) 4

Room Funchal

Chairs: Athanasios Karlis, *Democritus University of Thrace*
David Dorrell, *University of Turku*

- 11:10 ICEM26-000499 | Analytical Saturation Modeling and Optimal Control Reference Analysis of Isotropic Externally Excited Synchronous Machines**
Alessandro Capitano¹, Giacomo Sala², Giovanni Franceschini¹, Davide Barater¹, Stefano Nuzzo¹
¹ University of Modena and Reggio Emilia, Italy
² University of Bologna, Italy
- 11:30 ICEM26-000365 | Design of PM-free High Speed Electrical Machine With High Power Density Focus**
Jakub Rosendorf¹, Jakub Súkeník¹, Petr Lošák¹, Martin Světlík¹, Marek Toman¹, Petr Chmelíček², Lassi Aarniovuori³, Jan Barta¹
¹ Brno University of Technology, Czechia
² Garrett Motion Czech Republic s.r.o., Czechia
³ LUT University, Finland
- 11:50 ICEM26-000449 | Mechanical Design Considerations on the Solid Rotor of a Homopolar Inductor Alternator**
Laurenz Ziegler¹, Andreas Binder¹, Yves Burkhardt¹
¹ Technical University Darmstadt, Germany
- 12:10 ICEM26-000146 | Reduced order model for force density calculation in the air gap of squirrel cage induction machines**
Marcel Heilmann¹, Richard Steckel², Daniel Keller¹, Max Schuler¹, Mercedes Herranz Gracia¹, Joachim Kempkes¹
¹ University of Applied Sciences Würzburg-Schweinfurt, Germany
² ZF Friedrichshafen AG, Germany
- 12:30 ICEM26-000368 | Integrated Multi-Fidelity Thermal Modeling of a High-Speed Electric Motor Using LPTN and CFD**
Jakub Súkeník¹, Marek Toman¹, Jakub Rosendorf¹, Petr Lošák¹, Ondřej Vítek¹, Petr Chmelíček², Lassi Aarniovuori³, Jan Barta¹
¹ Brno University of Technology, Czechia
² Garrett Motion, Czechia
³ LUT University, Finland

Rotating Machines 3

Room Berlin

Chairs: Dieter Gerling, *Bundeswehr University Munich*
Giulio De Donato, *Sapienza University of Rome*

- 11:10 ICEM26-000137 | A Novel Stator/Rotor Dual-Three-Phase Matrix-Torque-Component Machine with Asymmetric Winding for Direct-Drive System**
Jun Lin¹, Shaofeng Jia¹, Pengcheng Sun¹, Dongxu Yang¹, Deliang Liang¹
¹ Xi'an Jiaotong University, China
- 11:30 ICEM26-000448 | Grid Strengthening for High-IBR Island Systems Using a Flywheel-Assisted Synchronous Condenser: Experience from Madeira, Portugal**
Sergio Mendes¹, Guilherme Schulz², Aires Henriques³, Joao Coelho³
¹ WEG, Portugal
² WEG, Brazil
³ Empresa de Eletricidade da Madeira, Portugal

- 11:50 ICEM26-000327 | Analysis and Design of a Doubly Fed Induction Generator with Fractional-Salient Pole Rotor for Variable-Speed Pumped Storage Applications**
Zeyuan Li¹, Jianyun Chai¹, Shanming Wang¹
¹ Tsinghua University, China
- 12:10 ICEM26-000155 | Effects of Static Excitation Converter on Key Components of Large Salient-Pole Hydrogenerators**
Joël Pedneault-Desroches¹, Kamal Al-Haddad², Arezki Merkhoul¹
¹ Hydro-Quebec, Canada
² École de Technologie Supérieure Montréal, Canada
- 12:30 ICEM26-000485 | From Three-Phase to Dual Three-Phase Induction Motors: Inverse-gamma Modeling and Rotor Field-Oriented Control**
Bilal Mustafa¹, Valiyaveetil Sadanandan Nithin², Ahmed Hemeida³, Nirangkush Das¹, Firdausa Ahmed⁴, Floran Martin¹, Anouar Belahcen¹
¹ Aalto University, Finland
² Prysmian Finland, Finland
³ Cairo University, Egypt
⁴ Danfoss Drives Oy, Finland

Diagnostics and Condition Monitoring 4

Room Sydney

Chairs: Carla Terrón Santiago, *Universitat Politècnica de València*
Panagiotis Kakosimos, *ABB Corporate Research*

- 11:10 ICEM26-000087 | Field and Damper Winding Testing for Brushless Synchronous Generators for Marine Applications**
Changhoon Song¹, Seungjun Cha¹, Muhammad Faizan Shaikh², Sungwoo Choe¹, Seungmin Shin¹, Jaewan Kim³, Chanseung Yang³, Chaewoong Lim⁴, Sang Bin Lee¹
¹ Korea University, Republic of Korea
² Samsung Electronics, Republic of Korea
³ HD Hyundai Electric, Republic of Korea
⁴ SN Heavy Industrial Company, Republic of Korea
- 11:30 ICEM26-000264 | The Effect of Rotor Magnetic Faults on the Operation of a Multi-channel Permanent Magnet Synchronous Machine**
Mariusz Korkosz¹, Krystyna Krzywdzińska-Kornak¹, Jan Prokop¹, Konstantinos Gyftakis²
¹ Rzeszów University of Technology, Poland
² Technical University of Crete, Greece
- 11:50 ICEM26-000354 | Detection of Static Eccentricity Faults in Coreless Dual-Rotor Permanent Magnet Generators via a Pseudo Zero-Sequence Flux Signal**
Marios Salinas¹, Markus Mueller², Konstantinos Gyftakis¹
¹ Technical University of Crete, Greece
² University of Edinburgh, UK
- 12:10 ICEM26-000437 | Simplified Extended Kalman Filter Design for Torsional Vibrations Estimation in a PMSM Drive**
Matteo Deponti¹, Angelo Boceda¹, Roberto Perini¹, Giovanni Maria Foglia¹, Antonino Di Gerlando¹
¹ Politecnico di Milano, Italy

12:30 ICEM26-000543 | Exploring the Use of Electronic Noses for the Detection of Misalignments in Electric Motors

Jose Antonino Daviu¹, Israel Zamudio², Vicente Biot-Monterde¹, Carlos A. Alvarez-Ugalde², Jacobo Fernandez-Jardon³, Ignacio A. García Menéndez³, Santiago Vila-Dominguez³, Eloy Fidalgo Blanco³

¹ *Universitat Politècnica de Valencia, Spain*

² *Universidad Autónoma de Querétaro, Mexico*

³ *ArcelorMittal – Global Research and Development, Spain*

Electrical Machines and Drives for Sustainable Transportation 2

Room Caracas

Chairs: Francisco J. Marquez Fernandez, *Lund University*
Michele Mengoni, *University of Bologna*

11:10 ICEM26-000361 | Electromagnetic Model of an Axial Rotary Transformer for Wound Rotor Synchronous Machines Excitation

Nicolò Gori¹, Claudia Simonelli¹, Antonino Musolino¹, Luca Sani¹, Rocco Rizzo¹

¹ *University of Pisa, Italy*

11:30 ICEM26-000399 | Effect of Switching Harmonics on AC Losses of Copper Clad Aluminum Hairpin Windings in Traction e-Motors

Brandon Finateri¹, Matteo Pizzuto¹, Bruce Williams², Afsaneh Edrisy¹, Narayan Kar¹

¹ *University of Windsor, Canada*

² *Natural Resources Canada, Canada*

11:50 ICEM26-000320 | Investigation on a Permanent Magnet Free Electrically Assisted Synchronous Reluctance Machine

Marco Pastura¹, Francesco Tripaldi¹, Nicola Bianchi¹

¹ *University of Padova, Italy*

12:10 ICEM26-000212 | Comprehensive Comparison of Drive Cycle Optimized Synchronous and Switched Reluctance Machines for Electric Vehicles

Yuancong Gong¹, Nejila Parspour¹

¹ *University of Stuttgart, Germany*

12:30 ICEM26-000393 | Slot/Pole Selection for Light Rare-Earth PMaSynRM Traction Motor Drives: Design Tradeoffs and Electromagnetic Performance Evaluation

Buddhika De Silva Guruwatta Vidanalage¹, Hossain Mohammadi², Reza Nasirizarandi², Narayan Kar¹

¹ *University of Windsor, Canada*

² *Schaeffler, USA*

³ *Schaeffler, Canada*

Electrical Machines and Drives for Renewable Energy Generation 2

Room Cape Town

Chairs: Fernando J. T. E. Ferreira, *ISR - University of Coimbra*
Nick Simpson, *University of Bristol*

- 11:10 ICEM26-000578 | Design and Evaluation of a 5-MW Brushless Doubly-Fed Reluctance Wind Generator**
Pieter Oosthuizen¹, Rong-Jie Wang¹, Maarten Kamper¹
¹ Stellenbosch University, South Africa
- 11:30 ICEM26-000133 | Comparison of Surface and Halbach PM Rotor Arrangements in Coreless Axial Flux Machines**
Haris Abrar¹, Rong-Jie Wang¹, Maarten Kamper¹
¹ Stellenbosch University, South Africa
- 11:50 ICEM26-000115 | Analytical Approaches for Estimating the Peak Short-Circuit Current of Doubly Fed Induction Generators**
Tim Frieß¹, Natalia Escobosa Pineda¹, Jutta Hanson¹
¹ Technical University of Darmstadt, Germany
- 12:10 ICEM26-000224 | Performance Evaluation of Multi-Phase AFPM Generator Using Rare-Earth-Free Magnets**
Mostafa Ahmadi Darmani¹, Ali Sadeghianjahromi¹, Myles Ing¹, Richard McMahon¹, Hugh-Peter Kelly², Sul Ademi¹
¹ University of Warwick, UK
² GreenSpur Renewables Ltd, UK
- 12:30 ICEM26-000618 | Comparative Electromagnetic Analysis of Bar Cage and Nested-Loop Rotors in Brushless Doubly Fed Machines**
Malihe Heidary¹, Salman Abdi Jalebi¹, Ehsan Abdi², Richard McMahon³
¹ University of East Anglia, UK
² Wind Technologies Ltd, UK
³ University of Warwick, UK

Electrical Machines in Aeronautics: Stakes and Opportunities

Room Rio de Janeiro

Chairs: Christophe Viguié, *Safran Tech*

Fernando Bento, *CISE | University of Beira Interior*

- 11:10 ICEM26-000583 | Optimizing Torque-Dense Direct-Drive Axial Flux Machines Using Rare-Earth-Free Magnets for Aerospace Applications**
Lorenzo Orsini¹, Jonathan Godbehere², Mircea Popescu²
¹ Ansys, Spain
² Ansys, UK
- 11:30 ICEM26-000477 | A fast and accurate boundary-coupled numerical strategy for computing AC losses**
Alexis Pons¹, Sullivan Küttler¹, Théodore Cherrière², Adrien Mercier², Loucif Benmamas¹, Guillaume Krebs², Christophe Geuzaine³
¹ Safran Tech, France
² CentraleSupélec, Université Paris-Saclay, France
³ University of Liège, Belgium
- 11:50 ICEM26-000220 | Analytical Design Optimization of an Electro Mechanical System for Aircraft Electric Propulsion**
Ali Salloukh^{1,3}, Abdelmounaim Tounzi¹, Ngac Ky Nguyen², Dany Prieto³, Mike McClelland³

¹ Lille University, France

² Arts et Metiers Institute of Technology, France

³ NIDEC - Leroy Somer, France

12:10 ICEM26-000489 | The Impact of SMC Density on Electromagnetic Performance: A Case Study of an Axial Flux Permanent Magnet Motor

Taha El Hajji¹, Lars Sjöberg¹, Bruno Ricardo Marques¹, Kristoffer Nilsson¹, Marcus Lenberg²

¹ Alvier Mechatronics AB, Sweden

² Höganäs AB, Sweden

12:30 ICEM26-000377 | Investigation of Halbach Arrays for Enhanced Torque Density in Aerospace Axial-Flux Machine

Natalia Narozanska¹, Michele Degano², Chris Gerada²

¹ Evolito Ltd, UK

² University of Nottingham, UK

12:50-14:00 Lunch

14:00-15:40 ORAL SESSIONS

Rotating Machines 4

Room Funchal

Chairs: Andy Knight, University of Calgary

Rukmi Dutta, UNSW Sydney

14:00 ICEM26-000157 | Analytical Modeling of a Novel Fully PCB-Based Electrically Excited Axial Flux Machine

Parisa Rezapour¹, Adrian Schäfer¹, Nejila Parspour¹

¹ University of Stuttgart, Germany

14:20 ICEM26-000658 | A Novel IPMSM with Unconventional Slot-pole Combination Featuring Low Torque Ripple Based on Multi-layer Winding Configurations

Jun Lin¹, Shaofeng Jia¹, Pengcheng Sun¹, Dongxu Yang¹, Yucheng Xu¹, Deliang Liang¹

¹ Xi'an Jiaotong University, China

14:40 ICEM26-000090 | Vibration Suppression Design of Mechanical-Variable-Flux Synchronous Machine

Tengze Zhang¹, Haiyang Fang¹, Qiang Zhang², Xinjie Wen¹, Dawei Li¹, Ronghai Qu¹

¹ Huazhong University of Science and Technology, China

² China State Shipbuilding Corporation, China

15:00 ICEM26-000491 | Axially Segmented Parallel Hybrid VFM Enabling Unified Peak Reluctance and PM Torque

Anesu Charamba¹, Lesedi Masisi¹, Maged Ibrahim²

¹ University of the Witwatersrand, South Africa

² German International University, Egypt

15:20 ICEM26-000338 | Effect of Rotor Eccentricities on Noise and Vibration of SPM and IPM Synchronous Machines

Yu Qi¹, Yinzhaoh Zheng², Yangju Zou¹, Shiyun Li², Yue Liu¹, Xiao Chen², Geraint W. Jewell², Zi-Qiang Zhu², Ruiren Luo¹, Hui Wu¹

¹ CRRC Times Electric, UK

² University of Sheffield, UK

Advances in Electrical Machines and Drives for Aeronautic Applications

Room Berlim

Chairs: Abdelmounaim Tounzi, *Lille University*
Giulio De Donato, *Sapienza University of Rome*

14:00 ICEM26-000425 | Analytical Design Considerations for Coreless AFPM Motors for Aerospace Applications

Daniele De Gregorio¹, Nicola Bianchi¹

¹ University of Padova, Italy

14:20 ICEM26-000027 | Fault-Tolerant IPM Machine with Mixed-Layer Fractional-Slot Concentrated-Winding

Peiyang Zeng¹, Guangjin Li¹

¹ University of Sheffield, UK

14:40 ICEM26-000420 | Synchronous Reluctance Motor for Air Mobility Healthy and Faulty Operating Conditions

Francesco Tripaldi¹, Ludovico Ortombina¹, Nicola Bianchi¹

¹ University of Padova, Italy

15:00 ICEM26-000222 | Investigation of Inter-Phase Short Circuit in Multi Three-Phase Electric Motor for Aircraft Propulsion

Ali Salloukh^{1,2}, Ngac Ky Nguyen³, Abdelmounaim Tounzi¹, Dany Prieto², Mike McClelland²

¹ Lille University, France

² NIDEC - Leroy Somer, France

³ Arts et Metiers Institute of Technology, France

15:20 ICEM26-000221 | Analytical Multiphysics Model of Surface Permanent Magnet Motors for Aircraft Propulsion

Ali Salloukh^{1,2}, Abdelmounaim Tounzi¹, Ngac Ky Nguyen³, Dany Prieto², Mike McClelland²

¹ Lille University, France

² NIDEC - Leroy Somer, France

³ Arts et Metiers Institute of Technology, France

Design Issues (Optimization, Modeling and Simulation) 5

Room Sydney

Chairs: Barrie Mecrow, *Newcastle University*
Silvio Vaschetto, *Politecnico di Torino*

14:00 ICEM26-000570 | Parameter and Topology Optimization of IPMSMs Using Multimodal Deep Learning Under Multiple Current Conditions

Hiddenori Sasaki¹, Kazuhisa Iwata¹, Hajime Igarashi², Daisuke Nakagawa³, Masanori Watahiki³, Tomoya Ueda³

¹ Hosei University, Japan

² Hokkaido University, Japan

³ Nidec Corporation, Japan

14:20 ICEM26-000066 | Design Optimization and Performance Analysis of Electrically Excited Synchronous Motor

Wei Peng¹, Johannes Kreher¹

¹ maxon motor ag, Switzerland

14:40 ICEM26-000049 | Modeling and Design Optimization of Brushless Doubly-Fed Reluctance Generators

Pieter Oosthuizen¹, Rong-Jie Wang¹, Maarten Kamper¹

¹ Stellenbosch University, South Africa

15:00 ICEM26-000512 | A Scaling Framework for Efficient Design Optimization of IPMSM for EV Traction

Ji-Hyeon Lee¹, Soo-Hwan Park², Myung-Seop Lim¹

¹ Hanyang University, Republic of Korea

² Dongguk University, Republic of Korea

15:20 ICEM26-000061 | Mitigation Strategies for Halbach Arrays Demagnetization in Radial-Flux Permanent Magnet Machines

Giuseppe Edoardo Antonio Porto, Lorenzo Fazzini, Jacopo Ferretti

¹ HPE Group, Italy

Thermal and Losses Issues (Magnetic and Insulation Materials) 1

Room Caracas

Chairs: Sandra Eriksson, *Uppsala University*

Shafiqh Nategh, *Li Auto*

14:00 ICEM26-000203 | Modal Analysis of a Magneto-Dynamic Reduced Problem for Copper Losses Evaluation

Rémi Jardot¹, Guillaume Krebs¹, Anas Lahlou², Francis Roy³, Claude Marchand¹

¹ CentraleSupélec, Université Paris-Saclay, France

² SAFT, France

³ Stellantis, France

14:20 ICEM26-000362 | Influence of Winding Turn Count on Insulation Lifetime Under Accelerated Thermal Aging

Israr Ullah¹, Antonis Theofanous¹, Vincenzo Madonna², Yatai Ji³, Paolo Giangrande⁴, Michael Galea¹

¹ University of Malta, Malta

² Dumarey Automotvie Italia S.p.A, Italy

³ Tsinghua University, China

⁴ University of Bergamo, Italy

14:40 ICEM26-000421 | Comparative Study on Efficiency Maps and Losses Measured for Switched Reluctance Motors with Different Core Materials and Applied Voltages

Yuichiro Tanaka¹, Yohei Murase², Eiji Sato², Takashi Kosaka¹

¹ Nagoya Institute of Technology, Japan

² Kawasaki Heavy Industries Ltd., Japan

15:00 ICEM26-000256 | An Analytical Approach for the Design of Cooling Jackets of Electrical Machines

Michelangelo Raimondo¹, Luca Carpeggiani¹, Stefano Fontanesi¹, Davide Barater¹, Stefano Nuzzo¹

¹ *University of Modena and Reggio Emilia, Italy*

15:20 ICEM26-000416 | Epstein-to-Ring Discrepancies in Non-Oriented Electrical Steel: Effect of Self-Bonding and Welding for Electric Motor Stator and Rotor Cores

Viviana La Russa¹, Giampaolo Devito¹, Jaesung Choi², Gilsu Choi², Luigi Solimene³, Simone Ferrari³, Paolo Pescetto³, Carlo Stefano Ragusa³, Gianmario Pellegrino³, Stefano Nuzzo¹

¹ *University of Modena and Reggio Emilia, Italy*

² *Inha University, Republic of Korea*

³ *Politecnico di Torino, Italy*

Diagnostics and Condition Monitoring 5

Room Cape Town

Chairs: Carlos Platero, *Universidad Politécnica de Madrid*
Davide Fonseca, *CISE | University of Beira Interior*

14:00 ICEM26-000434 | Automatic segmentation and identification of frequency characteristics on current and stray flux signals from electric traction motor

Geovanni Díaz Saldaña¹, Luis Morales Velazquez², Jose Antonino Daviu¹

¹ *Universitat Politècnica de València, Spain*

² *Universidad Autonoma de Queretaro, Mexico*

14:20 ICEM26-000616 | Model Parameter Identification for Induction Motor Fault Diagnosis

Moritz Benninger¹, Bingnan Wang¹, Hiroshi Inoue²

¹ *Mitsubishi Electric Research Laboratories, USA*

² *Mitsubishi Electric Corporation, Japan*

14:40 ICEM26-000321 | Non-Intrusive Diagnosis of Stator Inter-Turn Faults in Induction Motors Using Stray Flux Harmonics

Gabriel De Arruda¹, Marcelo Castoldi¹, Clayton Graciola², Ruhan Souza¹, Alessandro Goedtel¹, Wesley Souza¹

¹ *Federal University of Technology-Parana, Brazil*

² *Federal Institute of Paraná, Brazil*

15:00 ICEM26-000302 | Time-Frequency PMSM mechanical fault diagnosis under different load conditions based on stray flux signals

Leonardo Duarte Milfon¹, Jose Enrique Ruiz Sarrio², Mateus Giesbrecht¹, Jose Antonino Daviu²

¹ *Universidade Estadual de Campinas, Brazil*

² *Universitat Politècnica de Valencia, Spain*

15:20 ICEM26-000213 | A Novel CSNN Architecture for the Classification of Eccentricity Faults in Induction Motors

Xinyu Zhao¹, Haihang Xia¹, Zihao Song¹, Tiantai Deng¹, George Tsialiamanis¹, Panagiotis Panagiotou¹

¹ *University of Sheffield, UK*

Motor and Generator Windings - Design, Manufacturing, and Maintenance

Room Rio de Janeiro

Chairs: José Alberto, *Lusófona University*
Tianjie Zou, *University of Nottingham*

14:00 ICEM26-000481 | Uncertainty Analysis of Empirical AC Proximity Loss Methods for Low-Loss Windings

George Barnaby¹, Philip Mellor¹, Dominic North¹, Nick Simpson¹

¹ *University of Bristol, UK*

14:20 ICEM26-000085 | Magnetic Limitations of Polymer-Bonded Semi-Magnetic Slot Wedges for Electric Machines

Martin Enno Gerlach¹, Marvin Hengelsberg², Eva Bresemann²

¹ *Elektrowerk Hannover Behncke Maschinenbau GmbH, Germany*

² *Leibniz University Hannover, Germany*

14:40 ICEM26-000511 | Design of a Three-Flux-Level Winding for a Line-Start Synchronous Reluctance Motor to Improve Its Starting, Synchronization, and Efficiency

Fernando J. T. E. Ferreira¹, Pedro Guerreiro¹, José Alberto¹

¹ *ISR - University of Coimbra, Portugal*

15:00 ICEM26-000181 | Rectangular-Shaped Conductor Sizing: A Case Study on AC Power Losses Reduction

Zahoor Ahmad¹, Ants Kallaste¹, Muhammad Usman Naseer¹, Shahid Hussain¹, Sumeet Khalid¹, Toomas Vaimann¹

¹ *Tallinn University of Technology, Estonia*

15:20 ICEM26-000347 | Line-Start Synchronous Reluctance Motor Performance Under Supply Voltage Unbalance for Star and Delta Connection Modes

Fernando J. T. E. Ferreira¹, José Alberto², Aníbal T. de Almeida¹

¹ *ISR - University of Coimbra, Portugal*

² *Lusófona University, Portugal*

15:40-16:40 POSTER SESSION III & COFFEE BREAK

Room: Sunset

Chairs: Luca Vancini, *University of Bologna*
Paolo Pescetto, *Politecnico di Torino*
Payam Shams Ghahfarokhi, *Tampere University*
Sandra Eriksson, *Uppsala University*
Simone Ferrari, *Politecnico di Torino*

ICEM26-000557 | Health Monitoring and Fault Diagnosis of Large Hydrogenerators using CVAE-KAN and Stator Vibration Signals

Rony Ibrahim¹, Kamal Al-Haddad¹, Antoine Tahan¹, Arezki Merkhoul²

¹ *Ecole de Technologie Supérieure, Canada*

² *Hydro-Quebec, Canada*

ICEM26-000174 | Feasibility of Processing PEEK Insulation on Complex Prefabricated Electrical Machine Windings using Induction Heating

Harrison Mogg-Walls¹, Mark Goudswaard¹, Nick Simpson¹

¹ *University of Bristol, UK*

ICEM26-000297 | Design Methodology for Additive Manufacturing of PMSM Stators: Compensating Sub-Optimal Magnetic Properties by Geometry Optimization

Michal Freisleben¹, Zdenek Frank¹, Tomas Paveza¹, Roman Pechanek¹

¹ *University of West Bohemia, Czechia*

ICEM26-000343 | Present Status and Future Trends in Prototyping and Testing of Superconducting Electrical Machines

Lorenzo Perilli¹, Luis Bucho², Nicholas Storti³, João Filipe Pereira Fernandes², Emmanuel Agamloh³, Silvio Vaschetto¹

¹ *Politecnico di Torino, Italy*

² *IDMEC, Instituto Superior Técnico, Universidade de Lisboa, Portugal*

³ *Baylor University, USA*

ICEM26-000364 | Design of a Liquid Nitrogen Submerged High-Speed Motor

Connor de Trafford¹, Yuchen Wang¹, Xianwu Zeng¹, Xiaoze Pei¹

¹ *University of Bath, UK*

ICEM26-000490 | Analysis of a Cryogenic Heat Load in a Fully Superconducting Wind Energy Generator

Jannis Sindram¹, Sebastian Lengsfeld¹, Lukas Hohmann², Nick Thoenelt³, Sandeep Reddy Tukkan², Marco Jung²

¹ *Fraunhofer IEE, Germany*

² *Bonn-Rhein-Sieg University of Applied Sciences, Germany*

³ *Karlsruher Institut für Technologie (KIT), Germany*

ICEM26-000405 | An Initiating Control Strategy for Continuous Conduction Mode of High-Speed Switched Reluctance Motors

Ryo Kokubu¹, Kyohei Kiyota¹

¹ *Institute of Science Tokyo, Japan*

ICEM26-000186 | Manufacturing Influences on Wedge-Pins: A Comparative Study of Bending Characteristics for Direct Cooled Hairpin Windings

Anja Preitschaft¹, Tobias Zürrlein¹, Simon Stauber¹, Roman Hahn¹, Thorsten Ihne¹, Jörg Franke¹, Florian Risch¹

¹ *FAPS - Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*

ICEM26-000188 | Mechanical Fixation of Wedge-Pins Using Expandable Slot Liners Enabling Advanced Cooling in Electrical Machines

Simon Stauber¹, Roman Hahn¹, Tobias Zürrlein¹, Anja Preitschaft¹, Thorsten Ihne¹, Jörg Franke¹, Florian Risch¹

¹ *FAPS - Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*

ICEM26-000034 | Robustness of Rewound Five-Phase Permanent-Magnet-Assisted Synchronous Reluctance Machines Under Large Air-Gap Eccentricity

Kotb Tawfiq¹, Peter Sergeant², Mohamed Ibrahim², Ehab Elsadaany¹

¹ *Khalifa University, UAE*

² *Ghent University, Belgium*

ICEM26-000185 | Parasitic magnetic coupling specific to multiphase squirrel cage induction machines

Lucas Roux¹, Franck Scuiller¹, Florent Becker¹

¹ *Naval Academy Research Institute, France*

ICEM26-000389 | A Robust IDA-PBC Strategy Based On Disturbances Observer For PMSM With Uncertainties

Houssein Farhat¹, Azeddine Houari¹, Mohamed Fouad Benkhoris¹, Djamel Ziane¹, Emmanuel Frappé², Ali Kassem Jebai²

¹ *Nantes Université, France*

² *Schneider Electric, France*

ICEM26-000441 | Energy-Efficient MTPA-Based Current Control of a Six-Phase Induction Generator Under Healthy and Faulty Conditions

Marius Ouedraogo¹, Franck Betin¹, Amine Yazidi¹

¹ *University of Picardie "Jules Verne", France*

ICEM26-000014 | High-Frequency Common-Mode Voltage Diagnostics for Incipient Inter-Turn Short-Circuit Faults in Traction Motors

Hujun Peng¹, Haokun Liu¹, Yue Yu¹, Nora Leuning¹, Simon Steentjes¹

¹ *RWTH Aachen University, Germany*

ICEM26-000293 | AI-Driven Sensorless Predictive Maintenance of Induction Motors from Variable Speed Drive Signals

Ali Tfaily¹, Dilshad Surroop¹, Sofiane Benberkane², Ahmad Awde², Omar Khanous², Al Kassem Jebai¹

¹ *Schneider Electric, France*

² *Triskell Consulting, France*

ICEM26-000237 | Nonlinear current control for synchronous machines with LC filter

Pascal Seitter¹, Christoph Hackl¹

¹ *Hochschule München (HM) University of Applied Sciences, Germany*

ICEM26-000048 | Life Cycle Sustainability Assessment of an Electric Motor for a Sport Utility Vehicle

Flavio Calvi¹, Antonella Accardo¹, Gaia Gentilucci¹, Ezio Spessa¹

¹ *Politecnico di Torino, Italy*

ICEM26-000165 | Experimental Validation of Demagnetization in a Ferrite Spoke-Type Synchronous Machine under Symmetric Short-Circuit

Marcelo Silva¹, Mila Naghibian², Magnus Jansson³, Sandra Eriksson¹

¹ *Uppsala University, Sweden*

² *Traton SE AB, Sweden*

³ *Alstom, Sweden*

ICEM26-000214 | Design and Analysis of Consequent-Pole Vernier PM Machine Using Rotor Iron-Pole Shaping and Stator E-Type-Segment Modularization

Zonghao Liu¹, Xianglin Li¹, Jinyang Li², Xiangyu Li¹, Zhiwei Xue³, Kai Wang⁴

¹ *Qingdao University, China*

² *State Grid Qingdao Electric Power Supply Company, China*

³ *University of Hong Kong, China*

⁴ *Nanjing University of Aeronautics and Astronautics, China*

ICEM26-000626 | Bidirectional Electro-Mechanical Interaction Effects in Electric Powertrains: a Comprehensive Modeling Approach

Razie Ebrahimnejad¹, Giovanni Iarricchio¹, Alessandro Capitanio¹, Marco Barbieri¹, Stefano Nuzzo¹, Giovanni Franceschini¹

¹ *University of Modena and Reggio Emilia, Italy*

ICEM26-000063 | Research on Dynamic Modeling and Vibration Suppression of a Flexible-Rotor PMSM Considering Electromechanical Coupling

Hantao Shen¹, Haiyang Fang¹, Ruichen Xie¹, Junjie Zou¹, Dawei Li¹, Ronghai Qu¹

¹ *Huazhong University of Science and Technology, China*

ICEM26-000183 | Influence of Copper Coating on the Loss Characteristics of a High-Speed Solid Rotor Induction Machine

Shoaib Ahmed¹, Lassi Aarniovuori¹, Janne Nerg¹, Jouni Ikäheimo², Ondřej Vítěk³, Jan Barta³

¹ *LUT University, Finland*

² *ABB Oy IEC LV Motors, Finland*

³ *Brno University of Technology, Czechia*

ICEM26-000294 | Design and Analysis of a Hybrid-Excitation Generator for Hydropower Applications

Karlo Matić¹, Miroslav Petrinić¹, Damir Zarko²

¹ KONČAR - Electrical Engineering Institute, Croatia

² University of Zagreb, Croatia

ICEM26-000426 | Performance analysis and copper loss optimization of amorphous alloy motors

Yixuan Song¹, Fan Rao², Wei Gao³

¹ Lanzhou Wanli Aviation Electromechanical Co. Ltd, China

² Shanghai Electric Power Equipment Co. Ltd., China

³ China University of Geosciences, China

ICEM26-000463 | Study of Unconventional Connections for Post-Fault Operations of Three and Five Phases PMSM Drives

Erwann Accarie¹, Jean-Mathieu Bourgeot¹, Jean-Frederic Charpentier², Emmanuel Delaleau¹

¹ IRDL - Bretagne INP – ENIB, France

² Naval Academy France, France

ICEM26-000623 | Effect of Cooling Air Inlet Temperature on Rotor Cooling and Windage Losses in a Turbo Generator

Seyedehsan Rafiee¹, Teemu Turunen-Saaresti¹, Aki Grönman¹, Antti Uusitalo¹

¹ LUT University, Finland

ICEM26-000071 | Loss- and Thermal-Constrained Design of a PCB Stator Double-Rotor Axial-Flux Motor for Immersed Pump Applications

Simone Sansoni¹, Alessia Fracassi¹, Marco Gubitosa¹, Işık Emir Altunkol², Elif Topaloğlu², Ozan Keysan²

¹ Saleri Italo Industries, Italy

² Middle East Technical University, Turkey

ICEM26-000097 | A Novel Excess Loss Modeling Applicable to a Wide Range of Operating Conditions

Kazuki Semba¹, Takashi Yamada¹, Tomohisa Sato¹, Hiroyuki Sano¹

¹ JSOL Corporation, Japan

ICEM26-000124 | Acceleration Mechanisms and Adaptive Generation Control in Large-Scale Surrogate-Assisted Optimization

Kenta Kato¹, Shogo Asahino¹, Hiroyuki Sano¹, Koji Tani¹, Takashi Yamada¹

¹ JSOL Corporation, Japan

ICEM26-000371 | Next generation rotor cooling techniques of dual-stator axial flux electrical machines

Sergiu Marciuc¹, Daniel Santos², Jordi Vera², Carles Oliet², Ioan Deac³, Abderrahmane Rebhaoui³, Bogdan Butnariu⁴, Ioan-Claudiu Cotovanu¹, Maximilian Ruf⁵

¹ 4MULTIPHYSICS SRL, Romania

² Universitat Politècnica de Catalunya, Spain

³ Nidec PSA E-motors SAS, France

⁴ Technical University of Cluj-Napoca, Romania

⁵ MIMplus Technologies GmbH & Co, Germany

ICEM26-000559 | Impacts of Rotor Sleeves on Stress Distribution and Deformation in Electrically Excited Synchronous Machines

Ruonan Liu¹, Luca Boscaglia¹, Bowen Jiang¹, Yujing Liu¹

¹ Chalmers University of Technology, Sweden

ICEM26-000602 | e-NVH analysis of Induction motor refurbished to LSPMSM

Javed Ali¹, Reiko Raute¹, Cedric Caruana¹, Cyril Spiteri Staines¹

¹ University of Malta, Malta

ICEM26-000645 | Extended Model for Dynamic Simulation of Line-Start Synchronous Reluctance Motors Considering Distributed Stator Winding Specifications

Martim Furtado¹, Fernando Ferreira¹

¹ *ISR - University of Coimbra, Portugal*

ICEM26-000653 | Integral Modeling of the Magnetic Field in Ferromagnetic Materials for Electrical Machine Analysis

Yazid Statra¹, Hocine Menana²

¹ *UER ELT - Ecole Militaire Polytechnique, Algeria*

² *GREEN - University of Lorraine, France*

ICEM26-000656 | Analytical-Empirical Modeling of Heat Transfer from a Naturally Cooled Annular-Finned Electric Motor Housing

Marek Toman¹, Jakub Súkeník¹, Radoslav Cipin¹, Ondřej Vítek¹, Ondřej Pavlasek¹, Jiri Klima²

¹ *Brno University of Technology, Czechia*

² *MEZ Nedvedice, a.s., Czechia*

ICEM26-000667 | Integrating Life-Cycle Sustainability Metrics into Multi-Objective Electric Machine Design Optimization

Maykop Perez¹, Carlos Madariaga¹, Juan Tapia¹, César Gallardo²

¹ *University of Concepcion, Chile*

² *University of Nottingham, UK*

ICEM26-000482 | High Thrust Density Parallel Segmented PM Linear Synchronous Motor

Jasper Anttila¹, Aleksi Kytöviita¹, Rafal Jastrzebski¹

¹ *University of Turku, Finland*

ICEM26-000103 | Thermal Analysis of Medium Sized Induction Machines with Water Jacket Cooling

Felix Bloder¹, Bernhard Weilharter¹

¹ *Elin Motoren GmbH, Austria*

ICEM26-000609 | Preliminary Investigation of Electrophoretic Epoxy E-Coat Deposition: Suspension Characterization and Insulation Performance for Additively Manufactured Windings

Khizra Arif¹, Ants Kallaste¹, Sergei Bereznev¹, Toomas Vaimann¹, Ivar Kiitam¹, Ali Bhalli¹, Paul Taklaja¹, Hans Tiismus¹

¹ *Tallinn University of Technology, Estonia*

ICEM26-000630 | Bearing thermal modeling and lubrication method assessment for electric motors

Tuomas Kuitunen¹, Charles Nutakor¹, Juho Montonen¹, Jussi Sopanen¹

¹ *LUT University, Finland*

ICEM26-000244 | A New and Computationally Efficient Overmodulation Technique for Space Vector Modulation Driven Electrical Drives

Claudio Nevoloso¹, Massimo Caruso¹, Marco Bisesi¹, Gioacchino Scaglione¹, Antonino Oscar Di Tommaso¹, Rosario Miceli¹

¹ *University of Palermo, Italy*

ICEM26-000385 | Impact of current harmonics on field oriented control of permanent magnet synchronous machines in the field weakening area

Lars Boschert¹, Jan Philipp Degel¹, Stefan Haehnlein¹, Dominik Krahe², Johannes Kolb², Christian Klöffler¹

¹ *Offenburg University of Applied Science, Germany*

² *SHARE at KIT Schaeffler Technologies AG & Co. KG, Germany*

ICEM26-000456 | Self-Sensing Control of Highly Saturated PMSMs at Operating Points with Identical Self-Inductances

Viktor Willich¹, Axel Mertens¹

¹ *Leibniz University Hannover, Germany*

ICEM26-000571 | Design of Fractional-Order PID Controller to Active Magnetic Bearing Control

Feng Yi¹, Jian Li¹, Yang Lu¹, Haodong Li¹, Zhouwei Wu¹, Zixuan Zhang¹

¹ Huazhong University of Science and Technology, China

ICEM26-000600 | High-Precision Discrete Mathematical Modeling and Internal Model Controller Design for IPMSMs Under Low Carrier-Ratio Conditions

Mengjia Zhang¹, Jian Li¹, Yang Lu¹, Fei Du², Shuhuai Yang¹, Zhen Guo¹

¹ Huazhong University of Science and Technology, China

² Dalian University of Technology, China

ICEM26-000009 | Partial Discharge Behaviour and Accelerated Lifetime Model of an Induction Machine under Repetitive Impulsive Voltage

Mohammed Elmezain¹, Fawzy Abdo¹, Mehmet Gulec¹, Peter Sergeant¹

¹ Ghent University, Belgium

ICEM26-000117 | Methodology Choice for Fuzzy-Based Vibration Fault Diagnosis of Collaborative Robots

Siarhei Autso¹, Olga Dunaeva¹, Mare Roosileht¹, Karolina Kudelina¹

¹ Tallinn University of Technology, Estonia

ICEM26-000120 | Neural Network-Based Detection of Rolling Bearing Anomalies in a Closed-Loop Controlled PMSM

Mateusz Krzysztofak¹, Maciej Skowron¹

¹ Wroclaw University of Science and Technology, Poland

ICEM26-000201 | Graph-Based Machine Learning for Classification of Eccentricity Faults in Induction Motors

George Tsialiamanis¹, Florence Clifford-Albrighton¹, Zihao Song¹, Antonios Karavitakis², Konstantinos Gyftakis², Panagiotis Panagiotou¹

¹ University of Sheffield, UK

² Technical University of Crete, Greece

ICEM26-000259 | Multi-Domain Feature Learning for Broken Rotor Bar Fault Diagnosis in Induction Motors

Vasileios Vlachou¹, Theoklitos Karakatsanis², Dimitrios Efstathiou³, Stavros Vologianidis³, Zihao Song⁴, Panagiotis Panagiotou⁴

¹ National Technical University of Athens, Greece

² Democritus University of Thrace, Greece

³ International Hellenic University, Greece

⁴ University of Sheffield, UK

ICEM26-000334 | Time-Frequency Analysis of Brush Sparking in Wound Rotor Induction Machines

Jorge E. Carvajal P.¹, Jose Manuel Guerrero Granados¹, Garazi Hernández¹, Victor Valverde¹

¹ Universidad del País Vasco / Euskal Herriko Unibertsitatea (UPV/EHU), Spain

ICEM26-000541 | Data-Driven Multi-State Flux Model for Enhanced Static Eccentricity Diagnosis of IPMSMs

Jaeyoon Kim¹, Jae-Kyung Ryu¹, Chae-Young Jeong¹, Joonho Yang², Byeng Dong Youn², Soo-Hwan Park¹

¹ Dongguk University, Republic of Korea

² Seoul National University, Republic of Korea

ICEM26-000554 | High-Frequency Common-Mode Impedance Extraction and dv/dt Current Prediction in Small Inverter-Fed Induction Machines

Oliver Magdun¹, Yves Gemeinder², Ioan Corneliu Salisteanu¹, Andreas Binder³

¹ Valahia University of Targoviste, Romania

² Hyundai Motor Europe, Germany

³ Technical University Darmstadt, Germany

ICEM26-000617 | Prediction of Combination Resonance in a Beam with Superconducting Magnetic Supports

Toshihiko Sugiura¹, Taiga Miyahara¹

¹ Keio University, Japan

ICEM26-000232 | Comparative case study of propulsor motor design concepts for 4-seat all-electric aircraft

Tobias Knapp¹, Albert Schmidt¹, Matthias Centner¹

¹ Dresden University of Technology, Germany

ICEM26-000336 | Enhanced Speed Control Strategy for Propeller-Load PMSMs Incorporating Active Damping Compensation

Jingwei Lin¹, Yilin Ma¹, Huan Yang¹, Rongxiang Zhao¹, Jian-Xin Shen¹

¹ Zhejiang University, China

ICEM26-000536 | A Review of Axial Flux Machines Topology Classification and Manufacturing Techniques

Wasiq Ullah¹, Mehroz Fatima², Udochukwu Akuru³, Mohamed Abido⁴, Abdul Junejo⁴, Mahmoud Hamouda⁴

¹ Kabul Polytechnic University, Afghanistan

² Tallinn University of Technology, Estonia

³ Tshwane University of Technology, South Africa

⁴ IRC-SES - Fahd University of Petroleum & Mine, Saudi Arabia

ICEM26-000627 | Systematic Analysis of Axial Flux Synchronous Reluctance Machines Considering End Windings in a Fixed Installation Space

Adrian Schäfer¹, Yuancong Gong¹, Tobias Zürrlein², Yazan Bajah³, Nejila Parspour¹

¹ Institute of Electrical Energy Conversion - University of Stuttgart, Germany

² FAPS - Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

³ PEM - RWTH Aachen University, Germany

ICEM26-000164 | Performance Analysis of a Diode-Rectifier-Connected Permanent Magnet Vernier Wind Generator for DC Grids

Sandile Masango¹, Lucky Dube², Rong-Jie Wang¹, Maarten Kamper¹

¹ Stellenbosch University, South Africa

² University of Eswatini, Eswatini

ICEM26-000522 | Multi-Objective Model Predictive Control for an Induction Machine fed by an NPC Inverter

Gustavo Henrique R. Adelino¹, Marco Rivera², Nady Rocha¹, Patrick Wheeler²

¹ Universidade Federal da Paraíba, Brazil

² University of Nottingham, UK

16:40-18:20 ORAL SESSIONS

Rotating Machines 5

Room Funchal

Chairs: Jose Antonino Daviu, *Universitat Politècnica de Valencia*
Rosario Miceli, *University of Palermo*

16:40 ICEM26-000088 | Robust Optimal Design of Permanent Magnet Motors Approaching Ultimate Strength

Hao Hu¹, Haiyang Fang¹, Miao Wang¹, Dawei Li¹, Ronghai Qu¹

¹ Huazhong University of Science and Technology, China

17:00 ICEM26-000229 | Overloadability Analysis for Distributed Winding Multiphase Machines

Stepan Slama¹, Zdenek Frank¹, Jan Laksar¹, Karel Hruska¹

¹ University of West Bohemia, Czechia

17:20 ICEM26-000414 | Shaft Voltage and Bearings Durability of Closed-Slot Stator in Traction Permanent Magnet Machine

Tahar Hamiti¹

¹ Nidec PSA Emotors, France

17:40 ICEM26-000455 | Common-Mode Return Current Distribution and Circulating Bearing Currents in Electrical Machines with High-Conductivity Housings

Hans-Georg Kneidinger¹, Annette Muetze¹

¹ Graz University of Technology, Austria

18:00 ICEM26-000076 | CFD study of a hydroelectric generator and effect of air leakage on flow distribution

Erwan Lambert¹, Federico Torriano², Mathieu Bertrand¹

¹ Andritz Canada Inc., Canada

² Hydro-Québec, Canada

Digital Twins for Electrical Machines

Room Berlim

Chairs: Daniel Montesinos, CITCEA - Universitat Politècnica de Catalunya
Stéphane Clenet, Arts et Métiers Institute of Technology

16:40 ICEM26-000526 | Multi-Parametric Thermal Reduced Order Model of a Canned Motor Pump for Real-Time Digital Twin

Sascha Neusüs¹, Robin Köster¹, Boris Janjic¹

¹ KSB SE & Co. KGaA, Germany

17:00 ICEM26-000525 | Hybrid Thermal Modeling for Real-Time Self-Learning Digital Twins of Pump Drives

Robin Köster¹, Sascha Neusüs¹, Boris Janjic¹

¹ KSB SE & Co. KGaA, Germany

17:20 ICEM26-000572 | High-Fidelity model of an 800 V SiC-Based Powertrain Digital Twin

Amaia Lopez de Heredia Bermeo¹, Iago Martinez², Maitane Carrasco¹, Ion Iturbe², Fernando Garramiola²

¹ Ikerlan Technology Research Centre, Spain

² Mondragon University, Spain

17:40 ICEM26-000056 | Heat Flow Assessment with the Ecocycle Motor Digital Twin

Mario Vukotić¹, Juzer Rangwala², Urban Rupnik¹, Andrija Jeknić¹, Roman Manko¹, Selma Čorović¹, Alen Alić¹, Damijan Miljavec¹

¹ University of Ljubljana, Slovenia

² BorgWarner, Germany

18:00 ICEM26-000101 | Embedded Digital Twin for Optimal Control of EV PMSMs with Multiphysics Integration

Konstantinos Kostopoulos¹, Oriol Subirats Rillo¹, Daniel Montesinos¹, Julien Korecki², Thomas Henneron², Stéphane Clénet², Oriol Sanmarti Perona³, Daniel Santos Serrano³, Marcial Mosqueda Otero³, Carles Oliet³, Gyorgy Kulcsar⁴, Sergiu Marciuc⁴

¹ CITCEA - Universitat Politècnica de Catalunya, Spain

² Univ. Lille, Arts et Metiers Institute of Technology, France

³ Heat and Mass Transfer Technological Center - Universitat Politècnica de Catalunya, Spain

⁴ 4Multiphysics SRL, Romania

Design Issues (Optimization, Modeling and Simulation) 6

Room Sydney

Chairs: Luca Ferraris, *Politecnico di Torino*
Yujing Liu, *Chalmers University of Technology*

16:40 ICEM26-000216 | Laminated Material Modeling and Mechanical Stress Analysis of Hybrid Laminated–Solid Rotor Core for High-Speed High-Power Induction Motors

Yulong Cui¹, Mohammad Reza Ilkhani², Christopher Gerada², Andrea Cavagnino¹

¹ Politecnico di Torino, Italy

² University of Nottingham, UK

17:00 ICEM26-000611 | Inverter-Induced Bearing Currents in High-Specific-Power Outer Rotor PMSM: Influence of Slot-Pole Asymmetry

Konstantin Vostrov¹, Hüseyin Canseven¹, Ilya Petrov¹, Juha Pyrhönen¹

¹ LUT University, Finland

17:20 ICEM26-000373 | Impact of Saliency on Small Signal Stability of Synchronous Reluctance Motors for Electric Vehicles

Hernan Alonso Bravo Urrea¹, Enrique Quispe², Felipe Santacruz³, Juan Tapia³, Harold José Díaz Martínez⁴, Carlos Madariaga³, Jan Barta¹

¹ Brno University of Technology, Czechia

² Universidad Autónoma de Occidente, Colombia

³ Universidad de Concepción, Chile

⁴ Universidad del Valle, Colombia

17:40 ICEM26-000590 | Electromagnetic-noise-constrained optimization using coupled Mesh-Magnetic Equivalent Circuit and analytical vibro-acoustic model

Vyvien Dumont¹, Michel Hecquet¹, Maxime Ployard², Frédéric Gillon¹, Aymen Ammar², Abdelmounaïm Tounzi¹

¹ Univ. Lille, Arts et Metiers Institute of Technology, France

² JEUMONT Electric, France

18:00 ICEM26-000607 | System-Level and FEM Co-Simulation of a Nanocrystalline Medium-Frequency Transformer: A Comparative Study of Core Loss Models

Marco Stella¹, Vittorio Bertolini¹, Antonio Faba¹

¹ University of Perugia, Italy

Electrical Drives 4

Room Caracas

Chairs: Giacomo Scelba, *University of Catania*
Ioannis Tsoumas, *ABB Switzerland Ltd.*

16:40 ICEM26-000661 | A Modular Norton-Equivalent Approach to Control of Synchronous Machine Drives With an LC Filter

Hannu Hartikainen¹, Marko Hinkkanen¹

¹ *Aalto University, Finland*

17:00 ICEM26-000579 | Intermodulation-based Pulsating High-Frequency Injection Sensorless Control of a Multisaliient Traction Induction Machine

Peter Gangel¹, Eduardo Rodriguez Montero¹, Markus Vogelsberger², Thomas Wolbank¹

¹ *Vienna University of Technology, Austria*

² *ALSTOM Transport Austria GmbH, Austria*

17:20 ICEM26-000253 | Current Harmonics in Induction Machine Drives Under Torsional Vibrations

Angelo Boceda¹, Matteo Deponti¹, Giovanni Maria Foglia¹, Roberto Perini¹

¹ *Politecnico di Milano, Italy*

17:40 ICEM26-000234 | Linear Quadratic Integral Control with Incremental-State Kalman Filter for Synchronous Motor Currents under Limited Model Information

Gabriele De Boni^{1,2}, Lorenzo Mantione¹, Lucia Frosini¹

¹ *University of Pavia, Italy*

² *SPIN Applicazioni Magnetiche, Italy*

18:00 ICEM26-000210 | Dynamic Reference Current Adaptation for Field-Oriented Control of Electrically Excited Synchronous Machines at High Speeds

Felix Burkard¹, Andreas Gneiting¹, Nejila Parspour¹

¹ *University of Stuttgart, Germany*

Electrical Machines and Drives for Sustainable Transportation 3

Room Cape Town

Chairs: Peter Sergeant, *Ghent University*
Stefano Nuzzo, *University of Modena and Reggio Emilia*

16:40 ICEM26-000064 | Rewinding a PMSM Stator for Higher Voltages considering Alternative Hairpin Winding Schemes

Lukas Böcker¹, Luca Peretti¹

¹ *KTH Royal Institute of Technology, Sweden*

17:00 ICEM26-000614 | Suboptimal Control of Permanent Magnet-assisted Synchronous Reluctance Motors: Design and Application

Andrea Credo¹, Federico Centi¹, Giuseppe Fabri¹, Rama Salloum¹, Marco Villani¹, Marco Tursini¹

¹ *University of L'Aquila, Italy*

17:20 ICEM26-000402 | Harmonic Injection-Based Flux-Weakening Control of PMSM with Improved DC Bus Utilization

Matteo Pizzuto¹, Aiswarya Balamurali², Caniggia Viana³, Hossain Mohammadi⁴, Narayan Kar¹

¹ *University of Windsor, Canada*

² *Schaeffler, Canada*

³ *University of Manitoba, Canada*

⁴ Schaeffler, USA

17:40 ICEM26-000562 | Experimental Comparative Study on Regenerative Control Algorithms for Brushless DC Machines

Marcello Minervini¹, Emir Poskovic², Angelo Baggini¹, Paolo Giangrande¹

¹ University of Bergamo, Italy

² Politecnico di Torino, Italy

18:00 ICEM26-000472 | An Efficiency-Optimized Control Strategy for Variable Flux Machines

Santiago Cianca Sosa¹, Julius Kesten¹, Matthias Brodatzki¹, Martin Doppelbauer¹

¹ Karlsruhe Institute of Technology, Germany

Special Machines, Linear Machines, Actuators and Sensors 1

Room Rio de Janeiro

Chairs: Michael Galea, *University of Malta*

Ronghai Qu, *Huazhong University of Science and Technology*

16:40 ICEM26-000584 | Sensor-less Machine Learning Assisted Position Estimation of Linear Solenoid Actuator System

Christopher Strabegg¹, David Rafetseder¹, Lukas Pinsker¹, Florian Poltschak¹

¹ Johannes Kepler University, Austria

17:00 ICEM26-000473 | Fast Electromagnetic Assessment of a Phase Modular Transverse Flux Permanent Magnet Motor Using Static Solution Reconstruction

Georgios Assi Xylogiannis¹, Georgios Sakkas¹, Antonios Kladas¹

¹ National Technical University of Athens, Greece

17:20 ICEM26-000242 | Towards Sustainable Electromagnetic Actuators: A Comparative Study of Rare-Earth-Free Magnetic Materials

Trung Duong¹, Arda Tüysüz¹

¹ ABB Corporate Research Center, Germany

17:40 ICEM26-000036 | Subspace Projection for Self-Sensing Position Detection

Lukas Pinsker¹, David Rafetseder¹

¹ JKU HOERBIGER Research Institute, Austria

18:00 ICEM26-000121 | Design and Comparative Analysis of a Novel Interior Flux-Concentrating Rotor for Yokeless Stator AFPM Machines

Cheng Yuan¹, Pang Wei¹, Chen Huiyu¹, Zhao Da¹, Zhao Tianxu¹, Cui Shumei¹

¹ Harbin Institute of Technology, China

18:30-19:30 ICEM NPO General Assembly Meeting

Room Funchal

20:00-23:30 Gala Dinner

Casino da Madeira

Wednesday, 9 September 2026

08:00-18:00 REGISTRATION

Ground Floor - Pestana Casino Park Hotel

08:30-10:10 ORAL SESSIONS

Advances in Multiphase Electric Drives: Design, Reliability, and Control

Room Funchal

Chairs: Ayman EL-Refaie, *Marquette University*
Peter Sergeant, *Ghent University*

08:30 ICEM26-000563 | Asymmetrical Space Vector Modulation for Two-Level Nine-Phase Converters

Rodrigo Bastos¹, Rafael F. Bortolo, ¹ Braz J. Cardoso Filho¹

¹ *Universidade Federal de Minas Gerais, Brazil*

08:50 ICEM26-000411 | Consideration of Magnetic Coupling in Segmented Dual Three-Phase Electrical Machines with Residual Model Approach

Lorenz Schoch¹, Matthias Brodatzki¹, Martin Doppelbauer¹

¹ *Karlsruhe Institute of Technology, Germany*

09:10 ICEM26-000363 | Concept for a high-power Stator Cage Drive with integrated power supply

Dennis Guhl¹, Michael Schütz¹, Martin Dammer¹, Matthias Centner¹, Steffen Bernet¹

¹ *Dresden University of Technology, Germany*

09:30 ICEM26-000384 | Impact of Switching Frequency and DC-Link Voltage of Wide-Bandgap Inverters on Bearing Electrical Stress in Electric Machines

Fawzy Abdo¹, Daan Deruyter¹, Mehmet Gulec¹, Kotb Tawfiq², Peter Sergeant¹

¹ *Ghent University, Belgium*

² *Khalifa University, UAE*

09:50 ICEM26-000547 | Semi-Decoupled Modulation Method for Voltage Utilisation Improvement and Current Harmonic Mitigation of Dual Three-Phase Motor Drives

Mengmeng Cui¹, Dongdong Chen¹, Tianjie Zou¹, Dmytro Prystupa¹, Andrew Trentin¹, Jacopo Riccio¹, Xiang Ren¹, Michele Degano¹, Chris Gerada¹

¹ *University of Nottingham, UK*

Physics-Guided and Domain-Informed AI for Electrical Machine Design and Fault Diagnosis

Room Berlim

Chairs: Anh Thanh Huynh, *University of Nottingham*
Giovanni Franceschini, *University of Modena and Reggio Emilia*

08:30 ICEM26-000081 | Surrogate-based Sensitivity Analysis for Low-dimensional Freeform Generator Designs

Latha Sethuraman¹, Andrew Glaws¹, Panagiotis Tsilifis², Jaime Renedo Anglada²

¹ National Laboratory of the Rockies, USA

² GE Vernova Advanced Research, USA

08:50 ICEM26-000260 | A BERT-Based Surrogate Model for Permanent Magnet Motor Cogging Torque Prediction

Siyuan Sun¹, Ye Wang², Toshiaki Koike-Akino², Tatsuya Yamamoto³, Yusuke Sakamoto³, Bingnan Wang²

¹ Iowa State University, USA

² Mitsubishi Electric Research Laboratories, USA

³ Mitsubishi Electric Corporation, Japan

09:10 ICEM26-000631 | Physics-Informed Surrogate-Based Local Sensitivity Analysis of Stator Slot Geometry in Hairpin Winding IPMSMs with Limited Data

Anh Thanh Huynh¹, Thien-Phuoc Nguyen², Khang Huynh²

¹ University of Nottingham, UK

² University of Agder, Norway

09:30 ICEM26-000209 | Computationally Efficient Prediction of Electromagnetic Excitation Force in SPMSM Considering Axial Leakage Flux via Space Harmonic Analysis-Based Deep Transfer Learning

Jae-Kyung Ryu¹, Jae-Hyun Kim², Jae-Yoon Kim¹, Min-Ro Park³, Soo-Hwan Park¹

¹ Dongguk University, Republic of Korea

² Yeungnam University, Republic of Korea

³ Soonchunhyang University, Republic of Korea

09:50 ICEM26-000307 | Physics-Informed Machine Learning for Interpretable Fault Diagnosis in PMSM-Driven Belt Transmission Systems

Chengkai Shen¹, Joachim Weissbacher², Chen Song¹

¹ ABB Corporate Research Center, Germany

² ABB AG, Austria

Frequency Response Analysis for Electrical Machines' Fault Diagnosis and Prognosis

Room Sydney

Chairs: Jose E. Ruiz-Sarrio, *Universitat Politècnica de Valencia*

Konstantinos Gyftakis, *Technical University of Crete*

08:30 ICEM26-000301 | Impedance Frequency Response Analysis for Non-Destructive Evaluation of Concentrated Coils

Edward Stone¹, Panagiotis Panagiotou¹, Andrew Mills¹, Geraint Jewell¹, Alexis Lambourne²

¹ University of Sheffield, UK

² Rolls-Royce Plc. UK, UK

08:50 ICEM26-000261 | Modelling Sensitivity of Impedance Spectroscopy to Coil Insulation Thickness and Geometry

Edward Stone¹, Panagiotis Panagiotou¹, Andrew Mills¹, Geraint Jewell¹, Alexis Lambourne²

¹ University of Sheffield, UK

² Rolls-Royce Plc. UK, UK

09:10 ICEM26-000280 | A Highly-Sensitive Ground-Wall and Phase-Phase Winding Insulation Monitoring Method using Partial Common-Mode Excitation

Eduardo Rodriguez Montero¹, Markus Vogelsberger², Thomas Wolbank¹

¹ Vienna University of Technology, Austria

² ALSTOM Transport Austria GmbH, Austria

09:30 ICEM26-000105 | Comprehensive Measurement Analysis of the Cyclic Multi-Stress Ageing of Stator Winding Insulation

Norman Blanken¹, Bernd Ponick¹

¹ Leibniz University Hannover, Germany

09:50 ICEM26-000300 | Motor Poles' Degradation-based Frequency Response Analysis - The YASA Motor Paradigm

Magda Maragkoudaki¹, Tim Woolmer², Konstantinos Gyftakis¹

¹ Technical University of Crete, Greece

² YASA Ltd., UK

Design Issues (Optimization, Modeling and Simulation) 7

Room Caracas

Chairs: Athanasios Karlis, *Democritus University of Thrace*

Nicola Bianchi, *University of Padova*

08:30 ICEM26-000304 | Impact of electromagnetic coupling on bearing dynamics and acoustic response in electric machines

Charles Nutakor¹, Fabio Di Giusto², Lucas Van Belle², Alen Alić³, Selma Čorović³, Mario Vukotić³, Elke Deckers², Frank Naets², Damijan Miljavec³, Jussi Sopanen¹

¹ LUT University, Finland

² KU Leuven, Belgium

³ University of Ljubljana, Slovenia

08:50 ICEM26-000435 | Accelerating Magnetostatic FE Simulations of Electric Machines With Echo State Networks

Federico Valpiani¹, Gerd Bramerdorfer², Alessandro Niccolai¹, Sonia Leva¹

¹ Politecnico di Milano, Italy

² Johannes Kepler University, Austria

09:10 ICEM26-000339 | Effect of Symmetrical and Asymmetric Eccentric Arc Tooth Shaping on Vibration Force in SPM and IPM Synchronous Machines

Shiyun Li¹, Zi-Qiang Zhu¹, Yinzhaoh Zheng², Hao Xu¹, Yue Liu³, Hui Wu³, Ruiren Luo⁴

¹ Hong Kong Polytechnic University, China

² University of Sheffield, UK

³ CRRC Times Electric, UK

⁴ CRRC Times Electric, China

09:30 ICEM26-000017 | Assessment of proximity effect with conformal mapping for tooth wound windings in rotating electric machines

Lukas Resch¹, Reinhard Ingruber¹, Roland Seebacher²

¹ ELIN Motoren, Austria

² TU Graz, Austria

09:50 ICEM26-000111 | Coupling of Electromagnetic and Structural Domains for NVH Prediction of PMSM motor

Alen Alić¹, Lucas Van Belle², Fabio Di Giusto², Mario Vukotić, Charles Nutakor³, Selma Čorović¹, Frank Naets², Elke Deckers², Urban Rupnik¹, Damijan Miljavec¹

¹ University of Ljubljana, Slovenia

² KU Leuven, Belgium

³ LUT University, Finland

Diagnostics and Condition Monitoring 6

Room Cape Town

Chairs: Luca Vancini, *University of Bologna*
Sang Bin Lee, *Korea University*

08:30 ICEM26-000560 | The influence of single interturn short circuits on the properties of a switched reluctance motor and their detection

Mariusz Korkosz¹, Jan Prokop¹, Piotr Bogusz¹, Piotr Zasowski¹, Marcello Minervini²

¹ Rzeszów University of Technology, Poland

² University of Bergamo, Italy

08:50 ICEM26-000483 | An Automated Test Bench Concept for Degradation Testing of Electrical Insulation Systems Under Thermal and Electrical Stress

Philipp Tillmann¹

¹ ENGIRO GmbH, Germany

09:10 ICEM26-000230 | A Universal Diagnostic Framework for Stator Faults in Symmetrical and Asymmetrical Six-Phase Induction Motor Drives

Hugo R. P. Antunes¹, D. S. B. Fonseca¹, João Serra¹, Antonio J. Marques Cardoso¹

¹ CISE | University of Beira Interior, Portugal

09:30 ICEM26-000442 | Data Based Mechanical Fault Identification for Synchronous Reluctance Motor via Physically Significant Features

Angela Navarro¹, Oliwia Frankiewicz², Jose E. Ruiz-Sarrio¹, Maciej Skowron², Jose Antonino Daviu¹

¹ Universitat Politècnica de València, Spain

² Wrocław University of Science and Technology, Poland

Cryogenic Electric Machines

Room Rio de Janeiro

Chairs: Reda Abdouh, *Airbus UpNext*
Xiaoze Pei, *University of Bath*

08:30 ICEM26-000588 | Design and Preliminary Testing of a Cryogenically-Cooled Hyperconducting Motor

Matteo Felice Iacchetti¹, Alexander Smith², Hongye Zhang³, Paul Tuohy², Alexandru-Vlad Rusu⁴, Stephen Harrison⁵, Charalampos Manolopoulos⁵, Matthew Copus⁵, Chuanli Zhao⁶

¹ Politecnico di Milano, Italy

² University of Manchester, UK

³ University of Edinburgh, UK

⁴ European Organisation for Nuclear Research (CERN), Switzerland

⁵ GKN Aerospace, UK

⁶ Hpdrive Technologies Limited, U

08:50 ICEM26-000148 | Comparative Study of Superconducting and Hyperconducting Air-Cored Motors for Electric Aircraft Propulsion

Mingzhe Sang¹, Hongye Zhang¹, Matteo Felice Iacchetti², Markus Mueller¹, Alexander C. Smith³

¹ *University of Edinburgh, UK*

² *Politecnico di Milano, Italy*

³ *University of Manchester, UK*

09:10 ICEM26-000178 | AC Loss Reduction in the Stator Windings of a Fully HTS Axial-Flux Wind Generator via Coil Layout Optimization

Shuangrong You¹, Ozan Keysan¹, Adil Shah¹, Hongye Zhang¹, Markus Mueller¹

¹ *University of Edinburgh, UK*

09:30 ICEM26-000605 | Revisiting the Analytical Design of Wound-Field Synchronous Machines for High Torque Density Fully Superconducting Slotted Machines

Anass Lemansour¹, Thierry Lubin¹, Jean Lévêque¹

¹ *GREEN - Université de Lorraine, France*

09:50 ICEM26-000073 | Identifying Challenges and Solutions of Partially Superconducting Machines for Aviation Applications

Urooj Jadoon¹, Dong Liu¹, Lassi Aarniovuori¹, Juha Pyrhönen¹

¹ *LUT University, Finland*

10:10-11:10 POSTER SESSION IV, STUDENT FORUM & COFFEE BREAK

Room: Sunset

Chairs: Andrea Credo, *University of L'Aquila*
Giacomo Scelba, *University of Catania*
Hendrik Vansompel, *Ghent University*
Maciej Skowron, *Wroclaw University of Science and Technology*
Michael Galea, *University of Malta*

ICEM26-000050 | Characterization of Eddy Currents in Additively Manufactured Rotors of Synchronous Reluctance Machines

Max Langanke¹, Marius Behrendt¹, Bernd Ponick¹

¹ *Leibniz University Hannover, Germany*

ICEM26-000100 | Review of laser powder bed fusion and multimaterial additive manufacturing for soft magnetic electrical machine core components

Antti Mutanen¹, Antti Salminen¹, Rafal P. Jastrzebski¹

¹ *University of Turku, Finland*

ICEM26-000360 | Current Density Maximizing Design of an Additively Manufactured Axial Flux Switched Reluctance Motor

Martin Sarap¹, Ants Kallaste¹, Toomas Vaimann¹

¹ *Tallinn University of Technology, Estonia*

ICEM26-000093 | Comparative Loss Analysis of Additively Manufactured Copper and Aluminium Windings for Cryogenic Motors

Yuchen Wang¹, Wenkai Yan¹, Han Wang¹, Kenneth Nai¹, Biao Cai², Alexander Goodall³, Xianwu Zeng¹, Xiaoze Pei¹

¹ University of Bath, UK

² University of Birmingham, UK

³ University of Sheffield, UK

ICEM26-000161 | Characterization of Defect-Induced Losses and Insulation Reinforcement Strategies for Litz Wire in Submerged Liquid Hydrogen Pump Motors

Yan Zhang¹, Yuanzhi Zhang¹, Dawei Li¹, Ronghai Qu¹

¹ Huazhong University of Science and Technology, China

ICEM26-000083 | On the Definition of Specific Electric Loading in Switched Reluctance Machines

Vincenzo Madonna¹, Cesare Maria Meano¹, Alberto Lorenzo Vassallo¹

¹ Dumarey Automotive Italia S.p.A., Italy

ICEM26-000335 | A Shaped Profile Winding Configuration with Variable Cross-Section and Heat Pipe Cooling

Yanhe Ren^{1,2}, Han Zhao¹, Jing Li², Xiaochen Zhang¹, Weiduo Zhao², Dalin Du¹, Yixiang Yuan¹, He Zhang^{1,2}

¹ Advanced Electric Drive Centre Yongjiang Laboratory, China

² University of Nottingham Ningbo, China

ICEM26-000682 | Impact of Stator Slot Aspect Ratio on AC Loss in Hairpin Windings in Axial Flux Induction Machines

Carlos Galvez-Araya¹, Carlos Madariaga¹, Yosmani Almira¹, Felipe Santacruz¹, César Gallardo², Juan Tapia¹

¹ University of Concepcion, Chile

² University of Nottingham, UK

ICEM26-000518 | Fast Coupled Electromagnetic-Thermal Analysis for the Optimization of IPMSM Temperature Evaluation over Driving Cycles

Hiroyuki Sano¹, Taizo Senda¹, Atsuyoshi Nagase¹, Kazuki Semba¹, Takashi Yamada¹

¹ JSOL Corporation, Japan

ICEM26-000303 | Inter-Plane Cross Saturation Effects on the Vector Space Decomposition Modeling of a Dual Three-Phase IPM Machine

Marco Pastura¹, Fabio Tinazzi¹, Mauro Zigliotto¹

¹ University of Padova, Italy

ICEM26-000475 | Third-Harmonic Flux Effect in the Five-Phase Interior PMSM

Jan Laksar¹, Tomáš Komrská¹, Vaclav Šmíd¹, Karel Hruska¹, Lukáš Adam¹

¹ University of West Bohemia, Czechia

ICEM26-000648 | Direct Force Control of Six-Phase Bearingless Synchronous Machines

Nirangkush Das¹, Florian Martin¹, Eleftherios Kontodinas¹, Marko Hinkkanen¹

¹ Aalto University, Finland

ICEM26-000520 | Real-Time Inter-Turn Fault Detection in Six-Phase PMSMs and Aging Characterization

Luca Vancini¹, Paolo Seri¹, Michele Mengoni¹, Gabriele Rizzoli¹, Antonio J. Marques Cardoso², Andrea Cavallini¹

¹ University of Bologna, Italy

² CISE | University of Beira Interior, Portugal

ICEM26-000569 | Permanent Magnet Outer Rotor Motor for Aerospace application

Marco Villani¹, Francesco Parasiliti¹, Federico Centi¹, Moreno D'Andrea², Cecilia D'Angelo², Riccardo Ballesi²

¹ *University of L'Aquila, Italy*

² *UmbraGroup S.p.A, Italy*

ICEM26-000356 | Comparison of Capacitive and Resistive Faults in Field Windings of Synchronous Machines by Frequency Response Analysis (FRA)

Abel Dominguez¹, Alberto Perez-Arnal¹, Carlos A. Platero¹, Jose Manuel Guerrero Granados²

¹ *Universidad Politécnica de Madrid, Spain*

² *Universidad del País Vasco / Euskal Herriko Unibertsitatea (UPV/EHU), Spain*

ICEM26-000077 | An Overview of the Partial Discharge Electrical Measurement Chain for AI-Based Online Monitoring of Rotating Machines

Léo-Paul Carre¹, Thierry Boileau², Lionel Durantay¹, Cyrille Caironi²

¹ *GE Vernova, France*

² *LEMTA / Université de Lorraine, France*

ICEM26-000258 | Optimal Feedforward Torque Control of Permanent Magnet Synchronous Machines via a Meta-Learning-Based Artificial Neural Network

Erik Köster¹, Lukas Hölsch¹, Oliver Wallscheid¹

¹ *University of Siegen, Germany*

ICEM26-000537 | Compressed-sensing Approach to Magnetic-Flux Map Acquisition with Experimental Validation

Abhishek Patkar¹, Yebin Wang², Abraham Goldsmith², Dehong Liu², Kamal Youcef-Toumi¹

¹ *Massachusetts Institute of Technology, USA*

² *Mitsubishi Electric Research Laboratories, USA*

ICEM26-000166 | How NdFeB Placement Affects the Demagnetization of a Hybrid NdFeB and Ferrite Permanent Magnet in an Electric Motor

Kristina Bergström¹, Sandra Eriksson¹

¹ *Uppsala University, Sweden*

ICEM26-000276 | A Low-Cost Non-Destructive Method for the Diagnosis of Magnetic Health of Permanent Magnet Rotors

Alphousseyni Sagna¹, Stephane Clenet², Nicolas Perry¹, Wissem Bekir², Abdelkader Benabou²

¹ *Arts et Metiers Institute of Technology, Univ. Bordeaux, France*

² *Univ. Lille, Arts et Metiers Institute of Technology, France*

ICEM26-000534 | Review and Classification of Axial Flux Machines for Industrial Transportation Electrification

Wasiq Ullah¹, Mehroz Fatima², Udochukwu Akuru³, Mohamed Abido⁴, Abdul Junejo⁴, Mahmoud Hamouda⁴

¹ *Kabul Polytechnic University, Afghanistan*

² *Tallinn University of Technology, Estonia*

³ *Tshwane University of Technology, South Africa*

⁴ *IRC-SES - Fahd University of Petroleum & Mine, Saudi Arabia*

ICEM26-000624 | Stochastic Gradient Descent Based Torque Ripple Mitigation of Permanent Magnet Synchronous Machines: A Comparative Study

Qixuan Chenwei Wang¹, Torbjörn Thiringer¹, Joachim Härsjö²

¹ *Chalmers University of Technology, Sweden*

² *Volvo Cars, Sweden*

ICEM26-000016 | Magnet Volume Reduction of Spoke-Type IPM Motors Using Resin-Unit Rotor StructureTaketo Minami¹, Yuki Hidaka²¹ Nagaoka University of Technology, Japan² Ritsumeikan University, Japan**ICEM26-000283 | Mitigating manufacturing degradation in axial flux traction motors via stress relief annealing**Ahmed Abouelyazied¹, Abderrahmane Rebhaoui²¹ ArcelorMittal Global R&D, Belgium² Emotors Nidec PSA, France**ICEM26-000413 | Effects of Magnetic Saturation on the Field-oriented Control of Variable Flux Reluctance Machines**Yiwei Hu¹, Doga Ceylan¹, Konstantin O. Boynov¹, Elena Lomonova¹¹ Eindhoven University of Technology, Netherlands**ICEM26-000480 | Improvement of Magnetic Coupling by Simple Modification of Pot-Core Rotary Transformers**Murtaza Ali Khooharo¹, Luca Papini¹, Paolo Bolognesi¹¹ University of Pisa, Italy**ICEM26-000538 | Mathematical Modeling of a Wound Rotor Synchronous Generator with Phase-Shifted Non-Overlap Windings as a Synchronous Condenser**Karen Garner¹¹ Stellenbosch University, South Africa**ICEM26-000190 | AI-Assisted Multi-Physics Optimization of PWM-Supplied Electric Motors**Sifis Leventakis¹, Patrick Lombard², Limin Huang²¹ Altair, Greece² Siemens, France**ICEM26-000204 | Drive Cycle Based Multiphysical Optimization of an Interior Permanent Magnet Synchronous Machine Using Isogeometric Rotor Shape Optimization**Leon Blumrich¹, Michael Wiesheu¹, Sebastian Schöps¹, Yves Burkhardt¹¹ TU Darmstadt, Germany**ICEM26-000257 | A Method for Computation the Copper Layer Thickness of High Speed Copper-Coated Solid Rotor Induction Machines Based on Equivalent Circuit**Liwei Zhu¹, Zhiquan Deng¹, Aohua Wang¹¹ Nanjing University of Aeronautics and Astronautics, China**ICEM26-000290 | Comparative preliminary design of three 5 MW, 240rpm electric generators for wind and hydro energy conversion with FEM key validation**Ion Boldea¹, Lucian Tutelea¹, Ana-Adela Popa¹, Ileana Torac¹, Bogdan A. Cîrdei¹, Viorel Arton¹¹ University Politehnica Timisoara & Romanian Academy Timisoara Branch, Romania**ICEM26-000313 | Study on the influence of mount characteristics uncertainties on the electric machine-induced structure-borne noise**Fabien Chauvicourt¹, Alex McCloskey²¹ Siemens Industry Software NV, Belgium² Mondragon Unibertsitatea, Spain

ICEM26-000348 | Feasibility Study of a Pure Iron PBF-LB Printed AFPM Machine

Jean Francois Llibre¹, Olivier Maillot¹, Thomas Huguet¹, Nelson Sadowski², Isabelle Pasquet³, Valérie Baco-Carles³, Vincent Baylac³, Philippe Tailhades³

¹ LAPLACE - Université de Toulouse, France

² Federal University of Santa Catarina (UFSC), Brazil

³ CIRIMAT - Université de Toulouse, France

ICEM26-000366 | Influence of Air Gap Geometric Tolerances on Maxwell Pressures in Permanent Magnet Synchronous Machines

Thomas Poupon^{1,2}, Vincent Lanfranchi¹, Arthur Givois¹, Jean-Daniel Chazot¹, Tahar Hamiti²

¹ Laboratoire Roberval, UTC, France

² Nidec-PSA-Emotors, France

ICEM26-000372 | Simulation-Driven Preliminary Rolling-Bearing Design for Double Air-Gap Axial-Flux Machines

Gyorgy Kulcsar¹, Sergiu Marciuc¹, Robert Kulcsar¹, Ioan-Claudiu Cotovanu¹, Matei Salomie¹, Ioan Deac², Abderrahmane Rebhaoui², Bogdan Butnariu³

¹ 4MULTIPHYSICS SRL, Romania

² Nidec PSA E-motors SAS, France

³ Technical University of Cluj-Napoca, Romania

ICEM26-000395 | Electromagnetic Analysis and Constrained Genetic Algorithm Optimization of a Miniature Outer-Rotor BLDC Motor for UAV Applications

Sumeet Khalid¹, Ants Kallaste¹, Toomas Vaimann¹, Muhammad Usman Naseer¹, Shahid Hussain¹, Zahoor Ahmad¹, Mehroz Fatima¹, Waqas Sarwar¹

¹ Tallinn University of Technology, Estonia

ICEM26-000422 | Impact of Motor Design Parameters and Materials on the Bearing Voltage and Current Events

Francesco Gambelli¹, Stefano Nuzzo¹, Filippo Savi¹, Giovanni Franceschini¹, Davide Barater¹

¹ University of Modena and Reggio Emilia, Italy

ICEM26-000470 | Design and Validation of a Low-Speed PCB Hub Motor for Agricultural Steering Applications

Işık Emir Altunkol¹, Ozgur Gulsuna¹, İsmail Macit¹, Göktuğ Tonay¹, Ozan Keysan¹

¹ Middle East Technical University, Turkey

ICEM26-000558 | Optimization of the Fluid flux Barriers in a Synchronous Permanent Magnet Machine Using a Multiphysics Approach Considering Mechanical Stress, Demagnetisation and the Driving Cycle Losses

Abdenour Abdelli¹, Misa Milosavljevic¹, William Pommery¹, Olivier Tosoni²

¹ Institut Carnot IFPEN, France

² Univ. Grenoble Alpes, France

ICEM26-000296 | A Review of Cobalt-Iron Alloys for Electrical Machines

Jignesh Makwana¹, Juliette Soulard¹

¹ University of Warwick, UK

ICEM26-000544 | Experimental Investigation of Impingement Jet Cooling of End Windings in a Multiphase Machine

Vaclav Bruha¹, Stepan Slama¹, Lukas Veg¹, Roman Pechanek¹

¹ University of West Bohemia, Czechia

ICEM26-000642 | Effect of Rotor Core Hysteresis on Torque and Rotor Losses in a High-Speed Solid-Rotor Induction Machine

Felipe Ortiz-Bustos¹, Ilya Petrov¹, Konstantin Vostrov¹, Michele Degano², Pia Lindh¹, Janne Nerg¹

¹ LUT University, Finland

² University of Nottingham, UK

ICEM26-000037 | Active noise and vibration compensation in synchronous machines and gearboxes by controlling harmonic currents

Michael Kuper¹, Jonas Jansen¹, Axel Mertens¹

¹ Leibniz University Hanover, Germany

ICEM26-000109 | Continuous Control Set MPC for Induction Motors: A Multivariable State-Space Strategy with Stability Analysis

Jefferson Costa¹, Angelo Lunardi², Marco Rivera³, Alfeu Sguarezi²

¹ Federal University of Pará, Brazil

² Federal University of ABC, Brazil

³ University of Nottingham, UK

ICEM26-000565 | Sensor Fault-Tolerant Control of H8-CSI-Fed PMSM Using Adaptive Kalman Filter

Jundong Wang¹, Jianning Dong¹, Yongpeng Li¹, Mohamad Ghaffarian Niasar¹, Pavol Bauer¹

¹ Delft University of Technology, Netherlands

ICEM26-000567 | Comparison of Matrix Converter Topologies for a High Power Integrated Drive Application

Matias Hernandez Maturana¹, Liliana De Lillo¹, Lee Empringham¹, Mauro Di Nardo²

¹ University of Nottingham, UK

² Politecnico di Bari, Italy

ICEM26-000574 | A 2-DOF Flux Linkage Controller for PMSM Operating at Low Carrier Ratios

Shuhuai Yang¹, Jian Li¹, Yang Lu¹, Fei Du², Mengjia Zhang¹, Zhen Guo¹

¹ Huazhong University of Science and Technology, China

² Dalian University of Technology, China

ICEM26-000068 | Comparative Study of Power-Frequency and Impulse-Voltage Partial Discharge Measurements on Stressed Motorettes

Laureen Stahl¹, Kristin Homeier¹, Ali Azeroual¹, Moritz Kuhnke¹, Peter Werle¹

¹ Leibniz University Hannover, Germany

ICEM26-000084 | Online fault diagnosis of railway traction induction machines working under varying speed and load conditions

Razan Issa¹, Guy Clerc², Malorie Hologne-Carpentier³, Ryan Michaud¹, Eric Lorca¹

¹ SNCF Voyageurs, France

² Université Claude Bernard Lyon, France

³ LabECAM, France

ICEM26-000202 | Modelling and Simulation of Mechanical Gearbox Faults through Induction Motor Electrical Signal Analysis

Juan Barreno¹, Antonio J. Marques Cardoso¹

¹ CISE | University of Beira Interior, Portugal

ICEM26-000323 | A Reduced-Parameter Electromagnetic Model for Direct Inductance Matrix Evaluation of Induction Machines

Carla Terrón Santiago¹, Sandra Delfa-Baena¹, Angel Sapena-Bano¹, Manuel Pineda-Sanchez¹

¹ Universitat Politècnica de València, Spain

ICEM26-000328 | Multi-Physics Evaluation of Demagnetization in PMSM Rotor Topologies for Elevator Systems

Angelos Argyriou¹, Vasileios Vlachou¹, Theoklitos Karakatsanis², Antonios Kladas¹

¹ National Technical University of Athens, Greece

² Democritus University of Thrace, Greece

ICEM26-000436 | A Novel Control Scheme for Wind Turbine DFIG Drives with Robust Condition Monitoring Capability

Panos Papageorgiou¹, Jose E. Ruiz-Sarrio², Panagiotis Panagiotou³

¹ University of Patras, Greece

² Universitat Politècnica de València, Spain

³ University of Sheffield, UK

ICEM26-000503 | Sparse Representation-Based Broken Rotor Bar Diagnosis From Stator Current Measurements With Probabilistic Decision Making

Hadi Raja¹, Ants Kallaste¹, Toomas Vaimann¹

¹ Tallinn University of Technology, Estonia

ICEM26-000591 | A New Modeling Approach for Incipient Inter-Turn Short-Circuit Faults in Full PMSM Drive Systems

Azeddine Faouzi¹, Thierry Boileau², Abdenour Soualhi³, Nouredine Takorabet⁴, Farid Meibody-Tabar², Franck Vangraefschèpe¹

¹ IRT Saint Exupéry, France

² LEMTA - Université de Lorraine, France

³ LASPI - Université Jean Monnet, France

⁴ GREEN - Université de Lorraine, France

ICEM26-000008 | Effect Of Random Wound Winding On Partial Discharge Behaviors for A 400V Electric Vehicle Motor

Mohammed Elmezain¹, Fawzy Abdo¹, Mehmet Gulec¹, Peter Sergeant¹

¹ Ghent University, Belgium

ICEM26-000067 | Sequential Co-Simulation of SiC Inverter-Fed PMSMs for Electric Aircraft Propulsion

Jeff Kugener¹, Enrico Teichert¹, Fabius Liebermann-Zoehe¹, Matthias Lang¹, Ilja Koch¹, Stefan Kazula¹

¹ German Aerospace Center (DLR), Germany

ICEM26-000376 | A Novel Magnetization Process of Halbach Array Magnets for In-Wheel Motors

Akeshi Takahashi¹, Hirona Tanaka¹, Tomoaki Nishimura¹, Michihiro Takahashi¹, Tetsuya Suto¹

¹ Astemo, Ltd., Japan

ICEM26-000443 | A Novel Method for Fluid Compatibility Evaluation of Insulation Systems for 800V+ Electric Machines

Michael Suriyah¹, Christian Nörnberg², Shafigh Nategh³, Thomas Leibfried¹, Thomas Hellwig², Dilhun Örsler Özkardesler²

¹ Karlsruhe Institute of Technology (KIT), Germany

² Castrol Germany GmbH, Germany

³ SEDRIVE AB, Sweden

ICEM26-000599 | An Analytical Approach for Pole Shaping Optimisations in Electrically Excited Synchronous Machines

Gaia Petrelli¹, Amedeo Vannini¹, Stefano Nuzzo², Tianjie Zou¹, Davide Barater², Chris Gerada¹

¹ University of Nottingham, UK

² University of Modena and Reggio Emilia, Italy

ICEM26-000403 | General Analytical Modeling of Three-Phase Short-Circuit Currents and Demagnetization Analysis in Dual Three-Phase SPM Wind Generators

Chenning Zhang¹, Lijian Wu¹, Wenting Wang², Haoyu Zhou¹, Yidong Du³, Yang Shi⁴

¹ Zhejiang University, China

² University of Nottingham, UK

³ Soochow University, China

⁴ Shanghai Electric Wind Power Group Co., Ltd, China

Student Forum

Tests of novel Permanent Magnet Cogging Motor (PMCM)

Alicja Borzęcka¹

¹ AGH University of Krakow, Poland

Torsional Vibrations in Electrical Drives

Angelo Boceda¹

¹ Politecnico di Milano, Italy

Design, Test and Control of Cost-Competitive, Very High-Speed EESM for Traction

Edoardo Lagorio¹

¹ Politecnico di Torino, Italy

Advanced Fault Diagnosis and Condition Monitoring Techniques for Synchronous Machines

Saeed Afrandideh¹

¹ Johannes Kepler University Linz, Austria

11:10-12:50 ORAL SESSIONS

Rotating Machines 6

Room Funchal

Chairs: Gianmario Pellegrino, *Politecnico di Torino*

Ronghai Qu, *Huazhong University of Science and Technology*

11:10 ICEM26-000524 | Comparative Analysis of Rotor Topologies in Variable Flux Machines with Low Coercivity Magnets

Chen Chen¹, Raffaele Garino¹, Paolo Pescetto¹, Simone Ferrari¹, Gianmario Pellegrino¹

¹ Politecnico di Torino, Italy

11:30 ICEM26-000311 | Rotor for PM Machines with Axially Extended Magnet Modules

Gurakuq Dajaku¹

¹ FEAAM GmbH, Germany

11:50 ICEM26-000006 | Magnet Assisted Synchronous Reluctance Motor with Multiple Magnetic Circuit in Axial Direction

Yuki Hidaka¹

¹ Ritsumeikan University, Japan

12:10 ICEM26-000141 | Innovative Modular Axial-Flux PMSM Machine with Dual-Stator/Dual-Rotor Structure for Marine Applications

Fardan Aryamehr¹, Pedram Asef¹, Mohammad Amin Jalali Kondelaji¹, Dan M. Ionel²

¹ University College London (UCL), UK

² University of Kentucky, USA

12:30 ICEM26-000329 | Evaluation of a Switched Reluctance Motor Using a Newly Developed Si-Gradient Steel (JNHQ)

Nagomi Yamakawa¹, Ayumi Nagai¹, Kenji Nakamura², Yoshiaki Zaizen³, Tomoyuki Okubo³, Yoshihiko Oda³

¹ National Institute of Technology (KOSEN), Nara College, Japan

² Tohoku University, Japan

³ JFE Steel Corporation, Japan

Hairpin Conductor Windings Enabling Advanced Cooling Technologies in EV Electrical Machines

Room Berlin

Chairs: Antonios Kladas, *National Technical University of Athens*
Payam Shams Ghahfarokhi, *Tampere University*

11:10 ICEM26-000375 | Wideband Impedance Modelling of Hairpin Winding Under Material Uncertainty for EV Traction Motors

Mingjie Wang¹, Tianjie Zou¹, Xiang Ren¹, Hailin Huang², Hadi Naderiallaf¹, Adam Walker¹, Wenting Wang¹, Christopher Gerada¹

¹ University of Nottingham, UK

² University of Nottingham, China

11:30 ICEM26-000062 | Direct Cooled Hairpin Winding via Expandable Slot Liner – The Wedge-Pin

Tobias Zürlein¹, Daniel Walch², Jonas Gehring², Anja Preitschaft¹, Simon Stauber¹, Roman Hahn¹, Jörg Franke¹, Florian Risch¹

¹ FAPS - Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

² Fraunhofer IISB, Germany

11:50 ICEM26-000333 | Numerical and Experimental Analysis of Direct Oil Cooling Mechanisms in EV Traction Motors

Ioannis Alonistiotis¹, Athanasios Sarigiannidis¹, Antonios Kladas¹, Joseph Rosenfeld², Ioannis Karathanassis², Manolis Gavaises²

¹ National Technical University of Athens, Greece

² City St George's University of London, UK

12:10 ICEM26-000568 | Effect of Temperature Distribution on the Electromagnetic Performance of PMSM with Direct Oil Cooling Hairpin Winding

Ilya Petrov¹, Hüseyin Canseven¹, Pratik Bisale¹, Lassi Aarniovuori¹, Dong Liu¹, Juho Montonen², Juha Pyrhönen¹

¹ Lappeenranta University of Technology, Finland

² Danfoss Editron, Finland

12:30 ICEM26-000357 | Design and Validation of an Oil-immersed Closed-slot Continuous-Wave Winding Traction Motor

Alexandros Michaelides¹, Cleef Thackwell¹, Maximilian Wilhelm¹, Tiago Cesa¹, Wonrak Bae¹

¹ HiSpeed Ltd, UK

Design Issues (Optimization, Modeling and Simulation) 8

Room Sydney

Chairs: Antonino Di Gerlando, *Politecnico di Milano*

Christoph Hackl, *Hochschule Muenchen University of Applied Sciences*

11:10 ICEM26-000193 | Development of Dynamic Magnetic Network for the Outer-Rotor Flux-Switching Hybrid-Excited Machine Considering Magnetic Saturation Effect and Eddy Current Effect

Zhiyuan Xu¹, Ming Cheng¹, Zhongze Wu¹, Wentao Zhang², Honghui Wen³, Minghao Tong⁴

¹ *Southeast University, China*

² *University of Nottingham, UK*

³ *Hunan University, China*

⁴ *Nanjing University of Science and Technology, China*

11:30 ICEM26-000596 | Quasi-3D Analytical Modeling of Axial Flux Permanent Magnet Motors Using a Linear Motor Transformation

Young-Hyun Park¹, Kyu-Seob Kim¹

¹ *Gyeongsang National University, Republic of Korea*

11:50 ICEM26-000149 | A High-Torque-Density Axial-Flux Field-Modulated Servo Motor with Magnetic Harmonic Reduction for Robotic Joints

Yuyuan Qin¹, Ying Fan¹, Ming Cheng¹

¹ *Southeast University, China*

12:10 ICEM26-000432 | Comparative Evaluation of Soft Magnetic Composite and Laminated Materials for Axial Flux Synchronous Motor

Aleksandr Nadkin¹, Taha El Hajji¹, Jorge Luis Lora¹, Lars Sjoberg¹

¹ *Alvier Mechatronics AB, Sweden*

12:30 ICEM26-000582 | Comparison of Computed and Measured Flux Maps of a Five-phase Motor

Daniel Alban¹, Dieter Gerling¹

¹ *University of the Bundeswehr Munich, Germany*

Thermal and Losses Issues (Magnetic and Insulation Materials) 2

Room Caracas

Chairs: Luca Ferraris, *Politecnico di Torino*

Nick Simpson, *University of Bristol*

11:10 ICEM26-000277 | Evaluation of stator core cooling designs via inner-core iron loss tests

Leonardo Colombo¹, Rasmus Andersson², Avo Reinap¹, Francisco Marquez-Fernandez¹

¹ *Lund University, Sweden*

² *Volvo AB, Sweden*

11:30 ICEM26-000577 | Influence of Winding Arrangement on B-H and Core Loss Measurements: From Ring Specimens to Slotted Stator Cores

Giampaolo Devito¹, Viviana La Russa¹, Davide Barater¹, Stefano Nuzzo¹

¹ *University of Modena and Reggio Emilia, Italy*

- 11:50 ICEM26-000471 | Advancements in Semi-Magnetic Slot Wedge Design Through Pultrusion**
Eva Maria Bresemann¹, Hendrik Detampel², Martin Enno Gerlach³, Marvin Hengelsberg¹
¹ *Leibniz University Hannover, Germany*
² *Clausthal University of Technology, Germany*
³ *Elektrowerk Hannover Behncke Maschinenbau GmbH, Germany*
- 12:10 ICEM26-000135 | Reduction of Winding Losses in High Speed Electrical Machines with Tooth-Coil Rectangular Windings**
Kean Liu¹, Dinghua Zhang², Yue Liu³, Yangju Zou³, Ruiren Luo⁴, Hui Wu³
¹ *CRRC Group Co., Ltd, China*
² *CRRC SMD(Shanghai) Ltd, China*
³ *CRRC Times Electric UK Innovation Center, UK*
⁴ *CRRC Times Electric, China*
- 12:30 ICEM26-000593 | Simplified Thermal Network for Early-Stage Design of Axial Flux Permanent Magnet Machines**
Matias Jimenez¹, Federica Graffeo¹, Silvio Vaschetto¹, Alberto Tenconi¹, Andrea Cavagnino¹
¹ *Politecnico di Torino, Italy*

Diagnostics and Condition Monitoring 7

Room Cape Town

Chairs: Raphael Romary, *Artois University*

Thomas Wolbank, *Vienna University of Technology*

- 11:10 ICEM26-000345 | Intermittent Ground Fault Detection in Variable Frequency Drives with High Resistance Grounding**
Jesús Mauricio Pérez García¹, Aritz Iturregi¹, Carlos Platero², Nader Safari-Shad³, Inmaculada Zamora¹, Jose Manuel Guerrero Granados¹
¹ *Universidad del País Vasco / Euskal Herriko Unibertsitatea (UPV/EHU), Spain*
² *Technical University of Madrid, Spain*
³ *University of Wisconsin Platteville, USA*
- 11:30 ICEM26-000145 | Diagnosis of Bearing Faults in Induction Motors Using Hilbert-Huang Spectral Energy Descriptors**
Yuri Bórnea¹, José Pedro Barbosa Neto¹, Alessandro Goedtel¹, Wesley Souza¹, Marcelo Castoldi¹
¹ *Federal University of Technology – Paraná, Brazil*
- 11:50 ICEM26-000255 | Transient Analysis of Electromagnetic and Vibration Signals for Field Winding Fault Detection in Synchronous Motors**
Saeed Afrandideh¹, Jose E. Ruiz-Sarrio², Carlos Platero³, Jose Antonino Daviu², Edmund Marth¹, Gerd Bramerdorfer¹
¹ *Johannes Kepler University, Austria*
² *Universitat Politècnica de València, Spain*
³ *Technical University of Madrid, Spain*
- 12:10 ICEM26-000072 | Application of Machine Learning to a Low-Cost Condition Monitoring Ball-Screw Drive System**
Charlotte Harries-Harris¹, Judith Apsley¹, Sinisa Durovic¹
¹ *University of Manchester, UK*
- 12:30 ICEM26-000070 | Impact of Early-Stage Unbalance Fault on Vibration Analysis in Axial Industrial Fans Under Grid and Variable-Speed Drive Operation**

Francesca Muzio¹, Lorenzo Mantione¹, Tomas Garcia-Calva², Daniel Morinigo-Sotelo², Lucia Frosini¹

¹ *University of Pavia, Italy*

² *University of Valladolid, Spain*

Advanced Switched Reluctance Machines and Drives: a Magnet-Free Alternative for Cost-Sensitive and High-Reliability Applications

Room Rio de Janeiro

Chairs: Jan Barta, *Brno University of Technology*
Paolo Bolognesi, *University of Pisa*

11:10 ICEM26-000355 | A Balanced Torque Sharing Control Strategy with Low Torque Ripple and Wide Speed Range for 5-phase Switched Reluctance Machines

Ali Akbar Emarloo¹, Luca Papini¹, Milijana Odavic², Paolo Bolognesi¹

¹ *University of Pisa, Italy*

² *University of Sheffield, UK*

11:30 ICEM26-000310 | Comparison and Critical Aspects of Current Chopping Control and Field Oriented Controls for SRMs over the Whole Speed Region

Emilio Carfagna¹, Giovanni Migliazza¹, Fabio Immovilli¹, Emilio Lorenzani¹

¹ *University of Modena and Reggio Emilia, Italy*

11:50 ICEM26-000263 | Possibilities of Improving Fault Tolerance in Switched Reluctance Motors

Mariusz Korkosz¹, Jan Prokop¹, Piotr Bogusz¹, Piotr Zasowski¹, Marcello Minervini²

¹ *Rzeszów University of Technology, Poland*

² *University of Bergamo, Italy*

12:10 ICEM26-000404 | A Discrete-Time Super-Twisting Sliding Mode Controller for High-Speed Switched Reluctance Generators Under Single-Pulse Excitation

Filipe Pinarello Scalcon¹, Andy Knight¹

¹ *University of Calgary, Canada*

12:30 ICEM26-000046 | Reduction of AC copper loss by Modifying the Iron Core Shape in High-Speed (50,000 r/min) Compact SRMs for Automotive Traction

Wenyi Xu¹, Kyohei Kiyota¹, Akira Chiba¹

¹ *Institute of Science Tokyo, Japan*

12:50-14:00 Lunch

14:00-15:40 ORAL SESSIONS

Rotating Machines 7

Room Funchal

Chairs: Jörg Franke, *FAPS - Friedrich-Alexander-Universität Erlangen-Nürnberg*
Sebastião Nau, *WEG*

14:00 ICEM26-000245 | Optimized torque density and demagnetization analysis of innovative drone propulsion drive

Timo Wilfling¹, Kilian Streicher¹, Johannes Germishuizen¹, Andreas Möckel²

¹ *TH Nürnberg, Germany*

² *TU Ilmenau, Germany*

14:20 ICEM26-000523 | Material Selection and Multidisciplinary Design of a High-Power, High-Speed Sleeved Permanent-Magnet Synchronous Motor

Yulong Cui¹, Barrie Mecrow², Andrea Cavagnino¹

¹ *Politecnico di Torino, Italy*

² *Newcastle University, UK*

14:40 ICEM26-000107 | Topology Comparison of Pole-Changing Wound Field Synchronous Generators

Ryno Gerber¹, Maarten Kamper¹

¹ *Stellenbosch University, South Africa*

15:00 ICEM26-000151 | Feasibility Study of a 50 krpm Ultra-High-Speed Traction Motor Using Conventional Laminated Steel Sheet

Tsubasa Nakayama¹, Ren Tsunata¹, Masatsugu Takemoto¹, Jun Imai¹

¹ *Okayama University, Japan*

15:20 ICEM26-000331 | Coupled Power-Density Analysis of Planetary Geared High-Speed Electric Drivetrains

Paolo Atas¹, Guoyu Chu¹, Rukmi Dutta¹

¹ *University of New South Wales, Australia*

Fault Diagnosis and Fault-Tolerant Operation in Multiphase Electric Drives

Room Berlim

Chairs: Ehsan Jamshidpour, *Université de Lorraine*
Mehdi Taherzadeh, *University of Picardie Jules Verne*

14:00 ICEM26-000177 | Fault-Tolerance Analysis of Multiphase Permanent Magnet Bearingless Motors

Gabriele Antonino Cagliari¹, Amedeo Vannini¹, Mukhammed Murataliyev¹, Lorenzo Carbone¹, Meiqi Wang¹, Giacomo Sala², Michele Degano¹, Chris Gerada¹, Wolfgang Gruber³

¹ University of Nottingham, UK

² University of Bologna, Italy

³ Johannes Kepler University, Austria

14:20 ICEM26-000460 | Post-Fault Control of Dual Three-Phase Drives With Zero Inter-Turn Short-Circuit Current

Giacomo Sala¹, Gabriele Antonino Cagliari², Lorenzo Carbone², Gregorio Cutuli³, Stefano Nuzzo³

¹ University of Bologna, Italy

² University of Nottingham, UK

³ University of Modena and Reggio Emilia, Italy

14:40 ICEM26-000254 | Hybrid signal- and machine learning-based open-circuit fault detection and diagnosis algorithms for star-connected 5-phase SM-PMSM drives

Esther Altemir^{1,2}, Edorta Ibarra¹, Andres Sierra-Gonzalez², Borja Prieto³

¹ Tecnia Research and Innovation, Spain

² University of the Basque Country, Spain

³ Transport and Energy Division CEIT, Spain

15:00 ICEM26-000041 | Inter-Turn Short Circuit Current Analysis and Field-Weakening Mitigation in a Dual Three Phase PMSM for Aircraft Door Actuators

Daniel Walch¹, Christian Bentheimer¹, Yves Burkhardt²

¹ Fraunhofer IISB, Germany

² TU Darmstadt, Germany

15:20 ICEM26-000391 | Online Open-Phase Fault Detection in Variable-Speed Six-Phase Induction Machines

Mehdi Taherzadeh¹, Franck Betin¹, Marius Ouedraogo¹

¹ University of Picardie "Jules Verne", France

AI for Incipient Faults and Health Monitoring in Electrical Drives

Room Sydney

Chairs: Davide Fonseca, CISE | University of Beira Interior

Maciej Skowron, Wroclaw University of Science and Technology

14:00 ICEM26-000207 | Classification of Angular Misalignment Faults in Synchronous Reluctance Motor by Graph-based Machine Learning

Konstantinos Ptochos¹, Konstantinos Koutrakos¹, Epameinondas Mitronikas¹, George Tsialiamanis², Panagiotis Panagiotou²

¹ University of Patras, Greece

² University of Sheffield, UK

14:20 ICEM26-000227 | A Time-Frequency Fusion Convolutional Neural Network for Reliable Classification of Rotor Electrical Faults in Induction Motors

Haihang Xia¹, Xuecheng Wang¹, Xinyu Zhao¹, Zihao Song¹, Tiantai Deng¹, Panagiotis Panagiotou¹

¹ University of Sheffield, UK

14:40 ICEM26-000091 | Rotor Based Fault Detection in Electrical Machines Using AI Enabled Telemetry

Marius Meiswinkel¹, Benedikt Staudacher¹, Amir Ebrahimi¹

¹ *University of Bremen, Germany*

15:00 ICEM26-000217 | CPO-WPD and BO-MSCNN-Based Simultaneous Diagnosis of Inter-Turn Short Circuit and Local Demagnetization Faults Using Induced-EMF in VPMM

Chang Wang¹, Xianglin Li¹, Xuejiang Tian¹, Zhiwei Xue², Yongliang Liang³, Wei Hua⁴

¹ *Qingdao University, China*

² *University of Hong Kong, China*

³ *Shandong University, China*

⁴ *Southeast University, China*

15:20 ICEM26-000597 | Structure-Aware Neural Network with Physically-Informed Activation Function for PMSM analysis

Zhaokai Li¹, Matteo Felice Iacchetti¹, Roberto Perini¹, Angelo Boceda¹, Juri Tessaro¹, Luca Peretti²

¹ *Politecnico di Milano, Italy*

² *KTH Royal Institute of Technology, Sweden*

Design Issues (Optimization, Modeling and Simulation) 9

Room Caracas

Chairs: Gerd Bramerdorfer, *Johannes Kepler University Linz*
Michael Galea, *University of Malta*

14:00 ICEM26-000325 | Impact of Stator Segmentation on Cogging Torque and Torque Ripple: A Comparative Study

Matteo Olivo¹, Cesare Ciriani¹, Alberto Tassarolo¹

¹ *University of Trieste, Italy*

14:20 ICEM26-000529 | Low Computational Cost Thermal Modelling Enabling Real-Time Electromechanical-Thermal Co-Simulation in Electrical Machines

Vincenzo Madonna¹, Cesare Maria Meano¹, Alberto Lorenzo Vassallo¹

¹ *Dumarey Automotive Italia S.p.A., Italy*

14:40 ICEM26-000179 | 2D Implementation of Elastoplasticity for Electrical Machine Rotor Analysis

Daniel Keller¹, Holger Schunk², Stefanie Retka¹, Mercedes Herranz Gracia¹, Joachim Kempkes¹

¹ *Technical University of Applied Sciences Würzburg-Schweinfurt, Germany*

² *Siemens AG, Germany*

15:00 ICEM26-000665 | Comprehensive Data of a Grain Oriented Reference Material for Efficient Modelling of Axial Flux Machines

Vineetha Puttaraj¹, Sonja Karin Tidblad Lundmark¹, Torbjörn Thiringer¹

¹ *Chalmers University of Technology, Sweden*

15:20 ICEM26-000479 | Functional Equivalence Design of a Ferrite-Based Spoke-Type Traction Motor Under Torque and Power Envelope Constraints

Danyang Cui¹, Lena Max², Cecilia Boström¹, Boel Ekerlgård²

¹ *Uppsala University, Sweden*

² *University West, Sweden*

Diagnostics and Condition Monitoring 8

Room Cape Town

Chairs: Ants Kallaste, *Tallinn University of Technology*
Carlos Platero, *Universidad Politécnica de Madrid*

14:00 ICEM26-000114 | Super-Resolution for Magnetic Field Estimation in Rotor-Eccentric Induction Motors

Timon Callens¹, Jorik Vanuxem¹, Philip Desenfans¹, Sammy Verslype¹, Dries Vanoost¹, Hans Hallez¹

¹ KU Leuven, Belgium

14:20 ICEM26-000223 | Reliability-Based Evaluation of Electrical Signal Representations for Bearing Fault Impulsiveness in Induction Motors

Fardin Dalvand¹, Jose Antonino Daviu¹, Michael Pecht²

¹ Universitat Politècnica de Valencia, Spain

² University of Maryland, USA

14:40 ICEM26-000038 | Nonlinear Spark Fault Detection in DC Motors Using Multichannel Hidden Markov Models and Bicoherence Analysis

Miguel Enrique Iglesias Martínez¹, Jose Antonino Daviu¹, Larisa Dunai¹, Pedro Fernández de Córdoba¹, Vicente Biot-Monterde¹, Jose A Conejero¹

¹ Universitat Politècnica de Valencia, Spain

15:00 ICEM26-000625 | Feature-Level Fusion for BLDC Fault Diagnosis Under Electrical, Mechanical, and Mixed Fault Conditions

Marek Karbowniczyn¹, Jerzy Baranowski¹

¹ AGH University of Kraków, Poland

15:20 ICEM26-000546 | CNN-based Classification of Operational Regimes in Pulsating Loads Driven by Electric Drives via Current Signature Analysis, with experimental validation

Adrian Martin¹, Lucian Tutelea¹, Liviu Danut Vitan¹, Ion Boldea²

¹ University Politehnica Timisoara, Romania

² Romanian Academy Timisoara Branch, Romania

Advances in Multiphysics Topology Optimization of Electric Machines and Drives

Room Rio de Janeiro

Chairs: Giovanni Franceschini, *University of Modena and Reggio Emilia*
Maya Hage Hassan, *CentraleSupélec Paris-Saclay*

14:00 ICEM26-000318 | Multiphysical Topology optimization of a PMSM considering demagnetization, thermal and mechanical effects

Nepomuk Krenn¹, Peter Gangl¹

¹ RICAM, Austrian Academy of Sciences, Austria

14:20 ICEM26-000478 | Reducing AC losses in Halbach electrical machines with density topology optimization of winding

Théodore Cherrière¹, Alexis Pons², Guillaume Krebs¹, Adrien Mercier¹, Loucif Benmamas², Sullivan Küttler²

¹ CentraleSupélec, Université Paris-Saclay, France

² Safran Tech, France

14:40 ICEM26-000608 | Coupled Multiphysics Topology Optimization for V-Shape IPM Rotor: Design and Performance Analysis

Mohamed Reda Mahmoud¹, Mohamed Ibrahim¹, Peter Sergeant¹

¹ Ghent University, Belgium

15:00 ICEM26-000500 | Analytical Framework for Optimizing Winding Height in Hairpin Conductors in Automotive Electrical Machines

Tudor Plopeanu¹, Jaan Kalda¹, Hans Tiismus¹, Toomas Vaimann¹, Ants Kallaste¹

¹ Tallinn University of Technology, Estonia

15:20 ICEM26-000467 | Electromagnetic Topology Optimization of Brushless DC Motor Based on Density Method

Shahid Hussain¹, Ants Kallaste¹, Peter Gangl², Nepomuk Krenn², Théodore Cherrière³, Muhammad Usman Naseer¹, Zahoor Ahmad¹, Toomas Vaimann¹

¹ Tallinn University of Technology, Estonia

² RICAM, Austrian Academy of Sciences, Austria

³ CentraleSupélec, Université Paris-Saclay, France

15:40-16:10 Coffee Break

16:10-17:50 ORAL SESSIONS

Rotating Machines 8

Room Funchal

Chairs: Antonios Kladas, *National Technical University of Athens*
Giulio De Donato, *Sapienza University of Rome*

16:10 ICEM26-000606 | Impact of Multilevel Inverter Topologies on AC Copper Losses in Synchronous Machines

Amr Abbas¹, Joonas Vesa¹, Antero Marjamäki¹, Hadhiq Khan¹, Mohamed Taha², Ahmed Sayed², Paavo Rasilo¹

¹ Tampere University, Finland

² Cairo University, Egypt

16:30 ICEM26-000305 | Analysis of Low-Frequency Torque Ripples in Multi-Unit PMSM under Post-Fault Unit Isolation

Jiazhuang Gao¹, Li Liyi¹, Jiwei Cao¹, Boyu Chen¹

¹ Harbin Institute of Technology, China

16:50 ICEM26-000240 | Bearing Voltage Prediction in Inverter-Fed EESMs with a Common DC-Link Supply

Maximilian Bleicher¹, Niklas Himker², Bernd Ponick¹

¹ Leibniz University Hannover, Germany

² IAV GmbH, Germany

- 87

- 16:10 ICEM26-000265 | Impact of Key Design Parameters on the Startup- and Steady-State Performance of Line-Start Machines**
Thomas Krainer¹, Gabriel Weissitsch¹, Markus Peer¹, Edmund Marth¹, Gerd Bramerdorfer¹, David Klink²
¹ Johannes Kepler Universität, Austria
² Monash University, Australia
- 16:30 ICEM26-000176 | Yokeless Partitioned Stator Field Modulated Linear Machine for Long-Stroke Applications**
Aleksi Kytöviita¹, Jasper Anttila¹, Rafal Jastrzebski¹
¹ University of Turku, Finland
- 16:50 ICEM26-000095 | Analysis of Vernier Permanent Magnet Machine Based on Equivalent Magnetic Potential Difference Model Considering Iron Saturation**
Wenlong Yang¹, Li Fang¹, Ronghai Qu¹, Dawei Li¹
¹ Huazhong University of Science and Technology, China
- 17:10 ICEM26-000173 | Analytical Modeling of Multiphase Halbach-Array Permanent Magnet Bearingless Motors**
Gabriele Antonino Cagliari¹, Amedeo Vannini¹, Mukhammed Murataliyev¹, Lorenzo Carbone¹, Meiqi Wang¹, Giacomo Sala², Michele Degano¹, Chris Gerada¹, Wolfgang Gruber³
¹ University of Nottingham, UK
² University of Bologna, Italy
³ Johannes Kepler University, Austria
- 17:30 ICEM26-000672 | Electromagnetic Design and Performance Comparison of Limited Angle Rotary Voice Coil Motors**
Emre Cevik¹, Mehmet Gulec², Metin Aydin³
¹ MDS Motor Ltd., Turkey
² Ghent University, Belgium
³ Kocaeli University, Turkey

Thermal and Losses Issues (Magnetic and Insulation Materials) 3

Room Caracas

Chairs: Barrie Mecrow, *Newcastle University*
Payam Shams Ghahfarokhi, *Tampere University*

- 16:10 ICEM26-000132 | Bayesian Inference for Thermal Model Calibration in Multi-Layer Actuator Insulation**
Gan Fu¹, Mitrofan Curti¹, Calina Ciuhu¹, Elena Lomonova¹
¹ Eindhoven University of Technology, Netherlands
- 16:30 ICEM26-000208 | Heat Pipe Assisted Thermal Management of Torus-Type Axial-Flux Permanent-Magnet Machines**
Federico Marcolini¹, Rafal Wrobel², Giulio De Donato¹, Federico Caricchi¹
¹ Sapienza-University of Rome, Italy
² Newcastle University, UK
- 16:50 ICEM26-000412 | Characterization and Prediction of magnetic properties of electrical steels Subject to Punching in an Electric Machine**
Sima Soltanipour¹, Torbjörn Thiringer², Joachim Lindström¹
¹ Volvo Car Corporation, Sweden

² Chalmers University of Technology, Sweden

17:10 **ICEM26-000535 | Effect of magnetic doping of Soft Magnetic Composites: study of the Layer by Layer process parameters influence**

Luca Ferraris¹, Fausto Franchini¹, Federico Carosio¹, Emir Poskovic¹

¹ Politecnico di Torino, Italy

17:30 **ICEM26-000601 | A Review of Sustainable Encapsulation and Nanocrystalline Core Materials for Inductive Power Transfer Systems: State of the Art and Research Gaps**

Christian Auer¹, Ulf Schmitdtgen², Manuel Seidenath¹, Jörg Franke², Florian Risch¹

¹ Fraunhofer IISB, Germany

² FAPS - Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

Electrical Machines and Drives for Sustainable Transportation 4

Room Cape Town

Chairs: Michele Mengoni, *University of Bologna*

Narayan Kar, *University of Windsor*

16:10 **ICEM26-000496 | Torque Pulsation Reduction During Magnetization State Transitions of Variable Flux Machines**

Luca Gnudi¹, Lesedi Masisi¹

¹ University of the Witwatersrand, South Africa

16:30 **ICEM26-000431 | Circulating Currents Analysis in a Yokeless Segmented Stator of a Wound-Field Axial Flux Machine**

Ivan Taddia¹, Gregorio Cutuli¹, Shafigh Nategh², Philippe Farah², Giovanni Franceschini¹, Stefano Nuzzo¹

¹ University of Modena and Reggio Emilia, Italy

² YEESMA SARL, Luxembourg

16:50 **ICEM26-000647 | Multi-Physics Assessment of a Segmented Double-Stator Axial-Flux Machine with Grain-Oriented Stator Teeth**

Gianluca Zito¹, Mohamed Amine Hebri¹, Pierre Delpit¹, Abdenour Abdelli¹, Cristian Demian², Jean-Philippe Lecoïnte²

¹ IFP Energies Nouvelles, France

² Université d'Artois, France

17:10 **ICEM26-000390 | Design and Analysis of a Contactless Excitation System for a Wound-Rotor Synchronous Motor**

Lazar Lukic¹, Bogdan Brkovic¹, Mladen Terzic¹

¹ University of Belgrade, Serbia

17:30 **ICEM26-000314 | Motor Immersion in Sea Water for Marine Applications**

Giada Sala¹, Michael Galea², Claudio Bianchini¹, Joseph Cilia²

¹ University of Modena and Reggio Emilia, Italy

² University of Malta, Malta

High-Performance Electrical Drives: Physics-Based Modeling, Advanced Model-Based Control and Physics-Informed AI Operation

Room Rio de Janeiro

Chairs: Christoph Hackl, *Hochschule Muenchen University of Applied Sciences*
Oliver Wallscheid, *University of Siegen*

16:10 ICEM26-000022 | Iterative Moving Horizon Algorithm for Rotor Angle Estimation of Nonlinear IPMSMs

Max Bayer¹, Timo Hörmann¹, Simon Steentjes¹

¹ RWTH Aachen University, Germany

16:30 ICEM26-000452 | Saliency-based rotor position estimation from standstill to high speed

Johannes Roßmann¹, Christoph Hackl¹

¹ Hochschule München University of Applied Sciences, Germany

16:50 ICEM26-000021 | Impact of Model Fidelity and Parameter Sensitivity on Model Predictive Control Performance of Permanent Magnet Synchronous Machines

Timo Hörmann¹, Max Bayer¹, Simon Steentjes¹

¹ RWTH Aachen University, Germany

17:10 ICEM26-000454 | Comparison of Flux Linkage Identification Approaches for Synchronous Reluctance Machines

Jakub Sevcik¹, Romain Delpoux², Vaclav Šmídl¹

¹ University of West Bohemia, Czechia

² INSA Lyon, France

17:30 ICEM26-000641 | Chat with Your Drive: A Model Context Protocol Server for Safe and Efficient Drive Commissioning by AI Agents

Vaclav Šmídl¹, Zdeněk Peroutka¹

¹ University of West Bohemia, Czechia

18:00-19:00 Awards & Closing Ceremony

Room Funchal