



# EPNC 2026

XXIX Symposium on Electromagnetic Phenomena in Nonlinear Circuits

Tallinn, Estonia | 16–19 June 2026

*Park Inn by Radisson Meriton Conference & Spa Hotel Tallinn*

## Tuesday, 16th June 2026

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10:00 – 17:30	Arrivals & Check-in
17:30 – 20:00	Registration & Welcome Reception ( <i>White Hall / Hotel Lobby</i> )

## Wednesday, 17th June 2026

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10:00 – 10:30 Opening Ceremony

10:30 – 12:30 **Keynote Session**

Session Chair: *Dr. Ants Kallaste*

Session Co-Chair: *Dr. Wojciech Pietrowski*

**Next-Generation High Power-Density Electric Machines: Innovations in Design, Cooling and Manufacturing**

*Dr. Roman Pechánek, University of West Bohemia*

**Additive Manufacturing Technologies for Electrical Machines**

*Dr. Jenni Pippuri-Mäkeläinen, VTT Technical Research Center & Aalto University*

**Powering the Transition: Electrical Engineering Research for Next-Generation Electric Transport**

*Dr. Lassi Aarniovuori, LUT University*

12:30 – 12:45 Coffee Break

12:45 – 14:25 **Oral Session 1 — Nonlinear Devices and Systems**

Session Chair: *Dr. Lauri Kütt*

Session Co-Chair: *Shahid Hussain*

- Shape-Profile Winding: An Approach toward AC power Loss Suppression  
*Zahoor Ahmad, Tallinn University of Technology, Estonia*
- Determination of Soil Parameters using Evolutionary Methods with Consideration of Deeper Layers  
*Marko Jesenik, University of Maribor, Slovenia*
- Effect of Field Weakening in Intermittent Hoisting Duty on Energy Consumption  
*Kimmo Aarnio, Konecranes, Finland*
- Torque Ripple Reduction Strategy for Permanent Magnet Flux-Switching Synchronous Motors  
*Jedryczka Cezary, Poznan University of Technology, Poland*
- Three-Section Model of Inter-Turn Short Circuits in the Stator Winding of Induction Motors  
*Wojciech Pietrowski, Poznan University of Technology, Poland*

12:45 – 14:25

**Oral Session 2 — Nonlinear Coupled Electromagnetic Phenomena**

Session Chair: *Dr. Filip Kutt*

Session Co-Chair: *Sumeet Khalid*

- Frequency-Domain Impedance Interaction Modeling of Cable-Fed Motor Drive Systems for Insulation Stress Mitigation  
*Muhammad Usman Sardar, Tallinn University of Technology, Estonia*
- A Practical Method to Assess Stress in Strips of non-grain-oriented Electrical Steel  
*Krzysztof Chwastek, Czestochowa University of Technology, Poland*
- Pareto-like Meta-optimal Solutions in the Design of Reconfigurable Motors  
*Slawomir Wiak, Lodz University of Technology, Poland*
- Modeling of Hysteresis Curves of SMC Cores with modified Taurines Model  
*Mariusz Najgebauer, Czestochowa University of Technology, Poland*
- Predicting the Multi-Physics Performance of an Electromagnetic System using Machine Learning  
*David Lowther, McGill University, Canada*

14:30 – 15:30

Lunch

15:30 – 17:30

### Oral Session 3 — Nonlinear Devices and Systems

**Session Chair:** *Dr. Wojciech Pietrowski*

**Session Co-Chair:** *Muhammad Usman Sardar*

- Comparison of Sensor-Based and Sensorless Control Strategies for Permanent magnet Synchronous Motors with I-f Startup  
*Syed Ali Raza, Aalto University, Finland*
- Modified Field-Oriented Control for Delta-Connected PMSMs  
*Zala Muškardin, University of Maribor, Slovenia*
- A systematic Detection, Segregation and Quantification of Spectral Components in the Current Spectrum of a Grid-fed Induction Motor  
*Mehroz Fatima, Tallinn University of Technology, Estonia*
- Optimization-Based Determination of Operating Limits of IPMSMs  
*Pavel Ogrizek, University of Maribor, Slovenia*
- Influence of Slot-Pole combination on Torque and Efficiency in a Miniature Outrunner BLDC Machine  
*Sumeet Khalid, Tallinn University of Technology, Estonia*
- Experimental Validation of PMSM Torque Waveform in a HiL Environment  
*Magdalena Puskarczyk, Poznan University of Technology, Poland*

15:30 – 17:30

### Oral Session 4 — Nonlinear Coupled Electromagnetic Phenomena

**Session Chair:** *Dr. Jenni Pippuri-Mäkeläinen*

**Session Co-Chair:** *Zahoor Ahmad*

- Electromagnetic and Vibroacoustic modeling Approach for Electrical machines Optimization  
*Vyvien Dumont, Centrale Lille Institute, France*
- Modeling of Magnetic Relaxations of Magnetic nanoparticle Chain-Structures under 1D and 3D MPI Excitation Fields  
*Dmytrii Sachenko, Helmut-Schmidt-University, Germany*
- Vectorial Magnetic Anisotropy Model of Grain-Oriented Electrical Steel Sheet  
*Abir Janbain, Aalto University, Finland*
- Identification of Equivalent Magnetostriction Forces in Grain-Oriented Electrical Steel by Direct Problem Injection Regularization  
*Asma Kaleem, University d'Artois, France*
- Estimation of Jiles-Atherton Hysteresis Model Parameters from Three-Phase Transformer Inrush Currents  
*Stela Ugrinčić, University of Maribor, Slovenia*
- Extending Modified Winding Function Analysis for Contoured Airgap Topology in Electrical Machines  
*Muhammad Usman Naseer, Tallinn University of Technology, Estonia*

10:00 – 12:00

## Oral Session 5 — Nonlinear Coupled Electromagnetic Phenomena

Session Chair: *Dr. Jedryczka Cezary*

Session Co-Chair: *Waqas Ahmed Sarwar*

- Sparse-Sensing-Based Reduced modeling for Rapid Characterization of Nonlinear Magnetic Inductions  
*Kamil Gruszczyk, Politechnika Slaska, Poland*
- A Reproducible Workflow towards a Benchmark Tool for Surrogate-Assisted Optimization in Electromagnetic Design  
*Gianmarco Lorenti, Politecnico di Torino, Italy*
- Investigation of Magnetic Properties and Hysteresis Modeling of Fe-Co Alloys Under Complex Excitation Conditions  
*Jiapeng Zhou, Aalto University, Finland*
- Sensitivity of Stator Copper Losses to Deviations from the MTPA Trajectory in IPMSMs  
*Jernej Cernelic, University of Maribor, Slovenia*
- AC Losses Modeling in High Temperature Superconductors in the presence of Magnetic Materials  
*Hocine Menana, University of Lorraine, France*
- High-Fidelity Neural network meta-Modeling for IPMSMs: Simultaneous Flux Linkage Mapping Under Geometric and Material Variations  
*Mitja Garmut, University of Maribor, Slovenia*

10:00 – 12:00

## Oral Session 6 — Electromagnetics for Energy

Session Chair: *Dr. Jean-Philippe Lecointe*

Session Co-Chair: *Khizra Arif*

- Development of a Scenario-Based Platform for Micro E-Mobility Propulsion Emulation  
*Assem Meghawer, Tallinn University of Technology, Estonia*
- Experimental Testing of Drive Systems with SiC Converters  
*Lipa Miroslav, LUT University, Finland*
- Road-Condition-Aware EV Motor Drive System for Enhanced Propulsion Stability  
*Mahmoud Ibrahim, Tallinn University of Technology, Estonia*
- Analysis and Experimental Investigation of Linear-Motor-Type Flux Pump with Vertical-axis Asymmetric Winding Pattern  
*Adithya Harithas Venkatesh, Helmut-Schmidt-University, Germany*
- Advanced multi-scale Design and Simulation for Battery Energy Storage Systems with PyBaMM and Equivalent Circuit Models  
*Mahmoud Ibrahim, Tallinn University of Technology, Estonia*
- Evaluation of LF-EMF emitted from the overhead power lines through limited measurements and Model-based definitions  
*Lauri Kutt, Tallinn University of Technology, Estonia*

12:00 – 12:15

Coffee Break

12:15 – 14:15

## Oral Session 7 — Nonlinear Devices and Systems

Session Chair: *Dr. Muhammad Usman Naseer*

Session Co-Chair: *Tudor Plopeanu*

- Analysis of Power Loop Inductance and Power Losses in GaN HEMTs Based on PCB Layout Design  
*Ahmed Ali, Aalto University, Finland*
- From Three-Phase to Duan Three-Phase Induction Motors: Inverse Gamma modeling and Vector Control Principles  
*Bilal Mustafa, Aalto University, Finland*
- Comparison of IM and SynRM with 100kW Output power in Intermittent Hoisting Duty  
*Kimmo Aarnio, Konecranes, Finland*
- Effect of Magnet Length on Cogging Force and Force ripple of Tubular Linear Permanent Magnet Synchronous Machine  
*Muhammad Faraz Imam, Aalto University, Finland*

- Impact of Induction Core Nonlinearity on Power Transfer and Resonant Frequency in a Resonant Circuit  
*Marcin Kasprzak, Politechnika Slaska, Poland*
- Methods of Starting Asynchronous Motors Using Non-Contact Devices  
*Matkarimov Sardorbek, Urganch State University, Uzbekistan*

12:15 – 14:15

## Oral Session 8 — Nonlinear Devices and Systems

**Session Chair:** *Dr. Lassi Aarniovuori*

**Session Co-Chair:** *Yang Zhang*

- A Phase-Spectrum-Based Method for Machine-Level Insulation Aging Assessment and Lifetime Prognostics  
*Simon Steentjes, RWTH Aachen University, Germany*
- Field-Circuit Coupled Analysis of Fast-Ramping Magnets for a Muon Collider  
*Dominik Moll, TU Darmstadt, Germany*
- A Lumped-Element Model of the Well-Known Epstein Frame  
*Alexander Sauseng, Graz University of Technology, Austria*
- LFR Active Damper for Invariant Dynamic Response  
*Max Sebastia Rullo, Universitat Rovira I Virgili, Spain*
- Bending Stress and Annealing Effect in Non-Grain Oriented Silicon Steel Magnetic Circuit for Axial Flux Machine  
*Jean-Philippe Lecoq, Universite d'Artois, France*
- Synchronous Generator Saturation Modeling in Multiple Reference Frame Approach  
*Filip Kutt, Gdansk University of Technology, Poland*

14:30 – 15:30

Lunch

15:30 – 17:10

## Oral Session 9 — Bioelectromagnetics

**Session Chair:** *Dr. Anton Rassölnkin*

**Session Co-Chair:** *Assem Meghawer*

- Magnetic Hyperthermia of Functionalized Superparamagnetic Iron Oxide Nanoparticles (SPIONs) for Targeted Biological Cell Destruction  
*Anna Firyk-Nowacka, Politechnika Lodzka, Poland*
- Modeling Interaction between Peptide and Electromagnetic Field using Nickel and Iron IONS  
*Lukasz Szymanski, Politechnika Lodzka, Poland*
- Electromagnetic Texture Energy in Biomedical Images: Gabor-Based Spectral Histograms for Quantifying Lesion Asymmetry  
*Slawomir Wiak, Lodz University of Technology, Poland*
- Overview of Chosen Medical Diagnostic, Imaging and Therapy Methods with use of Electromagnetic Fields  
*Henryka Danuta Stryczewska, Lublin University of Technology, Poland*
- Optimization of the Cylindrical Collector Geometry in the Electrospinning Process using Genetic Algorithms  
*Anna Firyk-Nowacka, Politechnika Lodzka, Poland*

15:30 – 17:10

## Oral Session 10 — Additive Manufacturing for Electromagnetic Systems

**Session Chair:** *Dr. Roman Pechanek*

**Session Co-Chair:** *Mehroz Fatima*

- Multi-physical characterization of additively manufactured FeSi6.5% samples  
*Ronan Corin, Centrale Lille, France*
- Desktop-scale fused granulate fabrication of bonded NdFeB magnets for rapid electrical machine prototyping  
*Waqas Ahmed Sarwar, Tallinn University of Technology, Estonia*
- Closed-Form Formula for EDDY Current Losses in Rectangular Conductors via Electrostatic Analogy  
*Tudor Plopeanu, Tallinn University of Technology, Estonia*
- AM-Aware Topology optimization of Cooling Channels Using a Reduced-Order Cold-Plate Model for Electric Machine Water Jackets  
*Yang Zhang, Tallinn University of Technology, Estonia*

- Electrical Insulation Coating Methods for Additively Manufactured Windings  
*Khizra Arif, Tallinn University of Technology, Estonia*

19:30 – 22:30

### **Gala Dinner**

*Venue: Park Inn by Radisson Meriton Conference & Spa Hotel Tallinn*

19:30 – Starting Ceremony

20:00 – 20:45 Entertainment: *[Performance]*

20:45 – 22:30 Dinner & Socializing

Friday, 19th June 2026

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10:00 – 12:20

### Oral Session 11 — Additive Manufacturing & Nonlinear Devices

Session Chair: *Dr. Hans Tiismus*

Session Co-Chair: *Muhammad Usman Sardar*

- Iron loss reduction in Fe6.5%wtSi toroidal cores by assembling Additively manufactured sub-parts  
*Celien Bergeron, UTC UTEAM, France*
- Soft Magnetic Composites Manufactured via Stereolithography  
*Martin Sarap, Tallinn University of Technology, Estonia*
- Electromagnetic performance impact of Stator Tooth Rotation in a High-Speed Synchronous Reluctance Machine with an Additively Manufactured Rotor  
*Maksim Sitnikov, Aalto University of Technology, Finland*
- Nanofluids containing magnetic nanoparticles: fabrication, electromagnetic properties, and applications in Biomedicine and Therapeutics  
*Oleksandr Boiko, Lublin University of Technology, Poland*
- Comparative Study of Density Based and NGNet-Based Topology Optimization for Rotor Back Iron in BLDC Motor  
*Shahid Hussain, Tallinn University of Technology, Estonia*
- CNN-LSTM Based Transfer Learning for Sim-To-Real Broken Rotor Bar Diagnosis  
*Mehroz Fatima, Tallinn University of Technology, Estonia*
- Comparison of the Energy Usage and Embedded Emissions of the Intermittent, IE3 and IE4 motors in intermittent hoisting duty  
*Kimmo Aarnio, Konecranes, Finland*

10:00 – 12:20

### Parallel Oral Session 12 — Electromagnetics for Energy

Session Chair: *Dr. Mahmoud Ibrahim*

Session Co-Chair: *Zahoor Ahmad*

- Wideband High-Voltage Divider Design with FEM  
*Mislav Trbušić, University of Maribor, Slovenia*
- Design and Lyapunov energy function-based control of a Synchronous Reluctance machine for Electric Vehicle Application  
*Dwaipayan Barman, Aalto University, Finland*
- Performance Comparison of Phenomenological Static Hysteresis Models for Complex Magnetization Paths  
*Rahmanovic Ermin, University of Maribor, Slovenia*
- Enhancing the response of DFIG to grid voltage sags using a SOGI-based positive and negative sequence flux estimator and demagnetization control  
*Matej Kerndl, University of Maribor, Slovenia*
- Core loss prediction under 3D Magnetic Field Simulations in the 1-phase Transformers with Electrical Sheets and Amorphous Ribbons  
*Dariusz Koterak, Opole University of Technology, Poland*
- Super-Twisting Transmitter Current Control of Inductive Power Transfer System  
*Jure Domajnko, University of Maribor, Slovenia*

12:30 – 13:30

### Closing Ceremony

Best Paper Award

Closing Remarks by Dr. Ants Kallaste