Special Session on

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

Organized and co-chaired by:

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Abstract

Multiphase electric drives are gaining strong interest in transport electrification, renewable energy systems, and industrial automation. Their inherent fault tolerance, improved torque quality, and reduced current stress make them an attractive alternative to conventional three-phase systems. Recent advances in multiphase converter design, PWM strategies, and fault-tolerant control have pushed the boundaries of performance, efficiency, and reliability.

This special session aims to bring together experts working on different aspects of multiphase machine systems — from electromagnetic design and control to hardware implementation and experimental validation. The focus is on improving torque density, minimizing common-mode voltage and bearing currents, and enhancing system dependability under fault conditions.

The session will also highlight innovations in converter topologies, modulation schemes, and control methods that enable compact, reliable, and energy-efficient multiphase systems. Special attention will be given to high-performance PWM techniques that achieve low switching losses and reduced common-mode voltage, contributing to longer drive lifetime and quieter operation.

By creating a focused platform for discussion, this session encourages collaboration between researchers and industry professionals addressing the next generation of multiphase technologies. The contributions are expected to cover modeling, control, design, and testing, with both theoretical and experimental perspectives.

Topics of interest include, but are not limited to:

- Design and optimization of multiphase electric machines.
- Fault-tolerant topologies and control methods.
- Power converter architectures for multiphase drives.
- Advanced PWM strategies for CMV and bearing current reduction.
- High-torque-density design and thermal management.
- Experimental validation and practical implementation.
- Applications in EVs, aerospace, and renewable energy.

Important dates

- Full Paper Submission: February 1, 2026
- Full Paper Notification: May 1, 2026
- Final Paper Upload: June 1, 2026

Submission of papers

Paper submission follows the rules of regular papers. All the instructions for paper submission are included in the conference website:
https://icem2026.ubi.pt/submission.html