TUTORIAL 6
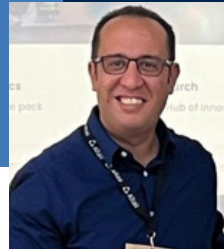
"Innovative Approaches to Electric Motor Design: AI-Driven Reduced-Order Modeling and Geometry Optimization"

SPEAKER
Philippe Wendling
Altair Co.

SPEAKER
Farid Zidat
Altair Co.

SPEAKER
Lavanya Vadamodala
Altair Co.

This tutorial presents two innovative approaches to enhancing electric motor design andperformance.

1. **Leveraging AI for Reduced-Order Modeling (RomAI):** We explore a hybridmethodology that combines finite element analysis (FEA) data with artificialintelligence (AI) to create reduced-order models. This approach aims to balanceaccuracy and computational efficiency, using an induction motor (IM) model as a casestudy. Participants will learn to integrate these techniques to improve efficiencycalculations across various operating conditions.

2. **Optimizing E-Motor Geometry with Physics AI:** The second focus is on PhysicsAI, whichidentifies the relationship between shape and performance in physics applications.Users will be guided through optimizing the geometry of electric motors, specificallythe Interior Permanent Magnet Synchronous Motor (IPMSM). The tutorial coverssetting up a motor simulation dataset, developing an AI model, and refining theoptimization process to achieve enhanced performance predictions.

By the end of this tutorial, participants will gain valuable insights into AI-driven modeling and geometric optimization techniques for electric motors.

IEMDC 2025
International Electric Machines & Drives Conference
Houston, TX May 18 - 21, 2025

Registration open at:

https://www.iemdc.org

BIOS

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Philippe Wendling received his master's degree from Ecole Central de Lille, Lille, France in1979. He is working as Vice President, GTT Electromagnetics Applications at Altair EngineeringInc. He is a Senior Lifetime Member of IEEE. His focus is modeling power generation, powerdistribution, and electromechanical power conversion applications in their Multiphysicsenvironment. Modeling for evaluation, design, or optimization in a sustainable world. He hasbeen involved in Finite Element modeling techniques of Electromagnetic Fields and Powerconversion devices and processes since the early 1980s. He is leading the technical supportand training activity. He is a frequent participant, session chair, committee member, andauthor at IEEE conferences, including CEFC, IAS, IEMDC, ECCE, and ITEC

Farid ZIDAT received his engineer degree in electrical engineering from UMMTO University(Algeria) in 2007. Then, he spent 4 years at Artois University (France) where he received his M.S. degree (2008) and his Ph.D. degree (2011). He was a member of the LSEE research laboratory. His research interests focus on the external magnetic field for diagnosis and on the efficiency of AC machines. He has joined the application team of CEDRAT on September 2011 as an application engineer specialist in electrical rotating machines simulations, since 2016 he is part of Altair Engineering. He is currently working on technical support, training courses, and several other issues associated with Altair EM Low Frequency solutions

Lavanya Vadamodala received her Ph.D. in Electrical Engineering from the University of Akron in 2021. She has been working as a Lead Solution Engineer at Altair Engineering, Inc. Her main fields are low-frequency electromechanical device design and analysis. Her current interests are Electromagnetics, Electric motor design, Optimization, and Multiphysics analysis. She has been participating in IEEE conferences like ECCE, ITEC, IEMDC, and APEC as an author, presenter, reviewer, session chair, and topic chair since 2018.

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