JOHANNES KEPLER UNIVERSITY LINZ

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Talk announcement

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Topology optimization of an electrical machine from scratch: multi-material and multi-physics considerations

Topology optimization is an automatic design method that aims to find an optimized material distribution. It was first widely developed in mechanical engineering and then extended to several fields of physics, such as electrical machines. One advantage of this approach is that it does not require any initial information about the geometry, which frees it from the biases of human designers. However, this methodology is generally applied to the distribution of two materials (typically iron/air); thus, most works that deal with electrical machines optimize only a part of it, such as the rotor. The creative potential of topology optimization is, therefore, not fully exploited.

This presentation proposes a generic multi-material framework that can handle the topology optimization of an entire machine.Magnetic performance, as well as mechanical stiffness, are considered. As an example, this method is applied to a 3-phase reluctance motor.

This presentation is based on joint work with S. Hlioui (CYU),L. Laurent (Cnam, Hesam University), F. Louf (ENS PS), H. Ben Ahmed (ENS Rennes), M. Gabsi (ENS PS), P. Duysinx (Liège University), C. Geuzaine (Liège University), and E. Fernández (Liège University).