

Seminar

Computational Methods for PDEs

Tuesday, March 12, 2024, 13:45

RICAM, SP2 416-1

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Dissertation Colloquium: Shape optimization of rotating electric machines

The topic of this PhD project is the shape optimization of rotating electric machines. The main mathematical tool used is the shape derivative, which gives a sensitivity with respect to the deformation of the domain along a given vector field. The focus of the project is on multiphysics and the attempt to include time-dependent effects in the optimization. In particular, the electromagnetic-thermal coupling is addressed. In one direction, the minimization of eddy currents is achieved solving a sequence of 2D magnetostatics problems, with the eddy currents being calculated in a finite difference in time approach. In another direction, the maximization of the average torque is performed with the eddy current equation as PDE constraint, which is solved in a space-time finite element framework. In addition, multi-objective shape optimization is addressed and Pareto-optimal points tracing is achieved with the use of homotopy methods and second order shape derivatives.

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