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Bachelor- / Masterthesis

Computation of optimal feedforward torque control strategies with embedded solvers

The LMRES research group investigates optimal control strategies for highly nonlinear synchronous machines. Recently, an optimal feedforward torque control (OFTC)-strategy was introduced; the strategy takes into account copper and iron losses as well as nonlinearities which are caused by magnetic saturation and cross-coupling effects.

In order to compute the optimal and feasible reference currents, a nonlinear optimization problem (NLP) must be formulated and solved. For using this algorithm in applications such as automotive motor control units, the NLP must be reformulated and solved by embedded solvers.

This student work studies nonlinear machine modeling as well as solving the OFTC-problem by using embedded solvers for optimization problems.

This project covers:

- State of the art of nonlinear machine modeling.

- State of the art of optimal feedforward torque control.

- State of the art of solving optimization problems such as nonlinear optimization problems and convex optimization problems.

- Developing an algorithm that solves the OFTC-optimization problem by using embedded solvers.

- Implementation of proposed algorithms in Python or Matlab.

- Simulative validation and comparison using Matlab & Simulink.

- Experimental validation and comparison using LMRES realtime system (dSpace).

For questions and application contact Niklas Monzen (`niklas.monzen@hm.edu`).