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Student Project  
(BA, MA, HS, FP, Projekt angewandte Forschung, etc.)

## Self learning flux observer of an electrical excited synchronous machine (EESM)

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. Instead of the well known maximum torque per current (MTPC) operation strategy, maximum torque per losses (MTPL) is realized. In order to apply this control strategies to an EESM, the machine parameters e.g. the resistances and flux linkages must be known. Therefore a self learning flux observer for Identification of the excitation flux linkage shall be designed, for instance by a combination of a neural network (NN) and a Kalman filter.

This project covers (depending on project type and student's interests):

- State of the art nonlinear flux based modeling of EESM.
- State of the art of self learning observers.
- Developing an algorithm for a self learning observer for the excitation flux linkage.
- Implementation of proposed and developed algorithms in Matlab & Simulink.
- Simulative validation using Matlab & Simulink.
- Experimental validation using LMRES machine lab's realtime system.

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