

Model predictive control of an externally excited synchronous machine

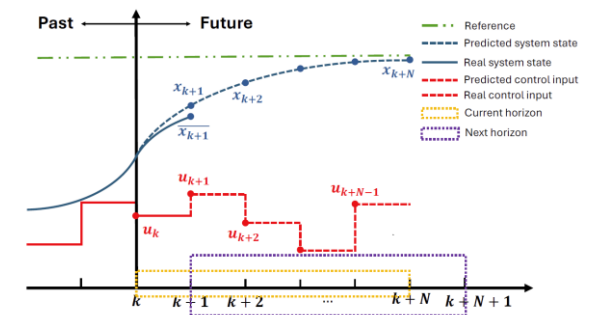
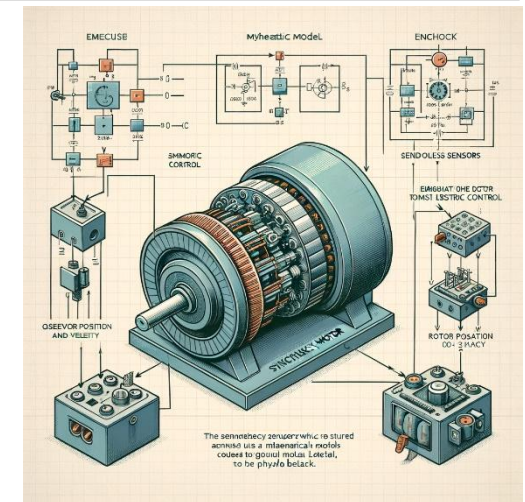
Master Thesis in cooperation with IAV GmbH

For the electric vehicles of the future, driving dynamics, costs, and efficiency place increased demands on the components and functions of the electric drive and require continuous further development and new approaches for its control and regulation. One of these methods is model predictive control (MPC), which can be used to control the involved electrical machines.

In this thesis, based on previous work, an MPC scheme shall be developed that controls the currents of an externally excited synchronous machine (EESM). The developed MPC shall also be replaced by a neural network to alleviate the computational cost associated with the solution of the optimal control problem.

- Familiarization with EESM, field oriented control, and MPC
- Literature study on (current) control of EESM
- Commissioning of the existing simulation model and an MPC controller for a permanent excited synchronous machine in MATLAB/Simulink
- Devise and implementation of MPC current control for EESM
- Devise and implementation of a neural network based MPC for EESM
- Documentation of work

The master thesis is conducted at IAV GmbH (preferably Berlin) and can be started in September at the earliest.



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