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<i>Title</i> Real-Time Solution of Quadratically Constrained Quadratic Problems for Predictive Converter Control					
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Master Thesis Description

Model predictive control (MPC) of power converters has received much attention in both industry and the academic community in the last few years. Implementing MPC requires a (possibly non-convex) optimization problem to be solved in real time at very high sampling rates.

Recent theoretical results have shown that for certain converter topologies, the non-convex MPC problem can be equivalently reformulated as a quadratically constrained quadratic problem (QCQP) with a certain structure.

The master thesis will investigate the best way of solving these QCQPs at very high speeds. The thesis could include the following topics:

- Implement different optimization methods in Matlab or Python and compare the performance. In particular, compare;
 - interior point method
 - tailored gradient-projection method
 - SQP method
- Implement the preferred solver in simulation to evaluate the performance of the MPC when controlling a converter.
- Implement the preferred solver on an embedded platform.
- FPGA implementation of a tailored solution algorithm developed in ABB.

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