Implementation of a Hybrid Controller for Highly Dynamic Multiphase Converters [MA]

A flexible, highly dynamic, low ripple current source is developed at the HPE laboratory intended to be used to drive magnets used in accelerators and highly fluctuating loads, like DC-arcs for HVDC research purposes. The particularly demanding nature of high power pulsed current sources imposes the need for the development of a time-optimal control concept that fully exploits the capabilities of the topology, in order to meet the strict application requirements.

In this thesis, you will have the chance to work on a promising hybrid control technique which combines the advantages of different control schemes and promises near-optimal control action. At first, the controller is simulated and its performance is evaluated. Later, the control algorithm is implemented in VHDL and its performance is finally verified with extensive co-simulations and Hardware-in-the-Loop simulations.

**Outcomes:** This work apart from in-depth understanding of control methods of power electronic systems, will also give you extensive hands-on experience with software development in VHDL and its FPGA implementation.

**Work Description:**
- 25% Theory
- 75% Hardware Implementation

**Prerequisites:**
- Interest in control algorithms for Power Electronics
- Interest in VHDL programming

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