

Master-Thesis:

Distributed Model Predictive Secondary Control for AC/DC Microgrid

Context:

Nowadays, more and more distributed energy resources (DER) are integrated to the distribution system like renewable energy sources (RES), energy storage systems (ESS) and controllable loads. In active distribution grids, these power-electronics-interfaced units participate in the regulation of the system. In addition, the advancements in power electronics converters stimulate the integration of DC links in the existing AC distribution networks and thus the development of hybrid AC/DC networks. In this context, the research project Flexible Electrical Networks (FEN) focuses on the development, implementation and analysis of converter-dominated AC/DC systems. In the framework of the FEN project, the ACS Institute participates in the development of control structures for local distribution grids, like AC/DC microgrids.

Student tasks:

The student shall work on the secondary-level control of a multi-terminal AC/DC microgrid already developed in the FEN project. In particular, the student will develop in Matlab/Simulink distributed model predictive control to coordinate all converters of the microgrid under different operation scenarios. Different factors of the development and its performance will be further analysed, such as:

- The topology of the communication network and the effect of lost communication
- The stability of the overall control structure considering communication delays.

Your profile:

- Good knowledge of power systems, power converters and their control
- Basic knowledge of control levels in microgrids
- Matlab/Simulink is a prerequisite skill

The collaboration with the supervisor will be done in English and the thesis should be written in English.

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