RWTH AACHEN UNIVERSITY

E.ON Energy Research Center
ACS | Institute for Automation of Complex Power Systems

Master-Thesis

Fault-Observer-based Distributed Control of Load Frequency in Multiple Area AC Microgrid System

Context:

The stability of the AC microgrid system largely depends on the equivalency of power generation and power demand. Usually, the behavior of power consumers is unpredictable, leading to a mismatch between power generation and power demand. One way to maintain stability during this mismatch is through the concept of Load Frequency Control. In LFC, an automatic generation controller is used to compute the generation adjustment power of the grid by manipulating the area control error obtained through tie-line power and frequency measurement. With the ever-increasing demand for electrical power, the LFC problem has continued to be a serious challenge for researchers. Unpredictable failure of measuring sensors and unscheduled behaviors of customer loads plays a major role in the LFC challenges of today. Thus, this master thesis will focus on developing a fault-observer-based distributed model predictive control for multiple area power system.

In this research, students will be involved in the following:

Student tasks:

* Literature review on stability problems in microgrid systems and various control strategies implemented for this purpose.
* Develop a state observer to estimate active sensor failure in multiple control areas.
* Develop a primary and secondary loop control scheme for frequency control using Model predictive control and PI controller.

Student Profile:

* Master student in Electrical Engineering or Control Systems
* Experience with MATLAB scripting and Simulink modeling or DIgSILENT Power Factory
* Fundamental knowledge of control theory and power systems.

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