AUSTRIAN INSTITUTE OF TECHNOLOGY

MASTER THESIS PROJECT

January 17, 2019

COMPARISON STUDY OF MODERN CONVERTER CONTROL TECHNIQUES FOR SUPPORTING MASSIVE INTEGRATION OF RENEWABLE GENERATION IN LOW INERTIA POWER SYSTEMS

BACKGROUND

An inevitable consequence of the global power system transition towards nearly 100% renewable-based generation is the replacement of combustion powered synchronous generators with renewable energy driven inverter interfaced generation. This transition strongly influences the way inertia, frequency and voltage control is handled in conventional systems. The gradual transformation of the power grid to a low-inertia system leads to critical challenges in maintaining system stability. Novel control techniques for converters such as the so-called grid-forming/following strategies are expected to address these challenges and replicate functionalities which so far have been provided by generators.

THESIS GOALS

This master thesis project aims to identify the system-level impact of generation technology transition on standard frequency performance metrics. More precisely, adopting a realistic transmission system model we aim to simulate a sequence of scenarios in which network transitions from 100% synchronous generation penetration to a 100% converter based system. In a nutshell, this project is expected to provide a comprehensive performance comparison of various grid-forming/following control techniques with respect to aforementioned generation transition.

REQUIRED QUALIFICATIONS

- Holding a bachelor degree preferably in the field of electrical engineering
- Enrollment in a master degree program preferably in the fields of power system/control/applied mathematics
- Sufficient familiarity with power system analysis and linear control systems
- Solid background in power system dynamic simulation with Matlab/Simulink SimPowerSystems
- Working proficiency in English

DESIRED QUALIFICATIONS

- Sufficient familiarity with linear system theory and non-linear systems control design
- Experience in using PowerFactory and OpenModelica

WHAT TO EXPECT

- EUR 1046 gross per month for 30 hours/week and additional company benefits
- Exploring a cutting-edge research topic in an international research environment
- Benefit from the scientific support provided by AIT Electric Energy Systems competence unit experts

APPLICATION

Send your resume/CV, degree diploma, transcript of records, list of relevant publications and projects in PDF format via email to Adolfo.Anta@ait.ac.at.

- Starting date: as soon as possible
- Project duration: 6 months
- Location: AIT Austrian Institute of Technology GmbH, Vienna, Austria.