

Master - Accuracy Evaluation of the Power Hardware-in-the-loop Modelings

Description:

The ever-increasing energy shift towards renewable-based power sources and new power technologies, along with their penetration into the grid, will require a comprehensive understanding of their behavior before implementing it into the main grid.

The Power-Hardware-In-Loop (PHIL) evaluation has gained more attention in the last years to validate new technologies in a low-risk and reliable environment. The PHIL testing allows the performance evaluation of the latest technology, known as Hardware under Test (HuT), while connected to a realistic simulated network in a Digital Real-Time Simulator (DRTS). Jointing the analog HuT to a DRTS calls for interfaces such as A/D converters which add more delays to the system along with DRTS delay. For this reason, more efforts must be made in the modeling evaluation of the PHIL setups while employing state-of-the-art power technologies, e.g., when a grid inverter in the HuT part is tested. To provide a better insight into the expected content of the Master thesis project, requirements and expectations are listed in the following:

- Read the literature and summarize the state-of-art approaches, particularly for different modeling (Continuous/Discrete-time) of P-HIL setups.
- Implement the different PHIL models in a non-real-time simulation environment using MATLAB and MATLAB/Simulink.
- Implement the same model in a real-time simulation environment such as RT-LAB or RTDS.
- Validate the model with experimental results using data provided by an operation of the real converters.
- Make a clear and comprehensive presentation and evaluation of the results. All results should be documented adequately.

Qualification:

- A background in electrical/control engineering is required for this project.
- Experience in programming using MATLAB or simulations using MATLAB/Simulink.
- Knowledge about power electronics, linear control theory, signals, and systems is a plus.
- Language: German/ English
- Due to the experimental nature of this work, attendance at our institute is required.

Starting date and duration of the contract:

Immediately after the agreement, short-term, six months

Contact person:

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