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ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Student project proposal

Project title: Integration of a dynamic signal estimation algorithm into a Real-Time Simulator

Project type ☒ MSc thesis ☐ BA semester project ☒ MSc semester project

Project responsible and e-mail
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Project description

Modern power systems are becoming increasingly prone to extreme dynamic behaviour due to the continued expansion of intermittent and low-inertia renewable energy sources. However, current monitoring algorithms performed by Phasor Measurement Units (PMU) are inherently incapable of capturing dynamic signals with steady-state phasor models. A new method has been proposed that uses a dictionary of dynamic signals to identify various transients that commonly occur in the grid. The validation of this method will be performed by means of hardware-in-the-loop setups, similar to how PMU-based applications are tested. A Real-Time Simulator (RTSs) will be used to reproduce the behaviour of a given electrical network in steady-state, dynamic and faulted conditions.

The aim of the project is to deploy the dictionary-based algorithm into an Opal-RT eMEGAsim PowerGrid Real-Time Digital Simulator and test how its performance compares to that of a standard PMU during dynamic conditions.

Details on previous related projects can be found here: https://infoscience.epfl.ch/record/211251

Tasks of the student

- Integrate a dictionary-based estimation method into the Opal-RT eMEGAsim RTS
- Assess performance of algorithm during dynamic conditions and compare to PMU synchrophasor estimates

Requirements

- Good Simulink programming skills