

Power System Real-Time Simulation using Modelica and the FMI

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Real-time digital simulation of power systems is incredibly important for the testing of appropriate control and protection strategies in the power system industry. However, the case in which one single model can be used in offline simulations and then for testing in real-time studies is rare, if existing at all. This is due to the lack of adequate standard development in the power industry and the adoption of successful standards elsewhere.

A direct consequence of this lack of portability is the large amount of time and resources spent in re-implementation and validation of models for real-time digital simulation of power grids.

The present study proposes the usage of Modelica and the FMI standard in order to address this issue. To test the proposed approach, two power system models are built in Modelica for offline simulations using the OpenIPSL library and are exported as co-simulation FMUs with source-code.

Real-time simulations of these typical power system models are performed using dSPACE SCALEXIO™, proving that the proposed framework using Modelica and the FMI can greatly contribute to the enhancement of today's current practice in the power industry by providing portability and tractability between offline and real-time power system models.

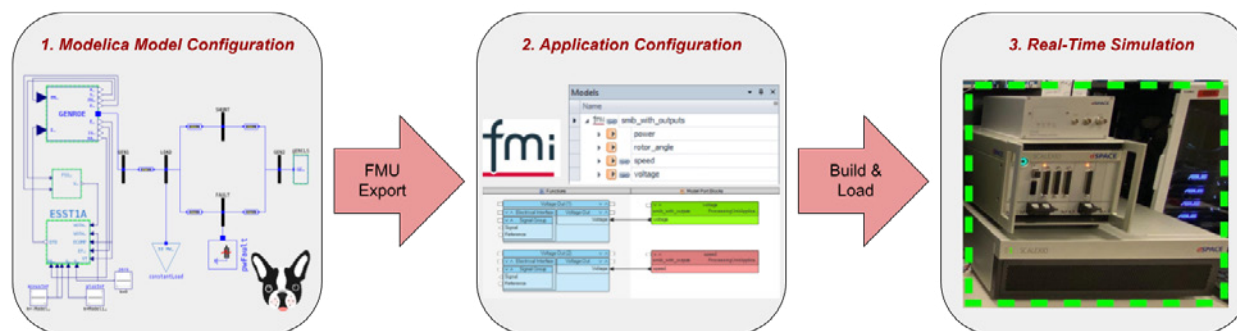


Figure 1: Three-step workflow adopted for simulation of FMUs in a real-time processing unit.