Development of a Real-Time Fuel Processor Model for HIL Simulation

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In this article a real-time model for dynamic simulation of a fuel processor is presented. The model is intended for HIL testing of the PLC for a truck Auxiliary Power Unit (APU) system.

The APU comprises a PEM fuel cell and fuel processor to enable direct utilization of on-board diesel. The system is under development in FCGEN, an EU project under the FP7 program FCH JU **Error! Reference source not found.**. One critical challenge is to design the control system (PLC) to ensure failsafe and environmental friendly startup and operation. The startup phase of the fuel processor is the most critical part, since it is a highly dynamic process involving several complex reactors. It is advantageous to verify the control system before the fuel processor is assembled to avoid possible breakage of components. Such verification can be done with a real-time model representing the physical system. In this study such a model is created using Modelica and Dymola. It is shown that it is possible to load and execute a real-time Modelica model capable of realistically mimicking the system response on a HIL platform. The model runs in real time using a first order explicit (Euler) solver with a time step size of 25 ms.