OMSimulator – Integrated FMI and TLM-based Co-simulation with Composite Model Editing and SSP

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Abstract

OMSimulator is an FMI-based co-simulation tool and recent addition to the OpenModelica tool suite. It supports large-scale simulation and virtual prototyping using models from multiple sources utilizing the FMI standard. It is integrated into OpenModelica but also available stand-alone, i.e., without dependencies to Modelica-specific models or technology. OMSimulator provides an industrial-strength open-source FMI-based modelling and simulation tool. Input/output ports of FMUs can be connected, ports can be grouped to buses, FMUs can be parameterized and composed, and composite models can be exported according to the (preliminary) SSP (System Structure and Parameterization) standard. Efficient FMI-based simulation is provided for both model-exchange and co-simulation. TLM-based tool connection is provided for a range of applications, e.g., Adams, Simulink, Beast, Dymola, and OpenModelica. Moreover, optional TLM (Transmission Line Modelling) domain-specific connectors are also supported, providing additional numerical stability to co-simulation. An external API is available for use from other tools and scripting languages such as Python and Lua. The paper gives an overview of the tool functionality, compares with related work, and presents experience from industrial usage.

Keywords: FMI, FMU, SSP, modelling, simulation, co-simulation, composite