**M. Arnold, C. Clauß, T. Schierz**
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**Abstract.** Complex multi-disciplinary models in system dynamics are typically composed of subsystems. This modular structure of the model reflects the modular structure of complex engineering systems. In industrial applications, the individual subsystems are often modelled separately in different mono-disciplinary simulation tools. The *Functional Mock-Up Interface* (FMI) provides an interface standard for coupling physical models from different domains and addresses problems like export and import of model components in industrial simulation tools (*FMI for Model Exchange*) and the standardization of co-simulation interfaces in nonlinear system dynamics (*FMI for Co-Simulation*), see `http://www.functional-mockup-interface.org/`.

In November 2011, the third $\beta$-version of FMI for Model Exchange and Co-Simulation v2.0 was released (MODELISAR consortium: *Functional Mockup Interface for Model Exchange and Co-Simulation v2.0 beta 3*, `http://www.functional-mockup-interface.org/specifications/FMI_for_ModelExchange_and_CoSimulation_v2.0_Beta3.pdf`, November 2011) that supports advanced numerical techniques in co-simulation like higher order extrapolation and interpolation of subsystem inputs, step size control including step rejection and Jacobian based linearly implicit stabilization techniques. Well known industrial simulation tools for applied dynamics support Version 1.0 of this standard and plan to support the forthcoming Version 2.0 in the near future, see the "Tools" tab of the FMI website `http://www.functional-mockup-interface.org/` for up-to-date information.

The renewed interest in algorithmic and numerical aspects of co-simulation inspired some new investigations on error estimation and stabilization techniques in FMI for Model Exchange and Co-Simulation v2.0 compatible co-simulation environments. In the present paper, basic design concepts of FMI for Model Exchange and Co-Simulation v2.0 are discussed from the viewpoint of co-simulation with special focus on reliable error estimation to be used in communication step size control.

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