

An FMI-Based Tool for Robust Design of Dynamical Systems

Maria Henningsson, Johan Åkesson, Hubertus Tummescheit
Modelon AB, Modelon Inc
{maria.henningsson,johan.akesson,hubertus.tummescheit}@modelon.com

Model-based engineering is a key technology for competitive product development. However, implementing, parameterizing, and validating simulation models of physical systems is time-consuming and costly. To make modeling efforts pay off, it is necessary to systematically consider tools, practices, and workflows to get the most use out of a model portfolio.

Concepts from quality sciences, such as robust design, six-sigma, and design-of-experiments have had a large impact on product development in industry. These concepts are increasingly used in a model-based engineering context where data is gathered from simulation models rather than laboratory setups or prototypes.

This paper presents a framework to apply such ideas to analysis of dynamical systems. A set of tools that can be used for uncertainty analysis of dynamical Modelica models is presented. These tools are made available in the FMI Toolbox for MATLAB. The workflow and tools are demonstrated on a cooling loop design problem.