Simulating n-dimensional Modelica models with SimulationX

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Holistic approaches for the analysis of physical systems often require more than just a calculation in time domain. Therefore the complete spectrum of computation methods available in SimulationX can be applied to all kinds of Modelica models.

The Linear Model Analysis offers many possibilities to examine the behavior of simulation models, e. g. the computation of natural frequencies and damping time constants for arbitrary systems in the operating point. The energy distribution and power dissipation in vibration modes do not only show the effects of changes in the system concerning unwanted vibration modes or frequencies but also provide valuable information for the systematic model reduction and optimization. The module Transfer Functions/Input Output Analysis allows determining the transfer behavior of a system from user-defined input- and excitation quantities to arbitrary output - or result quantities. The Input Output Analysis is applicable to models corresponding to differential algebraic equation systems.

The steady state simulation allows the computation of periodic solutions of nonlinear systems in dependence of a reference quantity. The harmonic balance method is employed not basing on the linearization of the system in the operating point (as it is the case for the input-output analysis) but computing the periodical solution directly for the nonlinear equations.

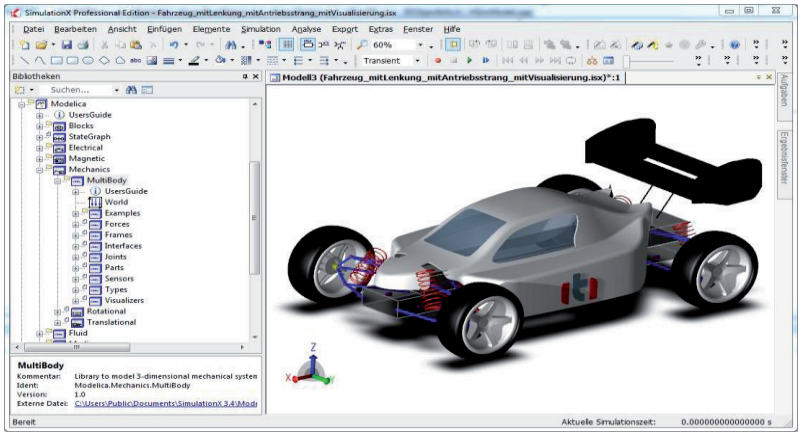

Figure 1: New 3D-Engine for intuitive MBS Modeling in SimulationX

Current developments focus on the support of interaction tasks in the 3D Environment. The upcoming 3D-engine including direct manipulation is elevating the 3D View from a passive display to an interactive environment and thus making common modeling tasks faster and easier. Furthermore enhanced postprocessing features, again ready for script based control, will increase efficiency in every day work.

References

[1] SimulationX: http://www.simulationx.com/

[2] Bittner S., Neidhold T., Uhlig A., Intuitive MBS Modeling: ITI-Symposium. Dresden, November 2010.