Dymola 2012 FD01

Release Highlights

Executive Summary

Productivity

- Greatly improved plotting capabilities offers easier to use and more flexible analysis of simulation results.
- Improvements in graphical editor to make common operations faster.

Simulation

- More flexible composition of FMI simulation units with support of co-simulation.
- Better accuracy and simulation speed, especially for fluid systems.

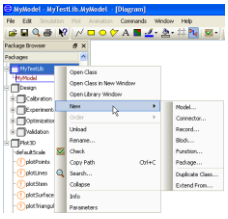
Openness

- Enhanced Simulink-interface makes distribution of pre-compiled S-functions easier.
- OPC server interface to simulator facilitates integration with process control and training simulators.

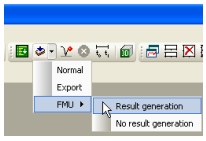
Libraries

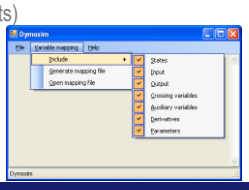
- General flexible bodies exported from FEA can be simulated in Modelica, increasing the scope of models that can be modeled.

Main Highlights

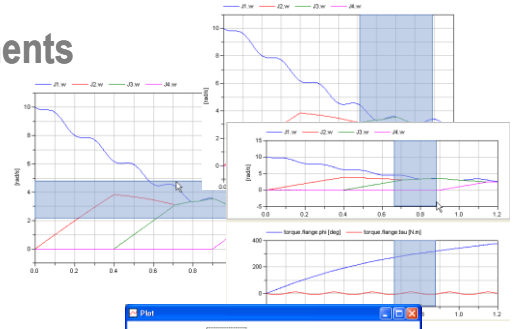


- Improved productivity
  - Error messages for encrypted libraries
  - Plotting facilities (zooming, curve highlight, …)
  - Graphical editor
    - General revision of context menus
    - Improved text editing dialog in icon and diagram layer
    - Code export and FMI import/export commands integrated in GUI
    - More settings stored between sessions
- FMI for co-simulation
  - Improved documentation
  - Support for import of Dymola-generated FMUs
- Better simulation
  - Improved non-linear solver for equation systems (homotopy at events)
  - Adaptive homotopy method (fluid systems)
- Enhanced Simulink-interface
  - Pre-compiled DymolaBlock S-functions can be imported
- Simulator as OPC server (process simulation)
- Improved libraries





Plotting Improvements

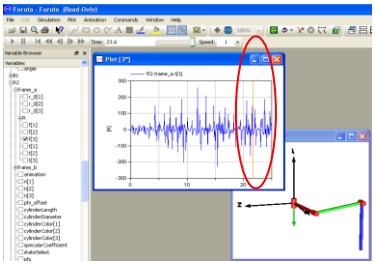


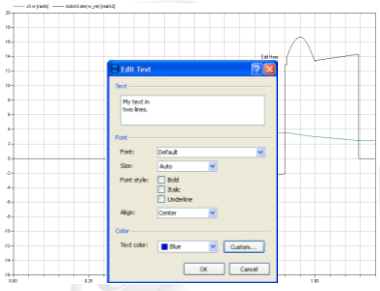
- Zooming
  - Vertical
  - Horizontal
  - Time-synchronized
- Curve highlighting
- Tooltip for legends
- Script support for plot display

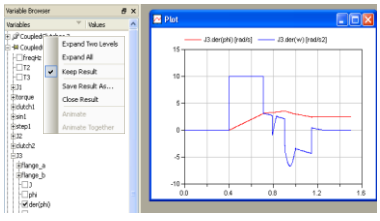
```
plot({"J1.w", "J2.w"},
     colors={{0,0,255}, {255,0,0}},
     patterns={LinePattern.Dash, LinePattern.Solid},
     markers={MarkerStyle.None, MarkerStyle.Cross},
     thicknesses={0.500000, 0.250000});
```

Plotting Improvements

- Simulation time-line in plot
- Insert text object in diagram
- Keep result files

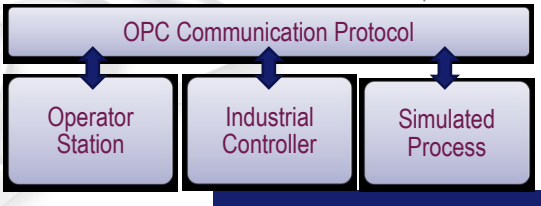




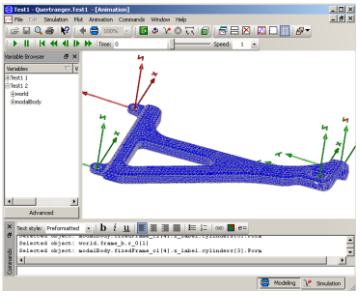


Improved Openness

- Enhanced Simulink-interface
  - Pre-compiled DymolaBlock S-functions can be imported
  - Makes it easier to deploy Dymola-generated models
- Simulator as OPC server (process simulation)
  - Process modeled in Dymola
  - Simulation executable can directly talk to control systems and operator stations via standard OPC communication protocol



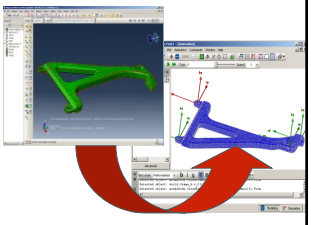
Library Improvements

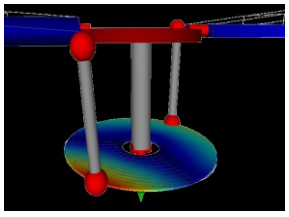


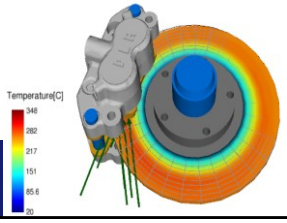
- New capabilities in FlexibleBodies library
  - Modal bodies
  - Annular plate
  - Thermo-elastic plate
- Improvements of existing libraries
  - Optimization 2.0
  - PowerTrain 2.1
  - AirConditioning
  - Hydraulics

CATIA

FlexibleBodies Library 2.0







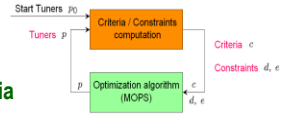
- Beams
  - analytic solution to common beam structures
- ModalBody (extended support)
  - applications: general FE-based flexible body description
  - consistent Catia-Abaqus-Dymola modeling process chain
- AnnularPlate (new modeling class)
  - semi-analytical modeling of annular Kirchhoff-plate (bending)
  - in arbitrary Lagrangian-Eulerian (ALE)-formulation: „rotate-with-plate-nodes“ + „slide-on-plate-nodes“
  - applications: brake squeal, machine tool, swash plate etc.
- ThermoelasticPlate (new modeling class)
  - variant of AnnularPlate with temperature field and thermoelastic coupling
  - applications: brake judder, hot spots etc.

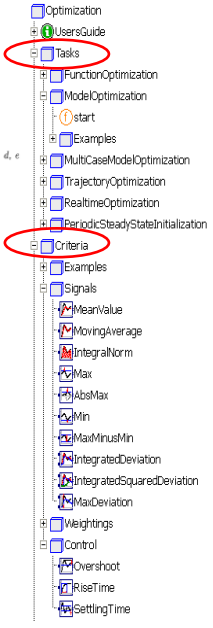
DLR Deutsches Zentrum für Luft- und Raumfahrt e.V. in der Helmholtz-Gemeinschaft

Optimization Library 2.0

New Features:

- Several **GUI-supported** optimization **tasks**
- Expanded sub-library for optimization **criteria**
- Support of **function objects (pointers)**
- Significantly enhanced **output** during optimization





Final Solution - evaluated once again (evaluation 61 of 61):

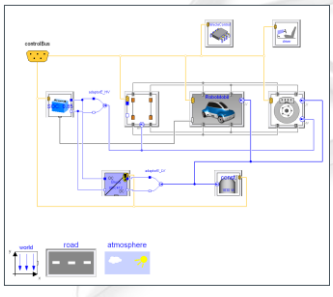
Tuner parameters	name	value
	Kf	-1.405985763435730
	Ki	-2.065697610134148
	Kq	0.632750130076522

Criteria	name	scaled criteria
0 1 2 3	overshoot	0.485809523825850
	maxElevator	0.486926696118355
	riseTime	1.382768709759114
	settlingTime	0.486966823836136
0 1 2 3	**Maximum of criteria**	0.486966823836136

PowerTrain Library 2.1

New Features:

- Backwards compatible
- Hybrid vehicles
- Electrical vehicle
  (especially:
  fast battery and electrical motor models)
- Improved bus
  (using features from Modelica 3.2)



Contact: Robomobil@dlr.de
Mr. Brembeck

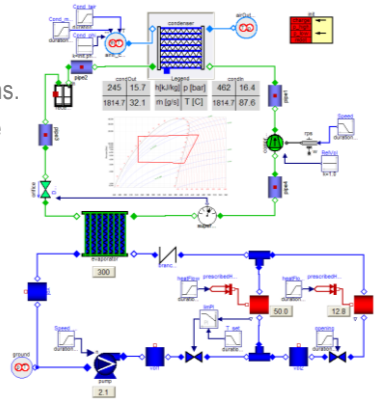
Electric research vehicle under development at DLR-RM:
- 10 electric actuators
- Wheel steering angles: 110°
- Vehicle dynamics control

Calibrated and hardware-tested models will be included in future PowerTrain versions

Other Library Enhancements

AirConditioning Library

- Support for battery cooling applications.
- Excel Interface in a separate package



Hydraulics Library

- Air content in medium
- Extended database with fluids
- Reversible hydraulic cylinders
- Hydraulic resistance