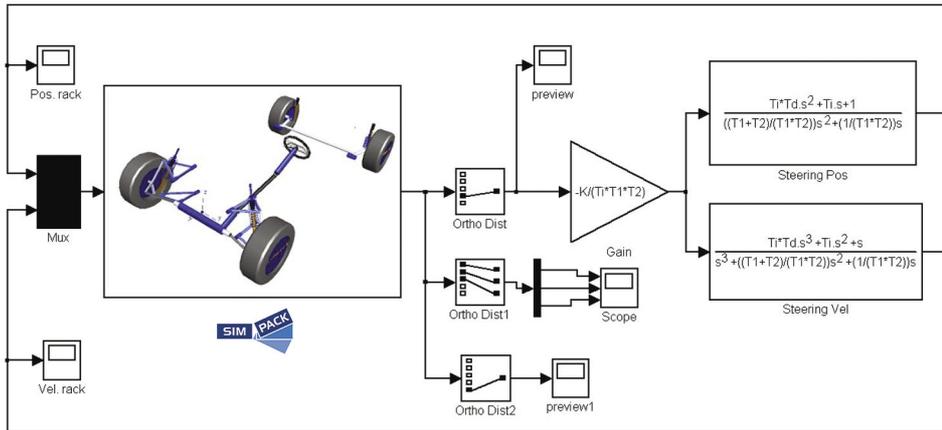


SIMPACK News

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SIMPACK Code Export

SIMPACK Code Export is designed to make existing and future multi-body models available to non multi-body simulation environments. Learn more on the basics of SIMPACK Code Export, the principle structure and the benefits it offers in a wide range of application areas.

WHY SIMPACK CODE EXPORT

How can general multi-body models be used in a non multi-body environment by non multi-body experts? How can a multi-body vehicle model be used in a control design environment such as MATLAB/Simulink? How can a 3D-multi-body model of a construction machine be used in a 1D-fluid dynamics software for hydraulic system design?

Multi-body models of trucks are subject to a huge variety of possible configurations such as the number and type of axles. What process flow is required to generate real-time models, which can be incorporated in a real-time environment? How can complex multi-body

models along with a highly specialised multi-body solver be used outside of SIMPACK? What is a suitable process for transferring simulation models from a multi-body division in a company to a control design department? What is a suitable link from SIMPACK models to in-house specific simulation environments? How can I close the gap between off-line simulation and on-line simulation? Is it possible for an OEM to transfer black-box vehicle dynamics models to a supplier without revealing structure and parameters of the car? How can engineering and consulting companies offer ready to use multi-body models to their clients without the need of running a multi-body tool at the clients' site? SIMPACK Code Export has been developed at INTEC to give answers and solutions to the technical and process relevant questions above.

BASIC PRINCIPLE OF SIMPACK CODE EXPORT

SIMPACK Code Export takes an indi-

» SOFTWARE01

Dr. Alex Eichberger, Frank Kohlschmied, INTEC GmbH

SIMPACK Code Export

» INTEC GMBH03

Dr. Alex Eichberger, INTEC GmbH

INTEC partners up with IST: EHD-Software TOWER now Available in SIMPACK

» UNIVERSITY APPLICATION04

Thomas Thümmel, Joseph Woyke, TU München

SIMPACK FEMBS Simulation of a Moulded Pantograph Mechanism

» SOFTWARE06

Johannes Gerl, INTEC GmbH

SIMPACK Virtual Suspension

» CUSTOMER APPLICATION09

Roger Gansekow, Siemens Transportation System, Krefeld

Approval of the Siemens Desiro Series Vehicle Dynamics for Use in Great Britain

» SOFTWARE 11

Dr. Lutz Mauer

Gearwheels in SIMPACK

vidual model as its input and generates the underlying parameterised motion equations

$$\dot{x} = f(x, t, u, p),$$

and corresponding sensor- or measurement equations

$$y = g(x, t, u, p),$$

whereas x denotes the system states, u is the system input, y contains the sensor outputs and p stands for the free parameters of the exported simulation model.

The motion equations can be generated as ordinary first order differential equations or, depending on the model, in addition, as differential algebraic equations. The equations are currently exported in Fortran and, in the future, the option to export the code in standard C will also be available. This makes it possible to use the code, once exported, in any simulation environment.

The structure of SIMPACK Code Export is shown below. The license *Code Export* enables the export of the model equations as source code; additional files are also generated for supplying the exported model with data and initial states. Independent from SIMPACK, the model can be compiled and linked with external code to build an executable program. At run-time, the model references a subset of the licensed (*Execution*) SIMPACK libraries which are shipped with the module SIMPACK Code Export. The equations of motion are solved by the external solver in the simulation environment or, optionally, if a *Time Domain Solver* license is available, the exported SIMPACK solver can be used.

The exported model and optional solver can now be used in any external simu-

lation environment without requiring a SIMPACK installation. To generate a ready-to-use model for MATLAB/Simulink, the model can be exported as a S-function, with the option of including the SIMPACK solver. Model and solver can now be run in multiple calculation cases by control design engineers. The often confidential model structure and topology are not transparent to the end user; only the data made available by the Code Export modeller for parameterisation in the code generation are visible and therefore can be altered.

SCOPE OF FUNCTIONALITY

Approximately 80% of the SIMPACK elements can be currently used in the exported code, with the range being continually expanded. An up-to-date list of the functions ready to use within Code Export can be requested from our Code Export product manager Frank Kohlschmied (frank.kohlschmied@simpack.de).

APPLICATION AREAS

SIMPACK Code Export has been designed to make existing and future multi-body models available to any

non SIMPACK simulation environment. Application areas are hardware-in-the loop, software-in-the loop, simulators and general real-time applications. It is also the tool designed for engineering and consulting companies who develop multi-body models for clients, who want to use those models independently from a SIMPACK installation. Finally, by means of SIMPACK Code export, multi-body models can be used as a „black box“ by third-parties, without having to reveal the model topology and structure.

INTRODUCTORY DAY

In summer this year, a one day free of charge introduction to SIMPACK Code Export will be offered to those interested in learning more about SIMPACK Code Export. If you are interested in attending the introduction course, don't hesitate in contacting our Marketing Manager, Ms Ernie Engert (ernie.engert@simpack.de). More information available on SIMPACK Code Export, www.simpack.com.

