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Simcenter 3D Motion MF-Tyre

Simulate tire forces for vehicle handling assessment and control prototyping analyses

Benefits

- Use an industry-standard handling simulation tire model
- Accurately predict vehicle handling behavior, including steady-state cornering, power-off in a turn, lane change, J-turn and more
- Simulate vehicle control systems such as ABS, ESP, VDC and TCS
- Analyze shimmy for car suspensions or aircraft landing gear

Summary

Simcenter 3D Motion MF-Tyre software enables you to create a tire model that corresponds to the Delft-Tyre implementation (revision 6.1.2) of the global standard, semi-empirical Pacejka Magic Formula from professor Hans Pacejka. These models can accurately and efficiently simulate the tire-road contact forces for various vehicle types such as passenger cars, motorcycles, trucks and



aircraft landing gear, from steady-state to high-frequency analyses.

With Simcenter 3D Motion MF-Tyre you can model the steady-state and dynamic behavior of the tire, within a frequency band that covers vehicle handling analyses (up to about 10Hz), as well as control prototyping and rollover simulations.

Parameters and measurements

To run simulations with Simcenter 3D Motion MF-Tyre, you need a tire property file with a list of parameters that contains the characteristics of a measured tire.

The Delft-Tyre formulation has been extensively validated through multiple experiments and under different conditions. In addition, Siemens (through TASS International – A Siemens Business) also provides measurement services in order to determine the MF-Tyre model parameters for a specific tire.

Starting from version 6.1, the effects from inflation pressure can be taken into account when calculating tire forces and moments. A full measurement protocol at a nominal inflation pressure and limited additional measurements at +/- 0.5 bar provide sufficient information to parameterize the MF-Tyre 6.1 models. Moreover, the models can interpolate between the highest and lowest inflation pressure on which measurements were done.

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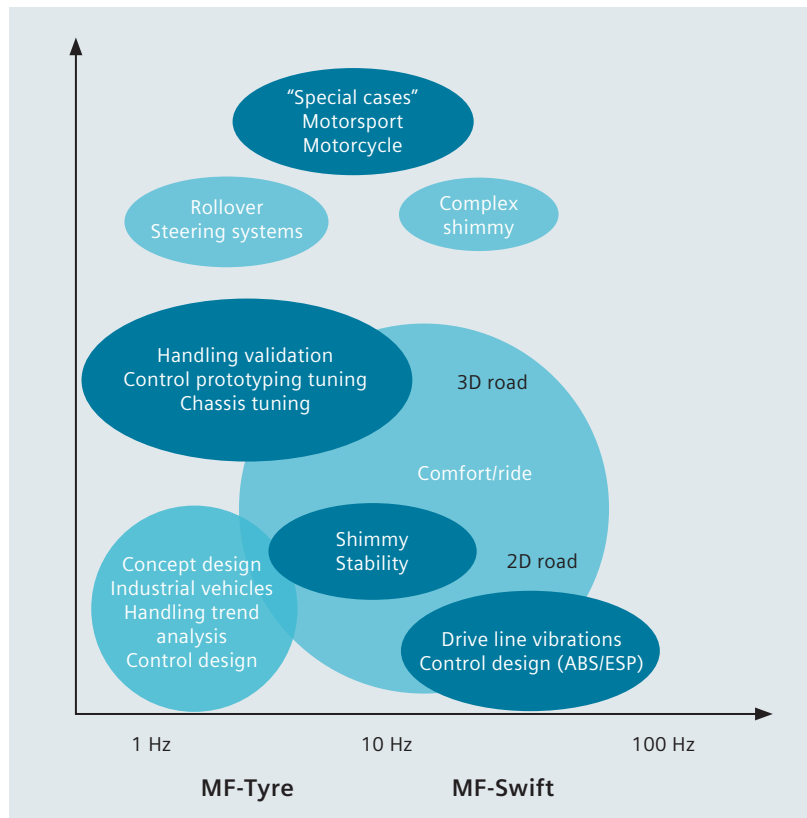
Capabilities

Simcenter 3D Motion MF-Tyre simulates the steady-state and the transient behavior up to 10Hz by calculating the force and moment components acting on the tire, based on the relative motion between the wheel and an arbitrary 2D or 3D road representation. Although flat roads are typically used for vehicle handling simulations, any undulation with a wavelength larger than the tire circumference can also be defined.

Lateral slip angle, camber angle, roll slip and vertical load are the main factors for the calculation of tire lateral and longitudinal loads and the resulting moments. Pure cornering and driving/braking as well as combined conditions can be accurately described. For transient effects, lateral and longitudinal tire relaxation lengths can be specified as a function of the tire vertical load. The frequency range of validity of this tire model covers all most typical operational conditions.

Compatibility

Simcenter 3D Motion MF-Tyre accepts MF-Tyre 6.1.2, MF-Tyre/MF-Swift 6.0, MF-Tyre 5.2, MF-MC-Tyre 1.0 and 1.1 as well as PAC89 and PAC94 tire property files. Under normal driving conditions, the simulation results will be the same as for all Delft-Tyre models. If for certain conditions a 6.1 version or higher is required, tire measurement data can be refitted using the MF-Tool, or using a built-in parameter estimation functionality.



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