

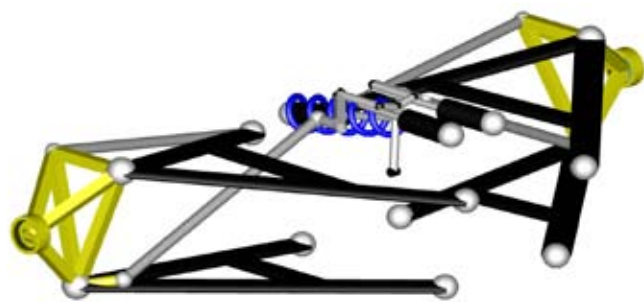
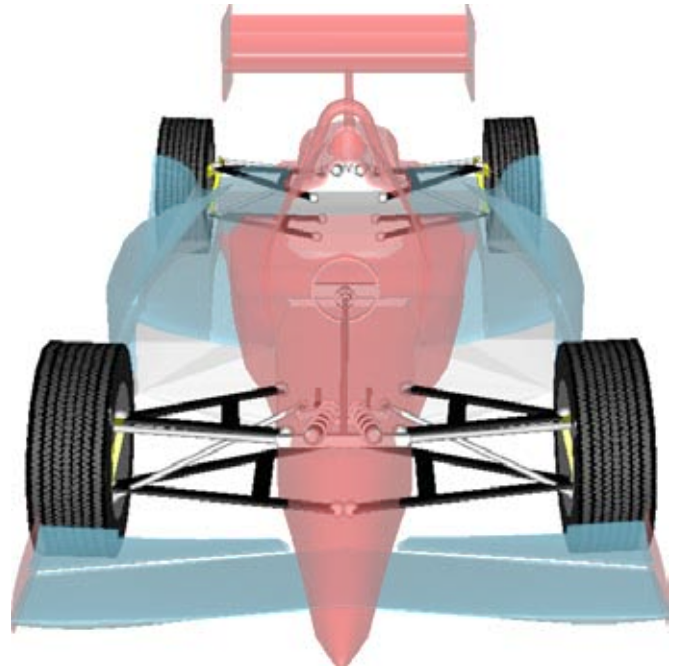
VDLMotorsports Library

Vehicle Dynamics for motorsport applications



Key features

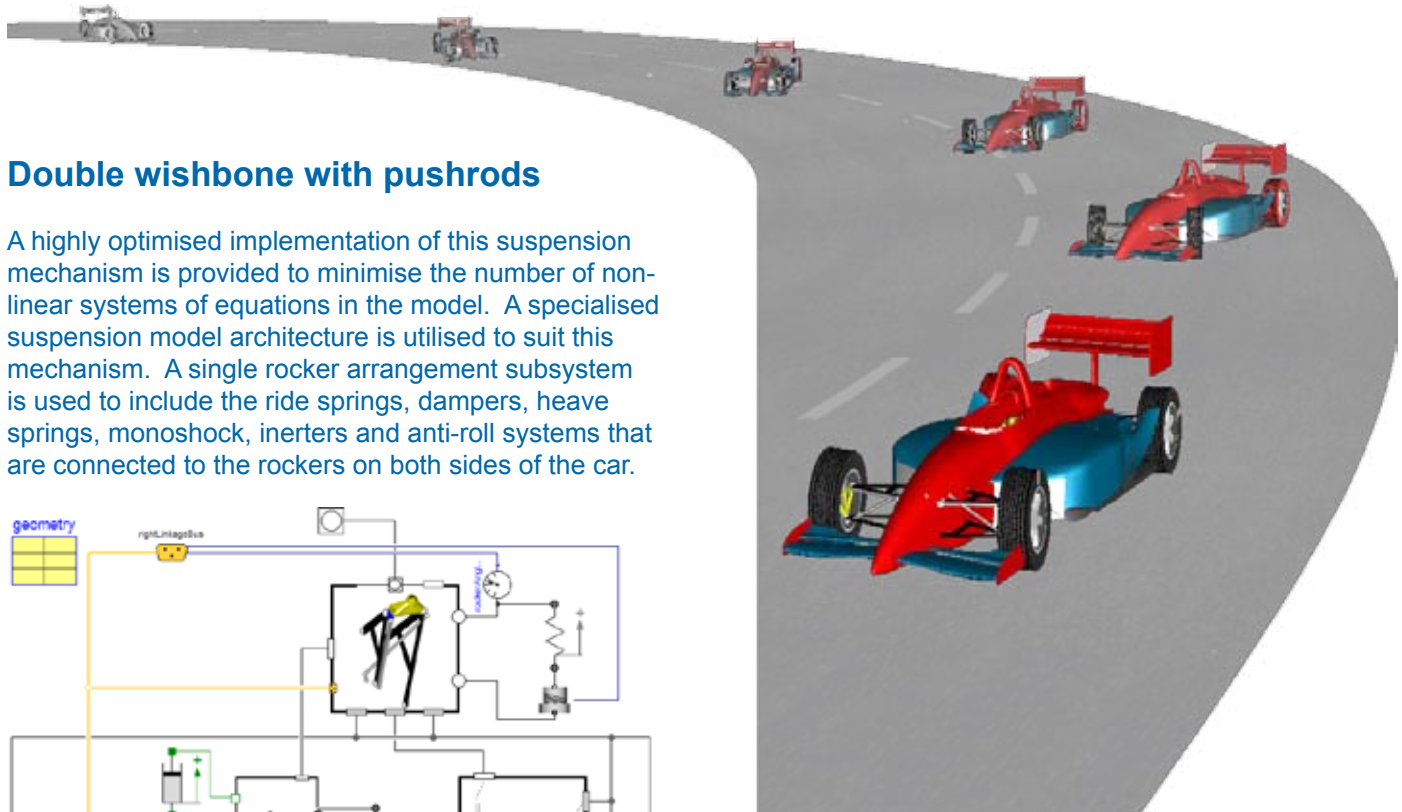
- » Add-on for the Vehicle Dynamics library developed by Modelon AB
- » Double wishbone with pushrod (or pullrod) suspension linkage featuring full range of adjustments for camber, toe, ride height, caster, etc.
- » Setup calculations enable shim sizes and spring preloads to be calculated to achieve specified wheel angles and ride heights
- » Modified Pacejka tyre slip model to enable steady state initialisation for straight line and cornering conditions
- » Compatible with Vehicle Dynamics 1.3.1 and Dymola 7.2 and later



Overview

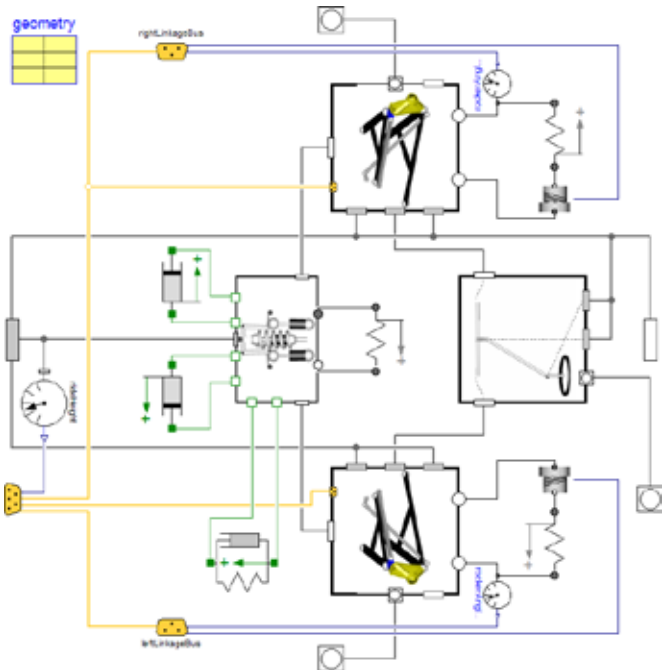
VDMotorsports is an extension to the Modelon Vehicle Dynamics library and builds on the capabilities incorporated in the Cars and Cars Suspensions versions. It provides optimised suspension models for motorsport applications including double wishbone with pushrod suspensions. The suspension mechanisms include the full range of adjustments that are applied in a physically correct manner.

The suspension models are fully compatible with the standard Vehicle Dynamics library which enables them to be used in all the standard test rigs and dynamic simulation experiments. Additional experiments are provided within the VDMotorsports library to run setup calculations, steady state initialisations and for half-car suspension kinematics including the tyre.



Double wishbone with pushrods

A highly optimised implementation of this suspension mechanism is provided to minimise the number of non-linear systems of equations in the model. A specialised suspension model architecture is utilised to suit this mechanism. A single rocker arrangement subsystem is used to include the ride springs, dampers, heave springs, monoshock, inertiars and anti-roll systems that are connected to the rockers on both sides of the car.



Setup calculations

Setup calculations as a half-car or full-car can be performed to automatically adjust the suspension to achieve specified wheel angle ride height targets. The setup calculations determine the shim thicknesses and spring preload adjustments required to achieve the specified targets.

Using setup records the results of these calculations can be stored and easily applied to models for use in other experiments.

Sensor packs

A full range of sensors are provided for measuring ride height, roll centres, caster angle, kingpin inclination, anti-dive and anti-lift in addition to the standard sensor packs in the Vehicle Dynamics library.

Mass and aerodynamic models

New vehicle body models are provided for the mass properties and aerodynamics. The mass properties include a user scaleable number of locations for ballast mass to be positioned within the vehicle. The aerodynamic model has been enhanced to generate lift and drag forces taking in to consideration vehicle speed, wind velocity, yaw rate and vehicle angles.

Steady state initialisation

Steady state initialisation experiments for half-car and full-car models are provided. For the full car models this is possible for both straight line and cornering conditions. Steady state initialisation is achieved due to the optimised suspension mechanism and the use of a modified implementation of the Pacejka tire model.

Requirements

This library requires the Vehicle Dynamics Cars and Cars Suspensions libraries which are developed by Modelon AB and available from your Dymola distributor.



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