MASTER THESES IN MECHANICAL & VEHICLE DYNAMICS

Introduction

Modelica is an equation-based modelling language that is used for modelling complex physical systems. Modelon is a leading provider of Modelica solutions. The Modelica-user usually works with components from a Modelica library. A library consists of components and subsystems used to build the desired system. One of Modelon's core business is to develop libraries and to support our customers with their specific Modelica solution. At the group of Mechanics and Vehicle Dynamics we are mainly working towards the automotive industry, but projects with aerospace applications are increasing. The group develops the Vehicle Dynamics and Electrification Libraries.

Many of the employees at Modelon started as master thesis student here. Since our ambition is to keep on growing, the chance to stay at Modelon after the thesis is good.The task in this Master thesis project is to develop a non-equilibrium dynamic model of a fuel tank based on existing libraries and models from Modelon. The models are implemented in the equation-based modeling language Modelica.

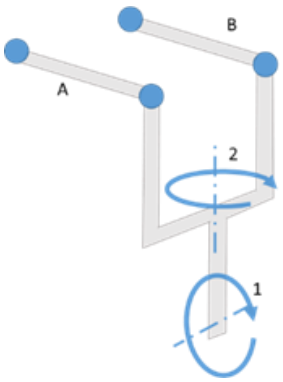
Multi-body mechanisms for improved simulation performance in Modelica

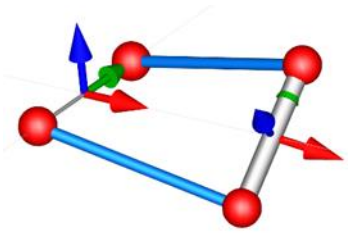
The Vehicle Dynamics Library (VDL) is a Modelica library for simulation of road vehicle dynamics. The library is used in several real-time applications. A key element is the efficient representation of suspension kinematics that allows for multi-body representations of suspensions to be simulated with high performance. These models are written such that the kinematic constraint equations can be solved analytically by Dymola. The scope of this thesis is to extend the set of available suspension kinematics models.

A few examples of interesting mechanisms are shown here. The complete scope of the thesis will be subject to discussion.

T-bar linkage

Two perpendicular revolute joints (1 and 2) connect to two length constraints (A and B). The two revolute joints will be connected to 1D rotational components to add stiffness and/or damping. Typically used for push/pullrod suspensions in motorsports.



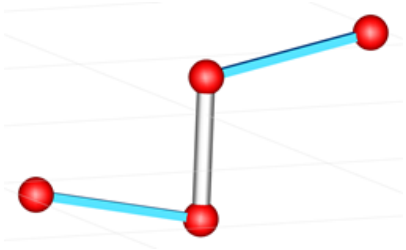


Two bar

Relation between two reference frames is constraint by two bars connected with spherical joints. It needs to be possible to attach components to at least one of the bars. This is typically used in multilink suspension models.

Watts linkage

Two separate bars with spherical joints constrain a body in the middle. The center body needs to be possible to connect to external mechanical components. Typically used in rigid axle suspensions to constrain the axle motion laterally.



Student profile

The thesis will primarily require good knowledge of mathematics and analytical mechanics. Experience with Modelica and mechanics simulations is a merit but not required.

Please attach cover letter, CV, and course transcript to your application.

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