*13*th INTERNATIONAL MODELICA CONFERENCE
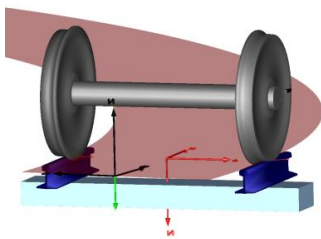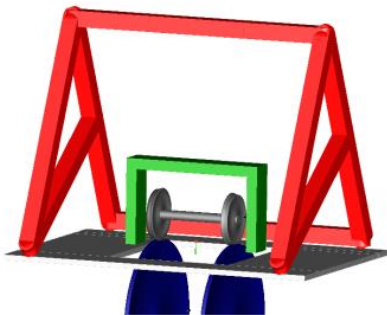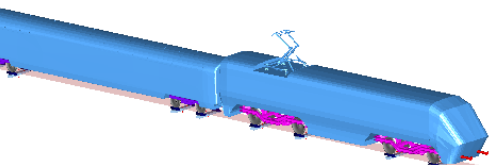
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Modeling and Simulation of Railway Dynamics in Modelica
Tutorial with hands-on excercise

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Railway vehicles are complex multibody systems running at high speed along a given track. The particular contact between steel wheels and rails carries the payload, provides lateral guidance and submits acceleration and deacceleration forces. Running gears and their suspensions decouple the dynamics of the components located close to the rail and excited by rail irregularities from the motion the passengers are supposed to perceive.

However, railway vehicles also employ multiphysical subsystems such as pneumatic friction brakes and air suspensions, electrical engines to provide propulsion and to regenerate energy, Diesel-electric or Diesel-hydraulic drive trains and so on.

This dual background motivates the application of the multidomain simulation environment Modelica in order to design, to optimize railway vehicles and to develop control, to test hard- or software on the system level (SiL, HiL). And in turn, it justifies the modeling the multibody dynamics of railway vehicles in Modelica to render a comprehensive system view in one setting.

The tutorial will give an introduction to fundamental railway dynamic issues such as traction, comfort and safety and present the associated capabilities of the DLR RailwayDynamics Library. In particular the goals of the tutorial are:
- To present the main modelling components of the library from the user's point of view
- To provide initial hands-on experience
- To describe the main underying concepts and their theoretical background
- To discuss essential details of the implementation

As a common platform for exercises the library and a test version of the simulation environment Dymola will be provided (MS Windows operating system). Please bring laptop with CD-reader in order to participate in the exercises.

Animations from the DLR RailwayDynamics Library from top to bottom:
- a mutiple car trainset
- a wheelset roller rig
- single wheelset on a curved track

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