Modelica™ MultiBody Library of DLR

download from http://www.Modelica.org/library/library.html

The free MultiBody library contains 3-dim. mechanical components to model rigid multi-body systems, such as robots or satellites. It efficiently solves the two standard problems:

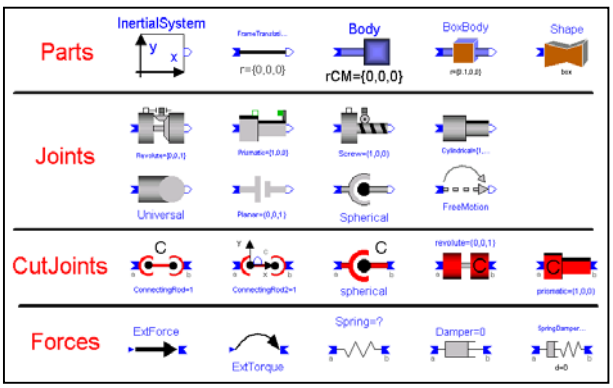
- The *direct* problem to generate the equations of motion, i.e., differential equations in state space form.
- The *inverse* problem to calculate the generalized forces in the joints as function of the movement of the multi-body system.

A unique feature of the library is the property that joints can have a *variable* structure. That is, every degree of freedom of a joint can be *locked* and *unlocked* during movement without degenerating efficiency. Together with the free library Modelica.Mechanics for modeling of 1-dim. mechanical systems, this feature can be used to easily model brakes, clutches, stops or sticking friction. Together with the library an example model of a robot is provided, which has Coulomb friction in all of its 6 joints leading to $2^6 = 64$ possible configurations.

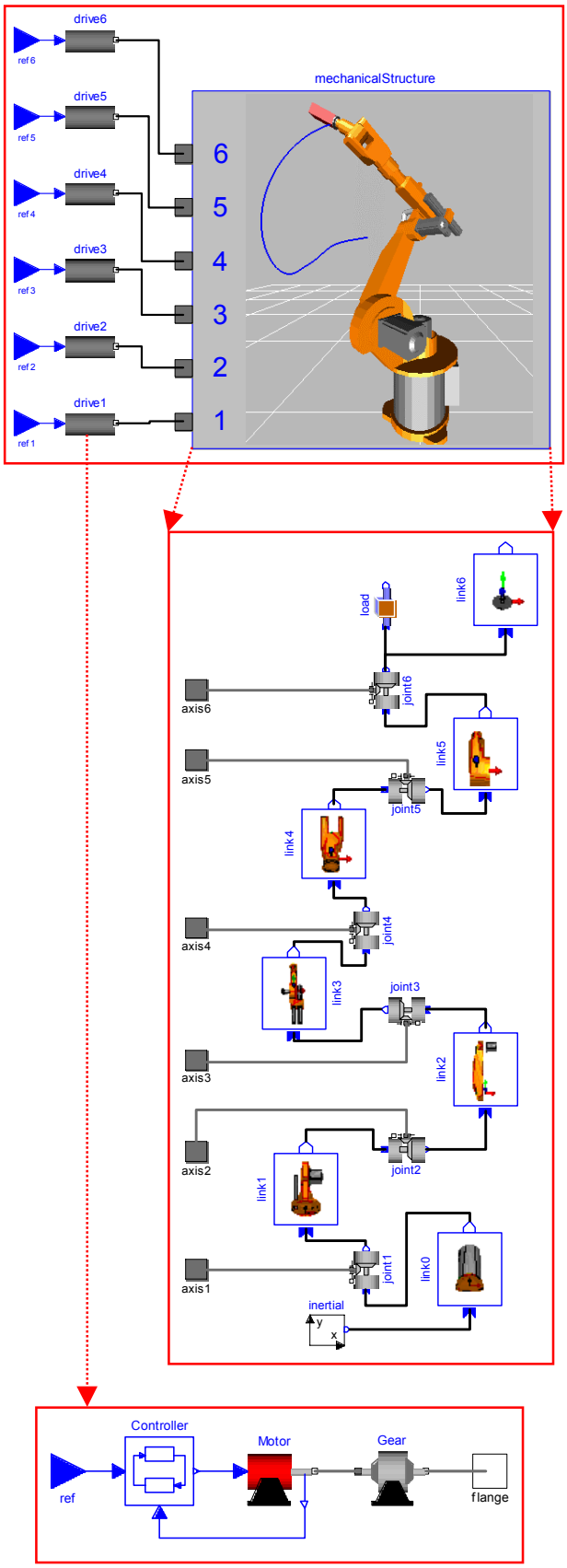
Basic model classes are provided for rigid bodies, ideal joints, force and measurement elements, visualizers for animation (different shapes, dxf-files, vector visualization). Bodies are connected by revolute, prismatic and other ideal joints. Kinematic loops can be handled by using cut-joints to break the loops.

For a user it is easy to introduce new components or copy and modify existing ones. For example, force elements may be derived by inheritance from the superclass *LineForce*.

Models of this library are simulated with the program *Dymola* (http://www.Dynasim.se) or with *SIMULINK*®, from The MathWorks Inc., using Dymolas S-function model generator.



Partial list of MultiBody components



Example system built-up with MultiBody library: Real time model of robot, including detailed models of controller, motor and gear box.

German Aerospace Center
Institute of Robotics and Mechatronics
Oberpfaffenhofen, D-82234 Wessling, Germany

Tel.: ++49 (0) 8153 28-2461
Fax: ++49 (0) 8153 28-1441
http://www.op.dlr.de/FF-DR-ER/

Modelica™ MultiBody Library of DLR