Modelling and parameter identification of a semi-active vehicle damper

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In this paper two semi-physical models of the semi-active dampers of the DLR robotic electric vehicle ROboMObil (ROMO) are described and their implementation in Modelica is presented. Besides the damper characteristics and hysteresis, the models additionally consider the gas force and cover the differences of the damper characteristics for compression and rebound. A procedure to identify the damper model parameters was implemented using the DLR Optimization library. The measurement data used for parameter identification was recorded during experiments on a damper test bench. The simulation results of the damper models are compared to the experiment data of the semi-active damper and the suitability of the damper models with respect to accuracy and real-time simulation is discussed.

Figure 1 Semi-active dual tube damper with external continuously variable valve

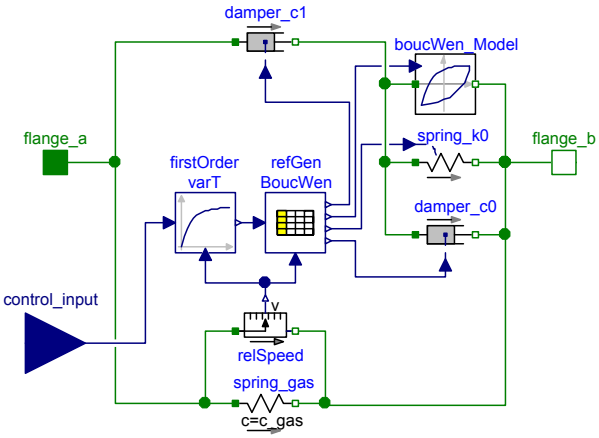

Figure 2 Generalized extended Bouc-Wen damper model

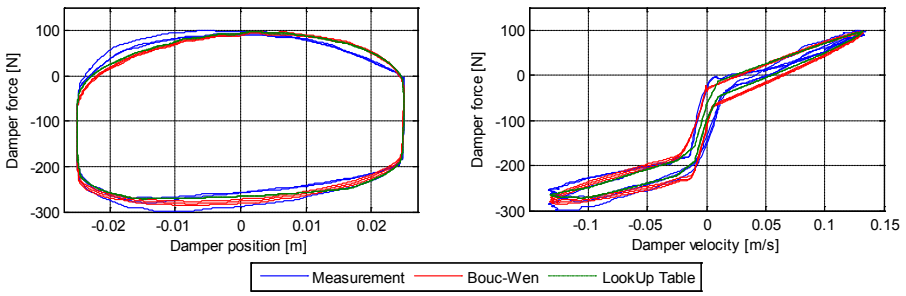

Figure 3 Comparison of damper models to damper measurements at 10% control input (left: Force over position; right: force over velocity)