

The Modelica library AlternativeVehicles for vehicle system simulation

Thomas Braig¹, Holger Dittus¹, Jörg Ungethüm², Tobias Engelhardt¹

¹Deutsches Zentrum für Luft- und Raumfahrt e. V. (DLR), Institut für Fahrzeugkonzepte, Pfaffenwaldring 38-40, 70569 Stuttgart

²Deutsches Zentrum für Luft- und Raumfahrt e. V. (DLR), Institut für Technische Thermodynamik, Pfaffenwaldring 38-40, 70569 Stuttgart

The activities at the Institute of Vehicle Concepts contribute to the sustainable development of technological systems for future generations of road and railway vehicles. During the last years the Modelica library AlternativeVehicles has been developed and since March 2011 it is commercially available.

The AlternativeVehicles Library allows the calculation of the energy demand and the optimization of energy management for conventional and alternative vehicle concepts. Among the vehicle concepts provided in the library are architectures of a conventional ICE powered vehicle (ICE), a extended range electric vehicle (EREV), a electric vehicle with a high-voltage battery as energy storage (BEV), and a fuel cell hybrid electric vehicles (FCHEV). To enable fast simulations of vehicle systems and architectures, mainly concentrated modelling approaches are used for the component models. The components provided focus on the simulation of alternative power trains. Therefore models of energy storages (battery, double layer capacitor) and energy converters such as fuel cells, electric motors and power electronics are included. In addition to the component models the library includes lots of parameter sets for component models representing technical data of real life components. Some component models are available in different detail levels which enables the user to choose an appropriate modelling approach depending on the aim of the simulations. Additional vehicle concepts can be easily created by combining the available components and developing the control strategy.

The library was developed within the european project Eurosyslib. The current version includes contributions of the DLR Institute of Robotics and Mechatronics and is distributed by the Bausch-Gall GmbH.

The presentation will give an overview of the library and typical applications, e. g. waste heat recovery for ICE powered cars or a parallel hybrid.