Abstract
The most challenging goals facing the automotive industry are reducing emissions and increasing fuel economy. These requirements are not only imposed by the society, but also by different cooperative agreements and legislative efforts such as the PNGV Program (USA), the ACEA (Europe) commitment to reduction of CO_2 emissions to 120 grams and the California Low Emission Vehicle Legislation.
The hybrid electric vehicles are seen as a solution for reducing of the pollution emissions and for improving of the fuel economy. Beside the conventional cooling system for the engine, the hybrid vehicle needs cooling systems for the electrical drive and the energy storage system as well. The thermal integration of the additional components leads to complex and coupled cooling systems. Therefore, a novel simulation model of the entire thermal management of the hybrid vehicle is required. This paper introduces an approach for the simulation of the vehicle thermal management system in a parallel hybrid vehicle within a comprehensive simulation environment. The hybrid drive train is developed by using a combination of the vehicle dynamics simulation program veDYNA and Matlab/Simulink. The simulation of the cooling system is performed by the 1D simulation program KULI. In order to carry out a comprehensive thermal calculation, a coupled simulation using the independent co-simulation environment tool ICOS is performed.

Keywords: Modeling and Simulation, Thermal Management, Cooling System, Hybrid Vehicle, Co-Simulation