Abstract

Vehicles with alternative power train concepts will require completely different HVACSystems
(Heating, Ventilating and Air Conditioning) than today's vehicles with combustion engines: On the one hand, due to increased system efficiency, the usable waste heat is smaller; on the other hand, switching the engine off in the start /stop driving conditions, the HVAC-System can not be powered by the engine in conventional ways.
This study investigates a promising alternative to today’s electrical auxiliary heaters by means of numerical simulations. A refrigerant circuit with the natural refrigerant R744 (CO_2) and an electrical driven compressor is operated in heat-pump mode for cabin heating, offering high efficiency compared to conventional electrical auxiliary heaters. The goal was to ensure competitive comfort, compared to today’s vehicles. The effect of the HVAC-system on fuel consumption of a hybrid vehicle was investigated by means of co-simulating the thermal system and the power train, using two different software tools: The thermal engine model, the coolant circuit, the HVAV system and the cabin were simulated with KULI. The software CRUISE was used tosimulate the power train.