

Abstract

The air conditioning system is one of the most important auxiliary systems of a vehicle and it offers a large potential for optimizations regarding costs and energy efficiency. In particular the possible introduction of the refrigerant R744 leads to challenges concerning the design and the operating strategy of the refrigerant cycle.

Within an efficient development process the use of numeric simulation tools became more important within the last years.

This paper presents the application of simulation tools in combination with experimental investigations in the field of the thermal management of a vehicle by the example of a R744 refrigerant cycle. In this context the single components (heat exchanger and expansion valve) as well as the system performance (control strategy) have been investigated. Finally an outlook on the entire vehicle simulation is presented, which can be used to investigate the interactions of the different cycles of the thermal management. This approach shall be used to determine the additional fuel consumption which is caused by the air conditioning system.