

Numerical Simulation of Refrigerant Cycles with New Methods

Dirk Limperich DaimlerChrysler AG (Stuttgart-Untertürkheim) Research Electronics and Mechatronics Acoustic and Climate Comfort (REM/AC)	Torge Pfafferoth Gerhard Schmitz Technical University Hamburg-Harburg (TUHH) Department of Technical Thermodynamics (6-08)
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In the future it will become more important to have accurate numeric tools for the simulation of energy and thermohydraulic systems. In order to optimize the efficiency of HVAC-Systems and to obtain a better understanding of the complex thermodynamic and hydraulic behaviour of R744 Refrigeration cycles a new Simulation tool has been developed using the object oriented language ModelicaTM. Within a research project of the TUHH and DaimlerChrysler (REM/AC) a CO₂-library has been created for the simulation of transient processes. The aim of this project is to establish a library for numerical investigations of refrigeration systems with the natural refrigerant R744. The development of the simulation tool is still in progress. The presentation contains the current results. A survey of the CO₂-library is presented and the modelling of CO₂-Heat exchangers is described in detail. Finally the results of a transient simulation run are compared with experimental data. The solution will be discussed to show the physical plausibility of the numerical models.

The presentation will contain:

- survey of the CO₂-library,
- description of the heat exchanger models,
- description of a test bed for the validation of the simulations,
- comparison of transient simulation results with experimental data,
- discussion of the quality of the simulation tool.