Effect of refrigerant mal-distribution in fin-and-tube evaporators on system performance -
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**Effect of refrigerant mal-distribution in fin-and-tube evaporators on system performance**

Refrigerant mal-distribution in fin-and-tube evaporators for residential air-conditioning (RAC) is investigated numerically in this paper. A model of the system is developed in the object-oriented modeling language Modelica. The models of the compressor and expansion valve are static, whereas the condenser is a dynamic moving boundary model. The evaporator model is a dynamic distributed one-dimensional homogeneous equilibrium model, in order to capture the distribution phenomena. Fin-and-tube heat exchangers usually have a complex circuitry, however the evaporator will be simplified to be two straight tubes. The refrigerant mal-distribution is then induced to the evaporator by varying the vapor quality at the inlet to each feeder tube, the pressure drop through each feeder tube and the air-flow across each tube. Finally it is shown that air-flow mal-distribution can be compensated by an intelligent distributor, that ensures equal superheat in both tubes. The refrigerant is R410a.

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