Modeling and Multi-objective optimization of parallel flow condenser using evolutionary algorithm

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Abstract

Parallel flow condenser (PFC), which is widely used in automobile air conditioning (AAC) industries, was modeled and optimized in this paper. A sample of designed and manufactured condenser of this type was modeled and tested. In the proposed physical model the condenser is divided into three regions of superheat, saturated (two phase) and subcooled. The modeling results validated by comparison with the experimental data.

In optimization section, the condenser heat transfer rate was maximized while its pressure drop was minimized applying genetic algorithm multi-objective optimization technique. A set of Pareto optimal solutions as well as the final optimal design point were presented for our case study.

The optimum design parameters resulted in heat transfer rate increase for 7.1% and decrease in pressure drop for 96% in comparison with the corresponding manufactured operating parameters.

Keywords: "Parallel flow condenser", "Modeling", "Multi-Objective Optimization", "Evolutionary algorithm"

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