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Modelling of ejector chillers with steam and other working fluids

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Abstract

The Constant Rate of Momentum Change (CRMC) criterion attempts to improve the design of supersonic ejectors, that can be used in heat-powered chillers for industrial or air-conditioning use. Moving from its original formulation, the CRMC design method can be advanced accounting for friction irreversibilities and real gas behavior, as done in a previous work by our research group. Here we present an upgraded version of this analysis, supported by experimental data from a prototype chiller using R245fa as working fluid. The analysis is extended to other fluids (water, isobutane, 5 HFCs and 3 HFOs) whose performance is calculated on a wide range of heat source/sink temperatures. The existing literature, based generally on ideal gas simulations, suggests that water yields poor results in terms of COP. This paper shows that this result may be argued. Low GWP fluid HFO1233zd also gives good results.

Keywords

Ejector chiller; Jet pump; Thermodynamic simulation; Refrigerants; GWP

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