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Shape optimisation of a two-phase ejector for CO₂ refrigeration systems

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Highlights

1. The CFD-based shape of the two-phase ejector is presented
2. The robust and efficient computational tool was used to perform the optimisation
3. The mixing section shape influence the ejector performance notably
4. The relatively high improvements of the ejector performance were obtained

Abstract

The shape optimisation of four CO₂ ejectors is presented in this study. The considered ejectors were originally designed for a multi-ejector supermarket CO₂ refrigeration system. The objective function was formulated to consider the multiple operating regimes, where the goal of the optimisation was to maximise the device efficiency. Six geometrical parameters were considered in the optimisation procedure. The applied optimisation scheme was a combination of a genetic algorithm coupled with the effective and validated CFD tool, ejectorPL. The optimisation results showed that the ejector efficiency improved by 6%. The shape modification trends were similar for all of the considered ejectors. All of the shape modifications resulted in a smoother expansion

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