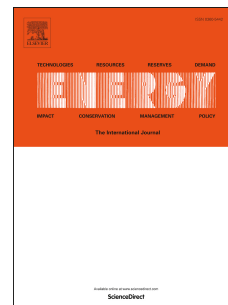


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Shape optimization of a long-tapered R134a ejector mixing chamber

José Sierra-Pallares^{a,b,*}, Javier García del Valle^c, Jorge Muñoz Paniagua^d, Javier García^d, César Méndez Bueno^a, Francisco Castro^{a,b}

^a*Departamento de Ingeniería Energética y Fluidomecánica, Escuela de Ingenierías Industriales. Universidad de Valladolid - Paseo del Cauce 59, 47011 Valladolid, Spain*

^b*Instituto de Tecnologías Avanzadas de la Producción. Universidad de Valladolid - Paseo del Cauce 59, 47011 Valladolid, Spain*

^c*Facultad de Ingeniería Civil y Mecánica. Campus Huachi. Universidad Técnica de Ambato. Av. Los Chasquis y Río Payamino 180206 Ambato, Ecuador*

^d*Departamento de Ingeniería Energética, Escuela Técnica Superior de Ingenieros Industriales. Universidad Politécnica de Madrid - C/ José Gutiérrez Abascal 2, 28006 Madrid, Spain*

Abstract

The purpose of this investigation is to develop a computational methodology for the shape optimization of long-tapered mixing chambers of refrigerant ejectors based on the internal entropy generation. The workflow of the aforementioned methodology includes a one dimensional model to generate a baseline geometry. Then a design of experiments is performed around a parametrization of the baseline geometry and the resulting combinations are introduced in the CFD model. Based on the CFD entropy generation results, a surrogate model is trained and further used to determine the optimum geometry for the mixing chamber. The application of the surrogate model is not straightforward, but rather a loop style routine has been programmed in order to assure a global minimum rather than a local one.

The proposed methodology has been applied to a R134a ejector geometry previously studied by the authors both experimentally and numerically. It has been found that given a design critical point, the entrainment ratio may be increased up to a value of 16% with the shape optimization whereas the discharge pressure remains constant.

Keywords: CFD, ejector, mixing chamber, refrigeration, shape optimization

*Corresponding author

Email address: jsierra@eii.uva.es (José Sierra-Pallares)

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