

# CFD Analysis of Ejectors

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## Abstract

Ejectors are the devices used to carry out mixing and recompression of two fluid streams, one with higher energy and the other with lower Energy. The high energy fluid is passed through the converging nozzle of ejector to very high velocities which in turn creates suction and draws the secondary fluid into the ejector through a secondary inlet.

In the present work an attempt is made to study the entrainment of primary fluid with secondary fluid of a single phase ejector using COMSOL Multiphysics' CFD module. The impact of varying operating conditions such as nozzle geometry, working fluids and inlet boundary conditions on the performance of the ejector was studied using various fluids like air, R141, R142 are used in the analysis and the results obtained are validated with the 1-D analytical results.

It is found that increase in the secondary throat diameter of the ejector results in decrease in entrainment ratio. It is also evident from the results that R141b has better performance over the R142b and R245fa in terms of entrainment ratio. Further it is found that increase in pressure ratio decrease the performance of ejector.

For the analysis, the simulations made using COMSOL Multiphysics' CFD module's High Mach number flow - Turbulent flow physics.

## Reference

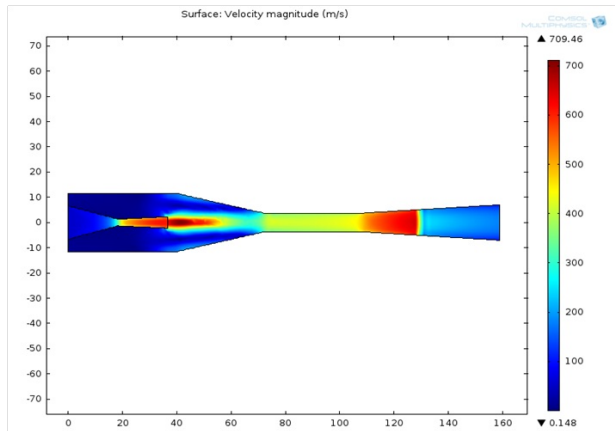
1) CFD Simulations Of a Supersonic Ejector for Use in Refrigeration Application.

-David SCOTT, Zine AIDOUN, Omar BELLACHE and Mohamed OUZZANE

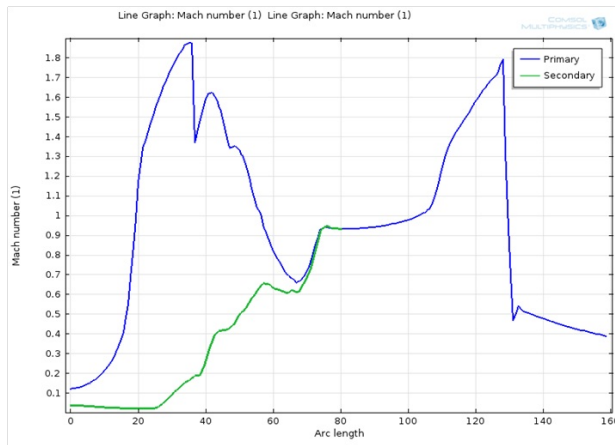
2) CFD analysis of ejector in a combined ejector cooling system

-E. Rusly, Lu Aye, W.W.S. Charters, A. Ooi

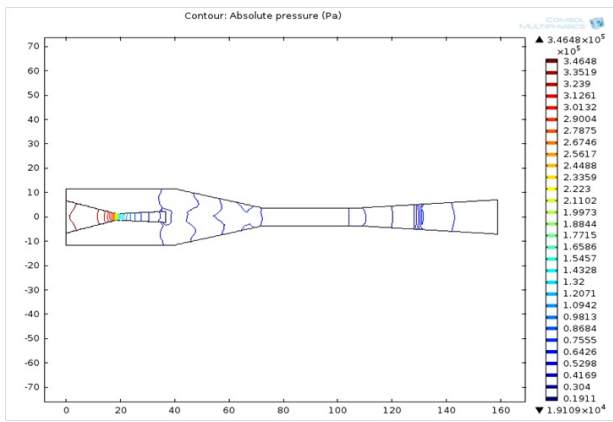
## Figures used in the abstract



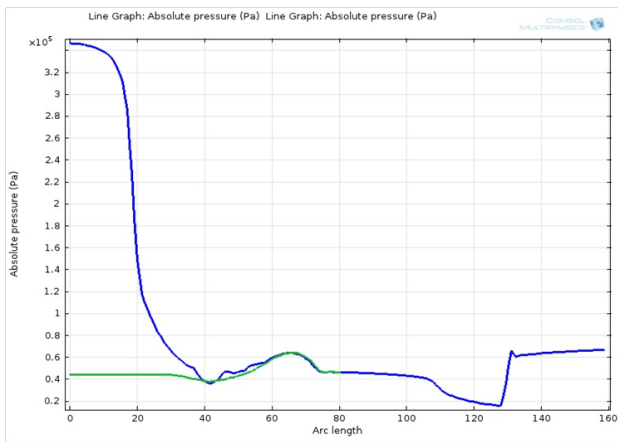
**Figure 1:** Velocity surface plot



**Figure 2:** Mach number plot



**Figure 3:** Pressure Contour plot



**Figure 4:** Pressure plot