

عنوان مقاله:

Development of a New Supersonic Rotor-vane Ejector using Computational Fluid Dynamics

محل انتشار:

ماهنامه بین المللی مهندسی، دوره 34، شماره 1 (سال: 1400)

تعداد صفحات اصل مقاله: 9

نویسندگان:

M. Sarvalishah - *Department of Mechanical Engineering, University of Hormozgan, Bandar Abbas, Iran*

S. Niazi - *Department of Mechanical Engineering, University of Hormozgan, Bandar Abbas, Iran*

Y. Bakhshan - *Department of Mechanical Engineering, University of Hormozgan, Bandar Abbas, Iran*

خلاصه مقاله:

An innovative design of a supersonic rotor pressure-exchange ejector is introduced in this paper. In this design, momentum is exchanged between supersonic primary flow and secondary flow using an idle rotor. A CFD code developed to model the 3-D compressible, viscous and turbulent flow of air inside the new design of ejector. Roe approach and Spallart-Allmaras methods used to analyze flow inside the ejector. The flow inside the ejector was modeled by using a structured grid and air was employed as the working fluid in both primary and secondary streams. The Mach number of the motive flow was set at 2. Momentum exchanged between the primary and secondary flows because of direct contact between those. In addition to that, rotation of idle rotor and mechanical blades entrained the secondary flow to the ejector. Enthalpy, entrained mass flow rate and created vacuum presented for the flow inside the ejector for different configurations of the rotor and ejector until an optimum case was achieved. Also, uniformity of the flow at discharge section compared between ejectors. For the optimum case with the presented geometry, the ultimate rotor speed of 5000 rpm was obtained and an increase of 47% in entrainment ratio achieved with respect to the stationary blades. To study the flow field in more details, the contours of the Mach number and stagnation pressure were compared according to the different sections of computational domain.

کلمات کلیدی:

Ejector, rotor, Viscous, Compressible, Entrainment ratio, Supersonic

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/1185375>

