Accepted Manuscript

A Methodology for the Prediction of Back-Pressure Induced Stall in Eductor-jet Pumps

Wenbo Liu, Kishore Pochiraju

 PII:
 S0140-7007(18)30303-7

 DOI:
 https://doi.org/10.1016/j.ijrefrig.2018.08.007

 Reference:
 JIJR 4074

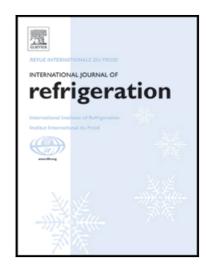
To appear in:

International Journal of Refrigeration

Received date:8 March 2018Revised date:7 August 2018Accepted date:9 August 2018

Please cite this article as: Wenbo Liu, Kishore Pochiraju, A Methodology for the Prediction of Back-Pressure Induced Stall in Eductor-jet Pumps, *International Journal of Refrigeration* (2018), doi: https://doi.org/10.1016/j.ijrefrig.2018.08.007

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



A Methodology for the Prediction of Back-Pressure Induced Stall in Eductor-jet Pumps

Wenbo Liu^{*} and Kishore Pochiraju

Stevens Institute of Technology, Hoboken, NJ, 07030

Abstract

Eductor-jet pumps are used to transfer large quantities of fluids using a high-pressure fluid source without the need for moving parts, such as motors and impellers. The pump operates by creating the Venturi effect inside a convergent-divergent nozzle. These pumps can stall when a back pressure develops at the outlet. In this paper, the critical condition at which the stall occurs is determined by comparing the thrust force from the jets of the pump to the opposing force caused by backpressure at the pump outlet. This methodology predicts the stall conditions for both over-expanded and under-expanded flow conditions. The motive gas pressure and the backpressure ratios at which stall occurs is dependent upon the pump geometry, fluid properties, and the pump operating conditions. Experiments conducted on a 3D printed and a commercially available pump, as well as 3D computational fluid dynamics analyses, enabled verification of the proposed methodology.

Keywords: Eductor-jet pump; Performance; Thrust force; Stall; Ejector refrigeration system; Backflow mode

^{*} Corresponding author. Tel: +12012168053 Email address: <u>Kishore.Pochiraju@stevens.edu</u> Postal address: 1 Castle Point Terrace, Hoboken, NJ 07030

Download English Version:

https://daneshyari.com/en/article/11012143

Download Persian Version:

https://daneshyari.com/article/11012143

Daneshyari.com