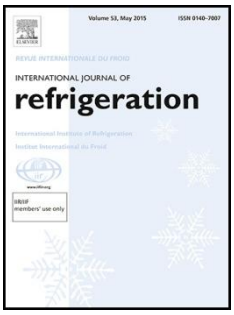
Accepted Manuscript



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PII: S0140-7007(17)30003-8
DOI: http://dx.doi.org/doi: 10.1016/j.ijrefrig.2017.01.002
Reference: JIJR 3513

To appear in: *International Journal of Refrigeration*

Received date: 17-6-2016
Revised date: 28-12-2016
Accepted date: 5-1-2017

Please cite this article as: Feng Hou, Zhaorui Zhao, Zhiqiang Yu, Ziwen Xing, Experimental study of the axial force on the rotors in a twin-screw refrigeration compressor, *International Journal of Refrigeration* (2017), http://dx.doi.org/doi: 10.1016/j.ijrefrig.2017.01.002.

Experimental study of the axial force on the rotors in a twin-screw refrigeration compressor

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Highlights

- An experimental study of the axial force on the twin-screw compressor rotors was conducted.
- The mean pressure model and sector pressure model are proposed to calculate the axial force on the end face.
- The sector pressure model is more accurate in predicting the axial force.
- The axial force on the rotor end face has more significant influence than that on the rotor helical surface.

Abstract

The high operating pressure of a twin-screw compressor employed in high temperature heat pump or NH_3/CO_2 cascade refrigeration systems often leads to extremely large axial force on the compressor rotors. Accurate calculation of this axial force is very important in selection of bearing and design of balancing pistons. In this paper, an experimental study of the axial force on the twin-screw compressor rotors was conducted. The variations of the axial force under different operating conditions were investigated. Furthermore, the axial force was also calculated by employing the mean pressure model and sector pressure model, and was compared with that of the experimental results. It was concluded that the sector pressure model is more accurate in predicting the axial force on the rotors in comparison with that of the mean pressure model. However, the mean pressure model was more accurate under operating conditions with large built-in volume ratio. Moreover, the axial force on the rotor end face was found to have larger influence than that on the rotor helical surface.

Keywords: Twin-screw compressor; Refrigeration; Axial force; Balance piston