Accepted Manuscript

Title: Performance evaluation of an active magnetic regenerator for cooling applications - part II: mathematical modeling and thermal losses

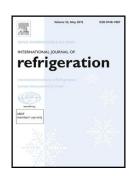
Author: Paulo V. Trevizoli, Alan T. Nakashima, Jader R. Barbosa Jr.

PII: S0140-7007(16)30218-3

DOI: http://dx.doi.org/doi: 10.1016/j.ijrefrig.2016.07.010

Reference: JIJR 3383

To appear in: International Journal of Refrigeration



Please cite this article as: Paulo V. Trevizoli, Alan T. Nakashima, Jader R. Barbosa Jr., Performance evaluation of an active magnetic regenerator for cooling applications - part II: mathematical modeling and thermal losses, *International Journal of Refrigeration* (2016), http://dx.doi.org/doi: 10.1016/j.ijrefrig.2016.07.010.

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.

ACCEPTED MANUSCRIPT

Performance Evaluation of an Active Magnetic Regenerator for Cooling Applications - Part II: Mathematical Modeling and Thermal Losses

Paulo V. Trevizoli*, Alan T. Nakashima, Jader R. Barbosa Jr. **

POLO - Research Laboratories for Emerging Technologies in Cooling and Thermophysics. Department of Mechanical Engineering, Federal University of Santa Catarina, Florianópolis, SC, Brazil

*Present address: IESVic - Institute for Integrated Energy Systems, Department of Mechanical Engineering, University of Victoria, Victoria, BC, Canada. Email: paulot@uvic.ca

**Corresponding author. E-mail: jrb@polo.ufsc.br

Highlights

- Main loss mechanisms in AMRs are quantified via a two-temperature porous medium model
- The model was validated using an extensive experimental database presented in Part I
- Casing heat transfer and dead volumes are the main factors affecting AMR performance
- Thermal insulation is an important aspect in the design and evaluation of AMRs

Abstract

In this second part of a two-part paper, a mathematical model of active magnetic regenerators is applied to identify and quantify the main losses taking place in the AMR evaluated experimentally in Part I. Among those losses, the heat interaction with the external environment and the presence of dead (void) volumes between each end of the regenerator and the hot and cold heat exchangers were found to be the main factors that affect the AMR performance. Demagnetizing losses were considered as a function of the matrix geometry, temperature and applied magnetic field. In addition to predicting the time-dependent behavior of the fluid temperature exiting the regenerator during each

Download English Version:

https://daneshyari.com/en/article/5017193

Download Persian Version:

https://daneshyari.com/article/5017193

<u>Daneshyari.com</u>