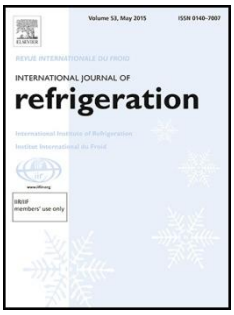
Accepted Manuscript



Title: Experimental performance investigation of an active magnetic regenerator subject to different fluid flow waveforms

Author: R. Teyber, P.V. Trevizoli, I. Niknia, T.V. Christiaanse, P. Govindappa, A. Rowe

PII: S0140-7007(16)30326-7
DOI: http://dx.doi.org/doi: 10.1016/j.ijrefrig.2016.10.001
Reference: JIJR 3444

To appear in: *International Journal of Refrigeration*

Received date: 22-7-2016
Revised date: 28-9-2016
Accepted date: 3-10-2016

Please cite this article as: R. Teyber, P.V. Trevizoli, I. Niknia, T.V. Christiaanse, P. Govindappa, A. Rowe, Experimental performance investigation of an active magnetic regenerator subject to different fluid flow waveforms, *International Journal of Refrigeration* (2016), http://dx.doi.org/doi: 10.1016/j.ijrefrig.2016.10.001.

Experimental Performance Investigation of an Active Magnetic Regenerator Subject to Different Fluid Flow Waveforms

R. Teyber*, P.V. Trevizoli*, I. Niknia*, T.V. Christiaanse*, P. Govindappa*, A. Rowe*
Department of Mechanical Engineering, Institute for Integrated Energy Systems, University of Victoria, PO Box 1700 STN CSC, Victoria, B.C., Canada V8W 2Y2

*Corresponding author. E-mail: rteyber@uvic.ca

Highlights (for review)

- A flow control device based on cam actuated valves is implemented on an AMR device
- A no-flow period is used to increase the flow-averaged magnetic field change
- The system is simulated to evaluate waveforms of constant displaced volume
- AMR experiments are conducted and the performance of each waveform is discussed

Abstract

A flow control mechanism based on cam actuated valves is designed and implemented on an active magnetic regenerator test apparatus. The objective is to overcome the brief low field period of the nested concentric Halbach array by decreasing the fluid blow width; displacing fluid only when the magnetic field is close to the minimum and maximum values. Flow waveforms are simulated to evaluate varying blow durations with the same displaced volume. AMR experiments are performed where the largest Ex_Q of 1.62 W is obtained with V_D = 13.90 cm^3 and a diversion ratio of δ = 0.41, demonstrating an 11.2% increase over the sinusoidal waveform.

Keywords: Active magnetic regenerator, room temperature magnetic refrigeration,