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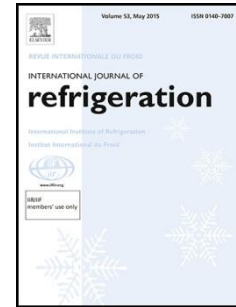
Author: Paulo V. Trevizoli, Alan T. Nakashima, Guilherme F. Peixer, Jader R. Barbosa Jr.

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# Performance Evaluation of an Active Magnetic Regenerator for Cooling Applications - Part I: Experimental Analysis and Thermodynamic Performance

Paulo V. Trevizoli\*, Alan T. Nakashima, Guilherme F. Peixer, 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

- The performance of an active magnetic regenerator (AMR) test apparatus is discussed
- Tests with 195.5 g of Gd gave a maximum cooling capacity of 53.7 W at 1 Hz
- Maximum system temperature spans of the order of 30 K were obtained.
- Peak values of COP and  $\eta_{2nd}$  were found in terms of utilization and frequency.

## Abstract

In this first part of a two-part paper, a new active magnetic regenerator (AMR) laboratory apparatus is presented and evaluated. The setup is composed of a nested Halbach cylinder magnetic circuit (maximum magnetic flux density of 1.69 T) assembled in phase with a double effect displacer that provides the cold and hot blows to the regenerator. A single packed-bed regenerator with 195.5 g of gadolinium spheres is used in a discontinuous (i.e., reciprocating) cycle. The system performance is evaluated in terms of characteristic curves (i.e., cooling capacity as a function of temperature span), coefficient of performance and second-law efficiency as a function of the utilization factor and operating frequency. Maximum values of *COP* have been identified for a given

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