

# Accepted Manuscript

Title: A new model of first-order magnetocaloric materials with experimental validation

Author: M.A. Benedict, S.A. Sherif, D.G. Beers, M. Schroeder

PII: S0140-7007(16)30194-3

DOI: <http://dx.doi.org/doi: 10.1016/j.ijrefrig.2016.07.001>

Reference: IJIR 3374

To appear in: *International Journal of Refrigeration*

Received date: 17-5-2016

Revised date: 17-6-2016

Accepted date: 1-7-2016

Please cite this article as: M.A. Benedict, S.A. Sherif, D.G. Beers, M. Schroeder, A new model of first-order magnetocaloric materials with experimental validation, *International Journal of Refrigeration* (2016), <http://dx.doi.org/doi: 10.1016/j.ijrefrig.2016.07.001>.

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 New Model of First-Order Magnetocaloric Materials with Experimental Validation

M.A. Benedict<sup>1,2,\*</sup>, S.A. Sherif<sup>1</sup>, D.G. Beers<sup>2</sup>, M. Schroeder<sup>2,3</sup>

<sup>1</sup>Department of Mechanical and Aerospace Engineering, University of Florida, Gainesville, FL, USA, <sup>2</sup>Advanced Development Group, General Electric Appliances Division, Louisville, KY, USA

<sup>3</sup>Department of Mechanical Engineering, University of Louisville, Louisville, KY, USA

\* Corresponding author: benedic2@outlook.com (727) 481-5895

## Highlights

- New model for first order magnetocaloric materials
- Experimental results from a variety of test conditions for a multistage first order regenerator
- Statistical comparisons of modeled materials to measured materials
- Numerical predictions of experimental results

*The use of new mathematical models to represent first-order magnetocaloric materials is reported. Three mathematical models with differing strengths and weaknesses are assessed. The material models are implemented in a numerical model to predict the cyclical performance of a magnetocaloric regenerator. Predictions using both measured and modeled material are compared. A prototype is used to confirm the predictions of the model as well as confirm performance trends related to the variables being investigated. The numerical model with measured and mathematically represented materials shows good correlation to experimental tests. The result is a new and useful method of representing magnetocaloric materials that can accurately predict results over a range of cyclical parameters.*

**KEYWORDS:** Magnetocaloric, refrigeration, material modeling, first-order material, multistage regenerator.

Download English Version:

<https://daneshyari.com/en/article/7175477>

Download Persian Version:

<https://daneshyari.com/article/7175477>

[Daneshyari.com](https://daneshyari.com)