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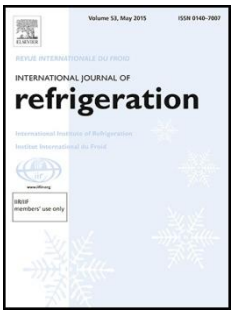

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Experimental Impact of Magnet and Regenerator Design on the Refrigeration Performance of First-Order Magnetocaloric Materials

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Highlights

- Modeling of LaFe based first order magnetocaloric material
- Experimental results from a variety of test conditions for a multistage first order regenerator
- Statistical comparisons of modeled materials to measured materials
- Multiple regenerator designs

Abstract

The first-order magnetic transition material LaFeSiMn(H) is used to create multi-stage regenerators to investigate the importance of regenerator and magnet design on magnetocaloric refrigeration performance. Aspect ratio, magnetic field strength, particle size, and staging are varied while keeping overall span and material mass at a constant level. Tests carried out on these regenerators show that the regenerator and magnetic systems play a key role in determining the performance of a magnetocaloric refrigerator. A one

-dimensional numerical machine model using both measured material data and data reconstructed from a mathematical material model is used to predict test results. The machine model