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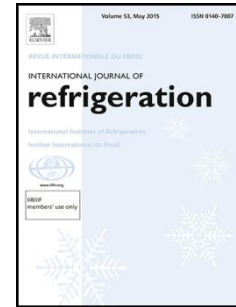
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Designing of Halbach Cylinder based Magnetic Assembly for a Rotating Magnetic Refrigerator.

Part 1: Designing Procedure

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Highlights

- The designing procedure for creation of two or higher pole magnet assemblies.
- The formulation of requirements on magnet design.
- Each designing procedure step is verified by 3D finite element simulation.
- Comparison of two and four pole designs.

Abstract

Generation of the alternating strong and almost zero homogeneous magnetic field that the magnetocaloric material has to be exposed to is a major challenge in magnetic refrigeration. With this paper we start a series of publications considering designing of Halbach cylinder based magnet assemblies for non simultaneous cycles. In present first part we define a designing procedure which applied to the Halbach cylinder allows creation of two or higher pole number magnet assemblies. We consider here two and four pole cases in great details. Each designing procedure step is accompanied by 3D finite element simulation. The achieved final magnet designs fulfill the predefined requirements of particular field distribution in the air gap, maximized ratio of high field volume to the permanent magnet volume, best utilization of magnets and magnetocaloric materials and constructional simplicity. A short comparison of two and four pole arrangements is given.

Keywords: magnetic refrigeration, Halbach cylinder, permanent magnet, magnet design, numerical simulation

1. Introduction

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