Experiments on a modular magnetic refrigeration device

An experimental magnetic refrigeration test device has been built at Risø DTU. The device is designed to be modular, and thus all parts of the device can easily be replaced depending on the experiment. This makes the device highly versatile, with the possibility of performing a wide variety of different experiments. The test device is of the reciprocating type, and the magnetic field source is provided by a permanent Halbach magnet assembly with an average flux density of 1.03 Tesla. This work presents experimental results for flat plate regenerators made of gadolinium and sintered compounds of La(Fe,Co,Si)13 and experimentally investigates the effect of thermal conduction through the regenerator housing walls. Each regenerator was tested over a range of hot reservoir temperatures under no load conditions for a regenerator comprised of gadolinium. The test machine was also tested with two different compositions of La(Fe,Co,Si)13 compounds. Test results are presented for a regenerator made of a single La(Fe,Co,Si)13 material and a two-material regenerator, and the results are compared to the same system using gadolinium. © 2011 Journal of Mechanical Engineering. All rights reserved.