

3D Modeling of Nd-Fe-B Magnets for Magnetic Resonance Imaging Systems – Models and Reality

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A 3D modeling method of Nd-Fe-B magnets for Magnetic Resonance Imaging (MRI) Systems using FEMLAB computer program is reported. The magnetic field map produced by this method was compared with the measurements taken from the 0.09 T MRI magnet within a 15 cm Diameter Spherical Volume (DSV). The magnet was constructed for the Institute of Physics, Jagellonian University, Krakow as a part of the MRI system. Whereas the actual magnetic flux density varies less than a few percent from the calculations, the discrepancy between the actual and calculated field homogeneity within DSV is much higher. This discrepancy is mainly due to the technological errors and differences in the actual material parameters and these assumed in the model. Some of technological errors were introduced into the model. The model was then used to design a 0.2 T magnet with 30 cm DSV MRI system for Institute of Biondiagnostics of National Research Council Canada. At present the magnet, located at the Life Sciences Research Station in Calgary, is ready for final shimming with the target homogeneity of 30 ppm.

The work was sponsored by AMAG – Dr Krzysztof Turek in the framework of research collaboration with Institute for Biondiagnostics of National Research Council Canada.

Abstract Category: Rare Earths and Actinides, Alloys and Compounds

Poster presentation

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