

Determination of the 3D-interaction between HTSC and magnetic field

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Abstract

The economical usage of any devices with high temperature superconductor bulks (HTSC) depends on the intensity of interaction between the external magnetic field and HTSC. The optimization of any HTSC system causes the necessity of development of very precise calculation methods. These must be adequate enough to be applied while designing different practical configurations. The paper deals with advanced three-dimensional calculation method for the determination of the interaction between HTSC-bulks and any field excitation system. By this approach the scalar potential formulation has been used. The extended 3D-FEM calculation model, developed at the Institute of Electrical Machines, TU Braunschweig, Germany is able to consider imperfect excitation systems with not matching permanent magnets and also interrupted iron structures. Furthermore, HTSC clusters composed of individual, electrically insulated bulks can be considered for more sophisticated force determinations. Based on this method the superconducting magnetic bearings design has been optimized to achieve an utmost reduced amount of HTSC-material for a given force and stiffness.

Scope: C3, B2