## APP5-7

### Moddeling of thrust magnetic bearings for levitation systems

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Currently, the main construction material for levitation bearings and suspensions are bulk high temperature superconducting samples. But bulk HTS has several drawbacks such as brittleness, the complexity of sample preparation, when samples of desired shape are needed. Also critical current density of the bulk samples is significantly less than it for the HTS tapes. Thus, an alternative way to construct levitation systems is to use HTS tapes stacks that has high strength, simplicity of thermal stabilization and the ability to vary the geometric parameters of the stack Special attention is paid to the HTS magnetic bearings development in various technical applications, such as gas-turbine installations, electric motors, high-speed rotor systems, where the magnetic bearing is one of the main components determining technical characteristics and durability. The complexity of this type magnetic systems need to take into account the superconducting materials properties in gradient magnetic fields. Therefore, using the special software taking into account the features of the three-dimensional magnetic system and sharply non-linear hysteresis materials properties is necessary. This work presents the complex results of the FEM H-formulation modeling of the thrust magnetic bearing based on 2G HTS tapes, which consist of HTS stator and PMs rotor. In view of the required size production problem, ring PMs magnetized radially replacing with sectoral PMs, as well as cubic PMs, were proposed and justified. Load characteristics and losses in the system for various bearing configurations were obtained. In this work we present a computational model for a magnetic levitation system based on the second generation HTS tapes $GdBa_2Cu_3O_{7-x}$. In our the model we have used the magnetic and transport characteristics of industrial superconductors and also took into account the thermal properties of each layer of high-temperature superconducting tape and the features of the layered structure of whole stack. The numerical simulation was performed using the finite element method. We compared the simulation data with the experimental results and got good agreement of results.
This work was supported by Russian Science Foundation ( project 17-19-01527 )

Keywords: levitation, bearing, HTS, moddeling