

Analyses of Solenoid Magnet which is Made of Pancakes of Coated Conductors Having Anisotropic Properties

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We analyzed the performances of cylindrical magnets of 24cm diameter and 28cm length using FEM4.0 program. That are made of three coaxial solenoids, and each solenoid are made of stacked pancakes of coated conductors(CC). We used a model for engineering critical currents density, $J_c(H, \Theta)$, which is a simulation of the anisotropic field dependent critical currents of real CC's with a filling factor of superconducting layer as large as 0.01. Here Θ 's are the angles of field directions. The applied current distributions of CC's and the field distributions in the magnet were calculated self-consistently by iteration. The directions of fields in the solenoids were very inhomogeneous, that results in inefficient performance of magnet. This is due to the reduction of critical currents by the anisotropic field dependence of J_c . The magnetic field produced at the center of magnet bore was about 7T. We considered about different pinning effects, effects of operating temperature, effects of differential of operating temperature, and arrangement effect of solenoid with different anisotropic pinning properties.

keywords : solenoid magnet, anisotropy, pinning, coated conductor, FEM