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C2Po3A-03: Thermal analysis of a HTS magnet with effects of magnet field

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Conduction cooled HTS magnet have been developed due to their easy operation and compact size. REBCO coated conductors are widely used for the HTS power application, high magnetic field magnet application, and etc.. The thermal stability of the REBCO conductor is essential for the operation of HTS-based device, and thermal conductivities of the conductor are relevant parameters for modeling cryogenic heat transfer. At cryogenic temperature, thermal conductivity of copper and silver strongly depend on the purity of the material and the intensity of the magnetic field.
In this study, FEM analysis was performed to obtain the magnetic field distribution of the magnet. In heat transfer analysis, thermal conductivity of REBCO conductors and cooling structures were calculated using the obtained magnetic field and temperature. Thermal conductivities of the laminated composite structure of REBCO conductor are evaluated by using the thermal network model. As a result, the heat transfer characteristics of the demostration HTS magnet for the NMR were examined depending on the magnetic field.

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