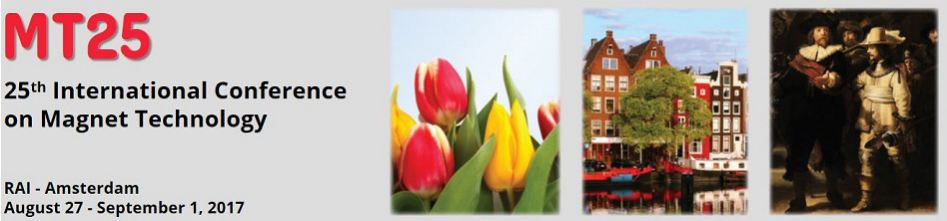

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Reduction effect of irregular magnetic field due to screening-current in copper-plated mutifilamentary REBCO tape

Thursday, 31 August 2017 13:45 (1h 45m)

The research and development on the applications of REBCO superconducting coil to the high field magnets for NMR, MRI, accelerator and so on are in progress. In these application, the magnets need to create highly homogeneous and temporally stable field. However, the screening currents lead to the serious problem in REBCO magnets for the applications required very high field quality. Then, multi-filamentary REBCO tapes are expected to reduce the screening current induced magnetic field in the REBCO coil. The multi-filamentary REBCO tape is plated the copper for mechanical strength and thermal stability. And, the coupling currents are induced between filaments in REBCO tape during excitation. In REBCO coil using copper-plated mutifilamentary REBCO tape, the transverse resistivity between filaments in REBCO tape is important factor for thinking about the behavior of magnetic field and current distribution. In previous study, we developed three-dimensional numerical simulation code using finite element method (FEM) and fast multipole method (FMM) to calculate the spatial and temporal behavior of screening current distribution in REBCO coil. The validity of the developed numerical simulation was confirmed by comparison with the experiments. In this study, we focused on the transverse resistivity between filaments in REBCO tape and investigated the current distribution in the mutifilamentary REBCO tape by using our developed simulation code. We discuss on the effects of transverse resistivity of mutifilamentary REBCO tape on the diffusion process of screening current and the spatial and temporal behavior of the magnetic field.

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