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Tue-Af-Po2.22-01 [75]: Investigation on Electrical and thermal behaviors of 2G HTS Racetrack Coil with Metal-Insulator Transition Insulation Material under External Time-Varying Magnetic Field

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This paper presents the basic investigation results on electrical and thermal characteristics of second generation high temperature superconducting race-track coil (2G HTS RTC) under external time-varying magnetic field. This RTC is electrically and thermally insulated by a vanadium III oxide (V2O3), which is one of the metal-insulator transition (MIT) materials and has a variability in the contact resistance with temperature changes. A synchronous rotating machine can be frequently operated under time-varying magnetic field of unsynchronized armature. Therefore, the electrical and thermal behaviors of MIT RTC should be examined and proved to confirm the applicability of MIT insulator on the turn-to-turn insulation of field coil for rotating machine. In this study, under external rotating magnetic field with various magnet grade, the basic behaviors of MIT RTC such as voltage, temperature, and center magnetic field are experimentally investigated in operating current charging in steady-state as well as overcurrent charging in transient-state.

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