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Wed-Af-Po3.15-03 [7]: Quench Analysis of HTS quadrupole magnets for the IF Separator of IBS RISP Demonstrating Electromagnetic Quench Propagation

Wednesday, 25 September 2019 14:00 (2 hours)

The Rare Isotope Science Project (RISP) of Institute for Basic Science (IBS) has been constructing a heavy ion accelerator complex, named Rare isotope Accelerator complex for ON-line experiments (RAON). To produce various high-intensity rare isotope beams, the RISP equips RAON with two rare isotope beam production systems: in-flight fragment (IF) separator; and isotope separator on-line system. The magnets placed in the forepart of the IF separator will be exposed to a high radiation dose of ~ 10 MGy/year. Considering the performance degradation and heating from high radiation, the RISP adopts high-temperature superconducting (HTS) magnets for the quadrupole magnets in the high radiation region. Each HTS quadrupole magnet consists of 8 series-connected metal-insulated single pancake coils. Because of the magnetic coupling, the quench of one or more HTS coils can induce the electromagnetic quench propagation to other coils. In this paper, we present probable quench scenarios and their electromagnetic and thermal transient behavior of HTS quadrupole magnets based on multi-coil circuit analysis.

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