MT29 Abstracts and Technical Program



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Thu-Af-Po.04-01: A Study on Determining Charging Current Waveform to Reduce Screening Current Induced Field in HTS NMR Magnets

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In this paper, we present a method for determining the appropriate charging current waveform to mitigate the screening current-induced field (SCF) in an NMR class high temperature superconducting (HTS) magnet. Screening currents have been observed to cause magnetic field drift in NMR class HTS magnets, leading to a degradation in performance. To address this performance degradation, various techniques were considered, and the Current Sweep Reversal (CSR) method, which mitigates SCF by adjusting the charging current waveform, was selected for this study. A simulation program was developed to predict the effects of specific charging current waveforms on the screening current and the resulting magnetic field variations in HTS magnets. By comparing the magnetic field changes induced by several preselected current waveforms, the most suitable waveform for a given HTS magnet was determined. To validate the accuracy of the program, the same current waveforms were applied to the actual HTS magnet, and the central magnetic field was measured. We compared the experimental results with the simulations and confirmed that they were nearly identical. This technique is expected to allow us to determine the most suitable charging current waveform for reducing screening currents before conducting time-consuming and resource-intensive charging experiments.

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