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Feasibility Study on Mitigation of Screening Current-Induced Field in a Conduction-Cooled REBCO Magnet

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The screening current-induced field (SCF) is well known to be an intrinsic problem for an REBCO magnet to have an NMR-quality field homogeneity. According to recent studies, the SCF in an REBCO magnet may be effectively reduced by the current sweep cycle method that requires “overshooting” in the magnet current. When an REBCO magnet is operated at a “low” temperature and thus has a large current margin to the magnet’s critical current, the overshooting often needs to be unacceptably “large” to eliminate a significant amount of SCF. In this study, we present an effective solution for this problem for the current sweep cycle method combining the thermal cycle. The SCF at a given operating current is known to be large at a small load factor, while it decreases as the load factor increases. Combined with the thermal cycle, the current sweep cycle technique is expected to be more effective as the temperature rise may reduce the magnet load factor. This paper presents test results of a conduction-cooled REBCO magnet that consists of a stack of 32 double pancake coils.

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