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Persistent Current Stabilization and Tuning of Bi-2223 HTS Coils

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We explore methods for stabilization and control of persistent currents in high-temperature superconducting Bi-2223 coils. Several different techniques are considered, including flux transfer through inductive coupling as well as other novel approaches. These different methods are tested at 77 K using an experimental setup with a closed loop of Bi-2223 conductor powering two iron-dominated magnets. Cryogenic hall probes characterize the effectiveness of stabilization techniques to prevent field decay, as well as the extent to which general control over the persistent current magnitude and waveform is achieved. The roles of conductor magnetization and path dependence of the persistent current initialization are studied numerically and then compared to experimental results. Finally, we describe the relevance of this work for full size Bi-2223 coils operating in persistent current mode.

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