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Magnetic Flux Trapping and Flux Jumps in Pulsed Field Magnetizing Processes in REBCO and Mg-B Bulk Magnets

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Pulsed field magnetization PFM technique is expected to be a cheaper and easier way to utilize the HTS bulk materials as high field trapped magnets. As the heat generation due to the flux motion in the bulk magnets causes degradation of field trapping performances, the flux motions during PFM should be clarified in various modes of field applications. As a way among various field-feeding modes, the authors applied the various shapes and intensities of pulsed magnetic fields to the cryo-cooled RE123/Mg-B bulk magnets to watch the field invasion behaviors. In the PFM evolutional profiles, the authors classify the flux motion in three categories as “no flux flow (NFF)”, “fast flux flow (FFF)”, and “flux jump (FJ)”. To clarify the conditions which allow the flux jumps to happen, we may have a couple of approaches in our experimental procedures. One is the variation of evolutional profiles of pulsed field application, and the other should be a compositional or structural approach like a metallic inclusion arrangement to enhance the specific heat or heat draining structure. In the experiments, we observed the highest field trapping appeared at the upper end of NFF region, and FFF caused to FJ. This means the heat generation and its propagation paths should be attributed to flux trapping behaviors.

Keywords: bulk superconductor, pulsed-field magnetization, flux trapping, flux jump