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Suppression of magnetization and creep in Bi2212 strands

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Interfilamentary bridging in Bi2212 conductors influences magnetization levels that are important for accelerator magnet applications. Specifically, bridging-induced magnetization is a linear function of sample length (L) and twist pitch (Lp). Magnetization measurements were made on state of the art Bi2212 strands with an 37 x 18 filament configuration (both as short straight samples and small helical samples). These results, when compared to a mathematical model, allowed us to extract an L- and Lp- independent connectivity parameter. These results were correlated to quantitative SEM studies made on cross sectional and longitudinal sample mounts. In addition to the magnetization, the magnetic relaxation rate (or flux creep rate) is important for accelerator applications. In this work, we show that not only the magnetization, but also the magnetic relaxation rates of Bi2212 strands are L and Lp dependent. The magnetic relaxation rate was measured as a function of L and Lp in transverse applied magnetic fields of 0-12 T. The magnetizatic relaxation rate was observed to increase by about 50% for samples with the largest L or Lp as compared to the samples with the smallest L and Lp. These results are interpreted in terms of weak bridging current induced anisotropy.

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