Time-Resolved Magneto-Optical Imaging of Superconducting YBCO Thin Films in the High-Frequency AC Current Regime

ALEXANDER FREY

College of William & Mary, Department of Applied Science, 2006
Field: Optical Spectroscopy, Degree: M.S.

Advisor: Gunter Luepke, Associate Professor of Applied Science

Abstract

Time-resolved quantitative magneto-optical imaging has been used to study the magnetic flux density and current density distribution in a *Y Ba2Cu3O7-8* thin film at *T=24K*, in dependence of the frequency and the phase of an applied AC transport current. In the range from 100*Hz* to 1000*Hz* , no changes in the flux distribution with the AC frequency have been observed. The phase dependent flux distribution can be described with a model based on the critical state model, which assumes that the transport current distributes in the sample in such a way, that the self field inside the sample zero. The total current distribution is the addition of time dependent transport current and the shielding current due to an external magnetic field. Deviations from this model can be attributed to thermally activated flux creep.