

Low-Temperature Magneto-Optical Studies of Magnetic Flux Local Penetration into HTSC Films on Magnetic and Nonmagnetic Substrates

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Magneto-optical imaging (MOI) is an excellent tool to visualize magnetic flux patterns in superconductors with high spatial as well as temporal resolution. Furthermore, quantitative MOI allows the determination of main properties of the critical state, such as Meissner and critical current density distributions, electric fields, flux velocity fields and the local activation barrier for thermally activated flux creep. Magneto-optical imaging offers also a unique and useful method for quality control of real HTSC tapes. In this report, local flux profiles visualized by MOI technique will be presented at different experimental conditions. Some types of HTSC films on both magnetic and nonmagnetic substrates are used in this study. Two cases are investigated: application of external magnetic fields and application of external pulsed currents. The behaviors and peculiarities of complicated flux penetration into the samples at different conditions as well as calculated local distribution of induced and transport currents will be discussed in detail.