Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Time resolved magneto-optical imaging of ac currents in YBCO conductor. ANDREA LUCARELLI, GUNTER LUEPKE, Department of Applied Science, The College of William and Mary, Williamsburg, VA, TIMOTHY HAUGAN, GEORGE LEVIN, PAUL BARNES, Power Generation Branch, Air Force Research Laboratory, Wright-Patterson AFB, OH — The use of $YBa_2Cu_3O_{7-\delta}$ (YBCO) in ac applications, whether with applied ac currents or alternating magnetic fields, is strictly related to the availability of long-length ac-tolerant YBCO coated conductor. These ac applications, such as fully superconducting generators and motors or transformers, may operate with ac currents in a range of frequencies from tens of Hz up to a thousand Hz. We present a newly developed time-resolved magneto-optical imaging (MOI) technique for studying high-temperature superconductors (HTS) with applied alternating currents (AC) in the frequency range 30 – 1000 Hz. The evolution of the magnetic flux density distribution in YBCO thin films and coated conductors is studied as a function of the phase of the applied AC current. Time- and spatially-resolved images of the magnetic flux profiles are presented for a detailed series of values of the phase. A quantitative analysis of the data allows us to calculate the current density profiles at different phases. We observe for the first time that the maxima of the AC current density is shifted from the edges further inside the sample which may be caused by the higher self-induced field in that region.

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Date submitted: 28 Nov 2005 Electronic form version 1.4