Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Flux dynamics in a two-band superconductor with delocalized electric fields[1] MILIND N. KUNCHUR, JAMES KNIGHT, Dept. of Physics & Astronomy, University of South Carolina — In conventional flux flow, vortex dissipation is localized to the vicinity of the vortex core leading to a viscous coefficient η that is independent of flux density B and a flux-flow resistance $R_f \propto B$. This causes a progressive broadening with B of I-V and R-T curves, which in turn degrades a superconductor's performance in switching applications. An anomalous behavior arises when a substantial quasiparticle population exists away from the cores and when the electric field and dissipation extend into those regions—a scenario that is realized in a disordered two-band superconductor with slow branch-imbalance relaxation. In this case η rises linearly with B and R_f becomes independent of B, as observed in disordered magnesium diboride. Such an intrinsically field indifferent mixed-state response makes this system especially suited for magnetic-field induced switching.

[1]Work supported by U. S. Department of Energy under grant no. DE-FG02-99ER45763.

Milind N. Kunchur
Dept. of Physics & Astronomy, University of South Carolina

Date submitted: 14 Nov 2007 Electronic form version 1.4