Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Mixed State $c-$axis Resistivity of $\mathbf{Y_{0.54}Pr_{0.46}Ba_2Cu_3O_{7-\delta}}$ Single Crystals[1] T. KATUWAL, V. SANDU, C.C. ALMASAN, Kent State University, B.J. TAYLOR, M.B. MAPLE, University of California at San Diego — We report temperature T, magnetic field H, and angle θ dependent out-of-plane resistivity ρ_c measurements on $Y_{0.54}Pr_{0.46}Ba_2Cu_3O_{7-\delta}$ single crystals. We performed these measurements in order to investigate the origin of the large ρ_c of layered superconductors like cuprates and of its T, H, and θ dependence. The $\rho_c(T, H, \theta)$ data are very well fitted by the Ambegaokar− Halperin expression [V. Ambegaokar and B. I. Halperin, Phys. Rev. Lett. 22, 1364 (1969)] for temperatures up to the critical temperature T_c and applied magnetic field up to 14 T. This implies that in the underdoped cuprates the layered structure can be depicted as stacks of Josephson junctions. We calculated the value of the critical current density J_c at different temperatures by using the above model and the values of the fitting parameters. Both the magnitude and T dependence of J_c are consistent with previous reports. This result supports the applicability of the model and indicates that the mixed state $c-$axis dissipation is mainly due to the Josephson effect.

[1]This work was supported by the National Science Foundation Grant No. DMR-0406471 at KSU and by the U. S. Department of Energy Grant No. DE-FG03-86ER-45230 at UCSD.

T. Katuwal
Kent State University

Date submitted: 03 Dec 2005 Electronic form version 1.4