Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Magnetic Vortex Interactions in Double Vortex Stadium Structures R.L. COMPTON, J.P. PARK, P. EAMES, P.A. CROWELL, University of Minnesota — We have used time-resolved Kerr microscopy (TRKM) to study the spin dynamics of individual Permalloy stadium structures having thickness 50 nm, width 600 nm, and lengths ranging from 800 nm to 1200 nm. The stadium geometry relaxes from saturation into either a single vortex or double vortex state, depending on the orientation of the applied field during relaxation. From the zero field double vortex state, the separation distance between the two vortices decreases with applied field until annihilation near 270 Oe. TRKM measurements on a 1200 nm long stadium reveal a zero field gyrotropic mode frequency of ~ 0.4 GHz that shifts downward in frequency to ~ 0.2 GHz near 270 Oe. This behavior is consistent with theoretical predictions for a coupled vortex system with decreasing vortex separation [1]. Above 270 Oe, a single vortex remains in the system, with a gyrotropic mode frequency ~ 0.5 GHz and non-monotonic field dependence. Finally, above 500 Oe, the dynamic behavior is characteristic of the saturated state. Similar TRKM measurements on increasingly shorter stadia, at zero field in the double vortex state, show the gyrotropic mode frequency shifting from ~ 0.4 GHz for the 1200 nm long stadium to ~ 0.2 GHz for a 900 nm stadium. [1] J. Shibata, K. Shigeto, Y. Otani, Phys. Rev. B **67**, 224404 (2003). This work was supported by NSF DMR 04-06029 and the University of Minnesota MRSEC (NSF DMR-02-12032).

R.L. Compton

Date submitted: 30 Nov 2004 Electronic form version 1.4