Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Anomalous Minor Loop Growth in Perpendicular Co/Pt-Multilayers ANDREAS BERGER, OLAV HELLWIG[1], ERIC FULLERTON, Hitachi Global Storage Technologies — We have studied the evolution of magnetic minor loops upon multiple field cycling for Co/Pt-multilayers with perpendicular anisotropy. For this purpose, we saturated the samples in a sufficiently strong magnetic field first and then measured up to 20 successive minor loops with identical field cycles. In our experiment, the minor loop field cycles were chosen to be symmetric around zero, i.e. unbiased. While most theoretical models of magnetic materials assume the existence of a stable minor loop for multiple field cycles, many experiments show a slight drift of magnetic minor loops upon repeat cycling due to thermal excitation. For the thinnest (0.4 nm Co/0.7 nm Pt)$_3$-multilayers, we observe such a conventional small minor loop drift. However, somewhat thicker (0.4 nm Co/0.7 nm Pt)$_8$-multilayers show a very different and anomalous behavior. Here, we observe a continuous growth of the magnetization amplitude for successive minor loop measurements, revealing a multi-loop memory effect. The growth is found to be limited only by approaching the full magnetization reversal, even for field amplitudes as small as 0.8*H$_c$. The amplitude and cycle dependence of this effect is experimentally characterized and can be consistently explained by a strong asymmetry between the nucleation and annihilation mechanism of domains in these structures.

[1]permanent address: BESSY, Berlin (Germany)

Andreas Berger
Hitachi Global Storage Technologies

Date submitted: 01 Dec 2004 Electronic form version 1.4