Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Effect of curvature on domain wall motion in elliptical nanorings[1]

FIKRIYE IDIL KAYA, JESSICA BICKEL, KATHERINE AIDALA, Mt Holyoke Coll — Understanding domain wall (DW) motion in ferromagnetic nanostructures is important to realize proposed magnetic data storage and logic devices. We investigate the effect of curvature on DW pinning and motion by studying elliptical rings using micromagnetic simulations [1]. Elliptical rings with constant width have varying curvature, with the lowest curvature at the minor axis, and the greatest curvature at the major axis. DWs can be created at any angular position within the ellipse by the application of an appropriate uniform magnetic field. However, only some of these positions are stable when the field is removed. We study the stability and depinning of the DWs by applying a slowly increasing elliptical magnetic field to determine the magnitude of the field at which the DWs begin to move. By varying the major to minor axis ratio, we examine the effect of curvature on DW pinning. A larger field is required to move DWs in regions of higher curvature (near the major axis) than lower curvature (near the minor axis). Overall, we see that increasing the major to minor axis ratio of elliptical nanorings requires increasing field strength to depin the DWs along the major axis. [1] Oommf software distributed by NIST at http://math.nist.gov/oommf

[1]Work supported in part by NSF DMR-1207924 and NSF CMMI-1025020. Simulations performed at the CNS computational facilities at Harvard University, a member of the NNIN supported by NSF Award No. ECS-0335765.

Fikriye Idil Kaya
Mt Holyoke Coll

Date submitted: 15 Nov 2013 Electronic form version 1.4