Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Dynamics of topological defects in a 2D magnetic stripe pattern

DAVID VENUS, NIDAL ABU-LIBDH, McMaster University — The magnetic stripe domain patterns formed in perpendicularly-magnetized ultrathin films are one example of pattern formation in 2D systems with short-range attractive (exchange) and long-range repulsive (dipole) interactions. Topological pattern defects (dislocations) play a key role in the evolution of the pattern. The magnetic susceptibility due to domain wall motion is very sensitive to the presence of the topological defects, and can be used to study their energetics and population dynamics. The total energy density of the domain pattern is altered by the contribution from the concentration of topological defects, changing the average domain density and magnetic "stiffness" in a characteristic way. These changes can be directly monitored in the magnetic susceptibility peak, where the peak location and shape can be related quantitatively to the defect concentration. These ideas are confirmed using recently published data for perpendicularly-magnetized Fe/ 2 ML Ni/W(110) films, and allows the extraction of the characteristic time scale, lifetime, and activation energy for the annihilation of topological defects. In addition, it is possible to quantify the proportion of the domain system energy density that is due to the topological defects.

David Venus
McMaster University

Date submitted: 03 Dec 2012 Electronic form version 1.4