Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Magnetic domain wall phases in perpendicularly magnetized ultrathin films. NIDAL ABU-LIBDEH, DAVID VENUS, Department of Physics and Astronomy, McMaster University — At low temperature, the ground state of a perpendicularly magnetized ultrathin film is the stripe domain state with an equilibrium density (n) of domain walls that respond to the applied magnetic field with an equilibrium magnetic susceptibility($\sim$1/n). The change in domain density with temperature involves the creation/annihilation of domain walls. We propose a simple relaxation model in which the domain wall creation/annihilation is an activated process. The model predicts a non-equilibrium domain density and thus an effective susceptibility that depends on the time scale of the measurements. We have measured the ac-magnetic susceptibility of perpendicularly magnetized ultrathin Fe films on a 2 ML Ni/W(110) substrate, as a function of temperature while changing the temperature at different heating rate (R) between 0.03K/s and 1K/s. In the low temperature range, the model calculations provide a consistent explanation of the measured susceptibility. In the high temperature range, the susceptibility measured with low heating rates (0.03K/s – 0.1K/s), deviates from the calculation due to an increase of the high temperature half-width of the susceptibility. This has been tentatively interpreted as a phase change from the stripe domain phase to the tetragonal phase in which the domains have no preferred direction.

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Date submitted: 20 Nov 2006 Electronic form version 1.4