Students wanted for numerical physics project!

Basic Description : Use a "Super Ising" and/or phi^4 model to simulate magnetic thin films which exhibit perpendicular magnetic anisotropy.

Requirements : Junior, Senior and Masters students welcome. C/C++ programming skills, aptitude for unix shell, and ability to keep a notebook required. E&M at a junior level or above is a bonus.

Contact:

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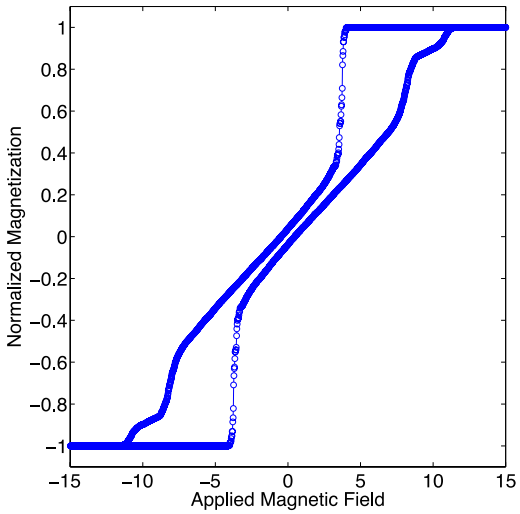
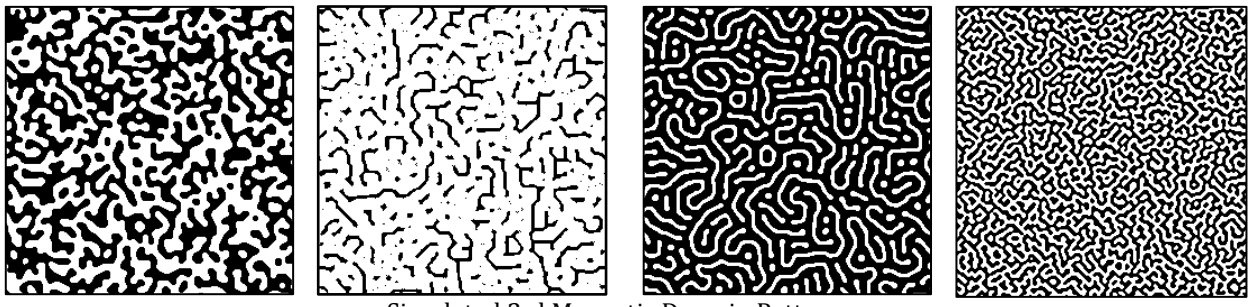


This is an example of a simulated thin film magnetic major hysteresis loop. This curve is almost identical to classic Co/Pt thin films.

Many of the hard disk drives in use today utilize perpendicular magnetic anisotropy, films where the easy axis of magnetic (spin) alignment is in or out of the plane of the film. This system involves competing interactions which give rise to complex domain patterns. There is a short range force favoring uniform spins in the same direction and a long range force favoring spins anti-aligned. Hence you have a binary system where each spin points either up or down (black or white in the figures below). The behavior of these domains then further depends on temperature, disorder, external applied fields and other factors.

The aim of this project is to explore the "parameter space" of some of the models of magnetic systems, and to see how well they can describe observations made in the lab. Simulations will be run on the RIT Research Computing cluster. Existing numerical C code can be used.

Course credit available beginning 2011 Winter Quarter, but research can begin earlier. This could potentially lead to a senior capstone or MS thesis project.



Simulated 2-d Magnetic Domain Patterns