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Numerical simulation of 2D ferromagnetic films with perpendicular magnetic anisotropy using a hexagonal lattice and a long range RKKY interaction potential ZACHARY HOWARD, MICHAEL S. PIERCE, Rochester Institute of Technology — A numerical φ^4 model combined with a RKKY potential was used to simulate 2-D ferromagnetic domains. A small random field component was added to allow for a controlled amount of disorder to be introduced into the system. A hexagonal lattice allows for more realistic domains patterns than a square lattice due to the higher density of lattice sites compared to the conventional square lattice. We find that appropriate regions of parameter space produce realistic domain patterns, major hysteresis loops, and reversal curves. For parameters that produce regions of rapid nucleation and growth we observe reversal curves that can extend outside the major hysteresis loops, due to highly frustrated domain configurations as recently observed by Ref. [1]. We also observe a significant region of exponential dependence of the domain spacing upon the interaction potential. Future work will include increasing the random field contribution to determine if the dependence of the domains and hysteresis loops upon disorder matches experimental systems [2].

[1] J.E. Davies et al., Appl. Phys. Lett. 95, 022505 (2009).
[2] M.S. Pierce, et al., submission to Phys. Rev. B

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