Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Markov Chain Analysis of Stochastic Micromagnetic Simulations

S. HILL THOMPSON, Florida State University, G. BROWN, Oak Ridge National Laboratory, P.A. RIKVOLD, Florida State University — Stochastic micromagnetic simulations are employed to study the magnetization dynamics of a realistic model of an iron nanopillar in an oblique applied field at nonzero temperature. The results suggest the existence of more than one reversal path, revealed by the distribution of switching times. The dynamics are further analyzed by considering the system as an absorbing Markov chain and studying the properties of the associated transition matrix. In particular, the eigenvalue spectrum provides the time to cross the free-energy saddlepoint separating the metastable well from the equilibrium configuration. Additionally, eigenvectors from individual runs are used to determine which reversal path each simulation followed, since it is likely the switching-time distributions overlap. Along with projective dynamics, this analysis shows that the evolution of the faster mode is indicative of a relatively flat free-energy landscape, while the slower-mode dynamics are dominated by a well-defined metastable well.

S. Hill Thompson
Florida State University

Date submitted: 15 Nov 2006

Electronic form version 1.4