Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Spin dynamics simulations for a nanoscale Heisenberg antiferromagnetic film[1] ZHUOFEI HOU, DAVID LANDAU, Center for Simulational Physics, The University of Georgia, G. MALCOLM STOCKS, Center for Defect Physics, Oak Ridge National Laboratory — Thermoinduced magnetization(TiM) is a novel response predicted to occur in nanoscale antiferromagnetic (AF) materials. Extensive Monte Carlo simulations[2] have shown that TiM is an intrinsic property of the AF classical Heisenberg model. To obtain a fundamental understanding of TiM, spin dynamics (SD) simulations are performed to study the spin wave behavior, which seems to be the cause of TiM. A classical Heisenberg model with an AF nearest-neighbor exchange interaction and uniaxial single-site anisotropy is studied. Simple-cubic lattices with two free-surfaces and periodic boundaries parallel to the surfaces are used. We applied fast SD algorithms with 4th-order Suzuki-Trotter decompositions of the exponential operator. Discrete spin wave modes due to spin wave confinement[3] are found in transverse $S(q, \omega)$ in the perpendicular direction to free surfaces.

[1]Research supported by UT-Battelle, and Office of Science, DOE.
[2]G. Brown, A. Janotti, M. Eisenbach, and G. M. Stocks, Phys.Rev.B **72**, 140405(2005)
[3]*Spin Wave Confinement*, edited by S. O Demokritov (Pan Stanford Publishing, Singapore, 2008)

Zhuofei Hou
Center for Simulational Physics, The University of Georgia

Date submitted: 12 Nov 2010 Electronic form version 1.4