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Thermally Randomized Magnetization Dynamics RALPH SKOMSKI, JIAN ZHOU, DAVID SELLMYER, Dept. of Physics and Astronomy and Center for Materials Research and Analysis, Univ. of Nebraska, Lincoln — The effect of thermodynamic fluctuations on magnetization processes in ferromagnets is investigated. In addition to Neel-Brown contributions, which assume local equilibrium [1], thermal excitations amount to local magnetic fields that disproportionally facilitate the nucleation of reverse domains. Explicit solutions are obtained for transition-metal rich rare- earth intermetallics, where the leading contribution to the temperature dependence reflects 4f intramultiplet excitations. The single-ion character of the 4f anisotropy leads to relatively transparent anisotropy distribution functions. A static random-field approximation is then used to analyze the temperature dependence of the coercivity. The modes affect the magnetization reversal of nanostructures including high-density recording media, where they affect the thermal stability of the stored information. We present quasi-static simulations describing this effect for hard-soft nanoparticles and derive an approximate analytical solution for the time dependence of the effect. In the static approximation, thermal fluctuations are modeled as snapshots of time-dependent random magnetic fields. Physically, the thermal excitations switch the magnetization of the soft phase, which then exerts a destabilizing bias field on the phase with the higher anisotropy. - This research is supported by USDOE, NSF-MRSEC, ARO, the W.M. Keck Foundation, INSIC, and CMRA. [1] R. Skomski, J. Phys. Condens. Matter **15**, R841 (2003).

Department of Physics and Astronomy and Center for Materials Research and Analysis,University of Nebraska,

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