Abstract Submitted
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Effect of dipolar interactions on the magnetization of a cubic array of nanomagnets[1] MARISOL ALCANTARA ORTIGOZA, TALAT S. RAHMAN, RICHARD A. KLEMM, Department of Physics, Kansas State University, Manhattan, KS 66506 — We investigated the effect of intermolecular dipolar interactions on an ensemble of 100 3D-systems of $5 \times 5 \times 4$ nanomagnets, each with spin $S = 5$, arranged in a cubic lattice. We employed the Landau-Lifshitz-Gilbert equation to solve for the magnetization curves for several values of the damping constant, the induction sweep rate, the lattice constant, the temperature, and the magnetic anisotropy. The dependencies of the magnetic hysteresis curves on these parameters will be presented. We also reproduce and test a previously reported magnetization curve for a 2D-system [M. Kayali and W. Saslow, Phys. Rev. B **70**, 174404 (2004)]. Although in 3D systems, dipole-dipole interactions generally diminish the hysteresis, in two- dimensional systems, they strongly enhance it. For both square two- dimensional and rectangular three-dimensional lattices with $B||(\hat{x}+\hat{y})$, dipole-dipole interactions can cause large jumps in the magnetization. New results including the low-temperature quantum effects appropriate for single molecule magnets will be presented.

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