Effect of disorder on the properties of ensembles of interacting, ferromagnetic nanoparticles with cubic magnetocrystalline anisotropy: A Monte Carlo study

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We investigate an ensemble of 216 ferromagnetic single-domain nanoparticles with cubic magnetocrystalline anisotropy. Particles are spherical in shape and identical in size. The Hamiltonian contains: the anisotropy energy, interactions with the external field and long-range dipole-dipole interactions. We use the Monte Carlo method to simulate zero-field-cooled and field-cooled experiments to estimate blocking temperatures. We apply periodic boundary conditions and the Ewald summation techniques to get rasults relevant for infinite systems. We compare systems with particles distributed randomly and forming the simple cubic lattice and additionally compare cases with parallel anisotropy axes with the ones where axes are oriented randomly.

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