112-009

ANGULAR AND GEOMETRY DEPENDENCE OF COERCIVITY AND REMANENCE NICKEL NANOTUBE ISOLATED

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During the last decade, interesting properties of magnetic nanotubes have attracted great attention. Besides their basic properties, there is evidence that they can be used in the production of magnetic devices. More recently, magnetic nanotubes have been grown motivating intense research in the field. Magnetic measurements, numerical simulations and analytical calculations on such tubes have identied two main states: an in-plane magnetic ordering, namely, the uxclosure vortex state, and a uniform state with all the magnetic moments pointing parallel to the axis of the tube. Nanotubes exhibit a core-free magnetic conguration leading to uniform switching elds, guaranteeing reproducibility and due to their low density they can oat in solutions making them suitable for applications in biotechnology. For the analysis of the magnetic properties of nanotubes through computer simulation, the internal energy has the following contributions: Exchange of interaction, magnetocrystalline anisotropy, demagnetizing energy, anisotropy of form and Zeeman energy. Geometrically, tubes are characterized by their external and internal radii, R and a, respectively, and length H. It is convenient to dene the ratio, beta = a / R, so that beta = 0 represents a solid cylinder and beta --> 1 corresponds to a very narrow tube. It was made a study of the anisotropic magnetization, varying the angle of application of the magnetic field, an angle 0° <= theta <= 90° with the axis z. In our work, we used the internal radius equal to 20 nm and the outer radius of 40 nm, that is the ratio beta = 0.5, the length of the nanotube is 10^-3 m. The magneticmicro-simulation is performed using the typical parameters Ni: saturation magnetization, MS = 4,85.10^5 A/m, your exchange constant, A = 9,0.10^12 J / m. Arrays nanotubes nickel are investigated through micromagnetic simulation by Object Oriented Micromagnetic Framework (OOMMF). We analyze the results for the hysteresis loop, where we vary the angle of the magnetic field applied to the ferromagnetic system. We investigated the role of geometry in the coercivity and remanence of hysteresis curves, where we analyze the types of magnetization reversal modes that can appear in isolated nanotube system.