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MICROMAGNETIC SIMULATION IN 2D HEXAGONAL ARRAYS OF COBALT HOLLOW-SPHERES

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2D hexagonal array of Co hollow-spheres are studied by micromagnetic simulation using object oriented micromagnetic framework (OOMMF) based on the finite difference method (FDM). In this study was varied the thickness of the shell (Re-Ri) according to the ratio e = Ri/Re (0 <= e <= 0.8) with fixed radius Re. We put the axis of minimum energy magnetocrystalline perpendicular to the arrangement. In parallel direction, the coercive field Hc it has the value range from 50 - 700 Oe, which is much higher compared to the bulk value of 10 Oe. This improvement is attributed in part to the effect shape anisotropy. It is close to the value reported in 60 Oe. We can see that by decreasing the thickness (e increase) the interaction effects begin to manifest showing an increased coercivity to e = 0.3. Then, with the increase e, coercivity and remanence probably reduce by the changing predominant reversal mode of magnetization. Remanent magnetization Mr/Ms is found in the range of 0.01 – 0.4 , the value 0.04 has been reported. In the direction perpendicular, with decreasing thickness, coercivity and remanence increase. This can be explained by an increase of the dipolar interactions between the external and internal surfaces of hollow spheres, which dominates over the global dipolar interaction on the array as a whole occurs. Which is reinforced with the axis magnetocrystalline minimum energy in the direction perpendicular to the array. The study on the dynamics done in this work showed that the reversal of the moments is not homogeneous and starts at the edges of the arrangement. During inversion, we can seed the vortex formation well organized.