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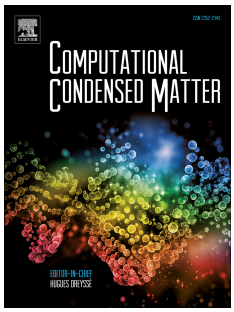

Monte Carlo study of the magnetization reversal times in a core/shell magnetic nanoparticle

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Monte Carlo study of the magnetization reversal times in a core/shell magnetic nanoparticle

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Abstract

In this work, we present an investigation of the magnetization reversal times for a ferromagnetic/antiferromagnetic core/shell nanoparticle, by means of Monte Carlo simulations. The magnetic behavior of the nanoparticle was evaluated with a classical Heisenberg Hamiltonian, which includes terms for the exchange interaction, external magnetic field interaction and uniaxial anisotropy. We determined the magnetization reversal times for the core and core interface, when the system is initially ordered and it is subjected to a negative magnetic field. We computed the influence of the core/shell exchange interaction, as well as the core anisotropy, core size and temperature dependence on the reversal times. It was found that there exists a strong influence of core/shell exchange interaction on the core sites reversal time. These parameters influence the reversal time in different ways. In general, the increment of the temperature and the core/shell exchange interaction produce a faster magnetization reversal. Moreover, the core interface reverses faster than the core bulk. On the other hand, the reversal time depends on the anisotropy and the uncompensated sites in the shell interface. In this way, it is possible to control the core reversal time in these kind of nanoparticles by means of the core/shell interface.

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