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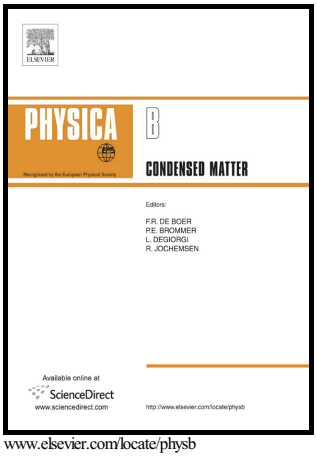

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Zero-field-cooled/field-cooled magnetization study of Dendrimer Model

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Abstract

Being motivated by Dendrimer model with mixed spins σ =3 and S=7/2, we investigated the magnetic nanoparticle system in this study. We analyzed and discussed the ground-state phase diagrams and the stable phases. Then, we elaborated and explained the magnetic properties of the system by using Monte Carlo Simulations (MCS) in the framework of the Ising model. In this way, we determined the blocking temperature, which is deduced through studying the partial-total magnetization and susceptibility as a function of the temperature, and we established the effects of both the exchange coupling interaction and the crystal field on the hysteresis loop.

Keywords: Dendrimer model, Monte Carlo simulations, Zero field cold, Field cold, Mixed spins, Hysteresis loop

1- Introduction

Different theoretical and experimental methods have studied the magnetic nanoparticle systems [1-7]. These systems derive their importance from the fact that they have many applications in the nanotechnology such as magnetic fluids, magnetic refrigeration, magnetic recording media, optics, thermo-electronic devices, sensors, etc [8-12]. A wide range of methods have been used to investigate these systems such as Monte Carlo simulation [13], differential operator technique with the approximated Van Der Wearden identity [14], variational cumulant expansion (VCE) method [15], mean-field approximation and effective-field theory [16], Green's function technique [17] as well as DFT method [18]