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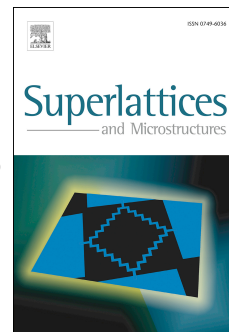
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Compensation Temperature in a Nano-Square with a Core-Shell Structure: Monte Carlo Study

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Abstract:

The aim of this work is to study the magnetic properties of a nano-structure consisting of an anti-ferri-magnetic surface based on a square core-shell. The geometry of the studied system is formed with alternate layers consisting of spins $\sigma = 3/2$ in the core and spins $S = 1$ in the shell. Exactly, we study the effect of the coupling exchange interactions and the crystal field.

We use Monte Carlo simulations to investigate the behavior of this nano-structure. Different phase diagrams were found depending on the parameters of the studied system. The influence of the temperature on the critical and compensation behaviors of this system is also examined. Finally, we showed that the compensation temperature can appear for specific values of system parameters.

Keywords: Nano-Square; Magnetic properties; Core-Shell nanostructure; Monte Carlo simulations; Compensation temperature; Critical temperature; The crystal field.

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