

Theoretical study of the spin-1 Blume-Emery-Griffiths model with odd interaction parameters and its impact on spin-crossover properties: Static and dynamic aspects

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The spin crossover properties on the square (two-dimensional) lattice have been studied based on the spin-1 Blume-Emery-Griffiths model with odd parameter (which is also called dipolar-quadrupolar parameter) and in the presence of an external magnetic field. The lowest approximation of the cluster variation method is used to obtain the self-consistent transcendental equations. From these solutions of the self-consistent equations, we study the influence of the odd interaction on the hysteresis behavior and phase transitions of high-spin state fraction. We examine the thermal properties of the high-spin fraction and magnetization across various parameters, such as magnetic interaction and quadrupolar (elastic) interaction. In addition, we study the nonequilibrium properties of the order parameters and high-spin fraction using the path probability method (PPM). The difference between spin crossover hysteresis curves and magnetic, thermal, and other hysteresis curves has been explained in detail.

References:

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