THE MAGNETIC SPECIFIC HEAT OF THE B-E-G MODEL

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9.7 cm

The magnetic contribution to the specific heat of the Blume-Emery-Griffiths (B-E-G) model with spin-one is studied in Cluster Variational Method in Pair Approximation (CVMPA). Besides ordinary exchange interactions the model takes into account the single-ion anisotropy and biquadratic terms. The theoretical formulae for the specific heat are derived with nearest neighbour correlation functions $\langle S_i S_j \rangle$, $\langle S_i^2 S_j \rangle$, $\langle S_i S_j^2 \rangle$ and $\langle S_i^2 S_j^2 \rangle$ taken into account. The temperature dependencies of the specific heat are calculated and discussed in the context of the phase diagrams obtained previously by the authors for the thin film with bilayer geometry ($z = 5$). The rich and various phase diagrams comprise the existence of ferromagnetic (F), paramagnetic (P), staggered quadrupolar (SQ) and ferrimagnetic (I) phases. The specific heat is studied for all possible phase transitions between various phases, including 1-st order phase transitions. The numerical results for most characteristic cases are presented in the figures. The present calculations confirm the stability of the phase diagrams and corresponding solutions for the order parameters. Together with the isothermal susceptibility, obtained recently, the results complete the full thermodynamic description of B-E-G bilayer system.

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