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Thermodynamics of Ising rare-earth magnet in the static fluctuation approximation

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Abstract

The authors obtain the closed self-consistent system of equations for calculation of the desired thermodynamic values of the Ising magnet with arbitrary spin and in presence of the single-ion anisotropy in the frame of the original static fluctuation approach (SFA). The essence of the SFA is based on accurate calculations of fluctuations of a molecular field. As an example the complete analysis of the critical behavior of the Ising magnet with spin $S = 1$ (Blume-Capiel model) is shown. The expressions for the phase transitions lines of the first and the second order are found. In addition, the coordinates of the tricritical point for some types of cubic lattices are found also. © 2014 Pleiades Publishing, Ltd.

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