Thermodynamic characteristics of spin-3/2 Blume-Capel model on rectangular lattice under longitudinal field

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The spin-3/2 Blume-Capel model on a rectangular lattice with the ferromagnetic bilinear short-range interaction $K^F = K(1 + x)$ ($x \in]-1, 1[$) in one direction and the antiferromagnetic one $K^{AF} = K(-1 + x)$ in the perpendicular direction under a longitudinal field is investigated within the mean field approximation. Basing on the study of temperature dependencies of sublattice magnetizations the phase diagrams in the (x, temperature) plane are constructed for different values of model parameters.

It has been shown that the usual classification of phases (like used in works [1-3]) which distinguishes the antiferrimagnetic $\mathbf{ai}_{-3/2,+3/2}$, $\mathbf{ai}_{-1/2,+3/2}$, $\mathbf{ai}_{-1/2,+1/2}$, and ferrimagnetic $\mathbf{i}_{+1/2,+3/2}$ phases (where indices correspond to sublattice magnetizations in the ground state) is mainly suitable for investigation of temperature dependencies of sublattice magnetizations. However, a different class of ordered phases is found at the certain values of model parameters which does not easily fit the mentioned classification.

1. S. Bekhechi, A. Benyoussef, Phys. Rev. B **56** (1997) 13954.

2. C. Ekiz, J. Magn. Magn. Mater. **284** (2004) 409.

3. M. Keskin et al., Phys. Lett. A **353** (2006) 116.