A MONTE CARLO STUDY OF THE MIXED PHASE REGION IN THE 3D ASHKIN-TELLER MODEL

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9.7 cm

The three-dimensional (3D) Ashkin-Teller (AT) spin-lattice model has an interesting and complicated phase diagram due to presence of the tricritical points, weakly first order phase transitions and the mixed phase region. It is an important reference point in statistical physics and also it has found many interesting applications including interpretation of the experimental data. The 3D AT model on a cubic lattice was thoroughly analysed by both the short series analysis and the Monte Carlo (MC) method by Ditzian et al. [1] and the approximate phase diagram was obtained. In [1] the reader finds also an interesting comparative discussion which brackets the behavior of the 3D AT model between the mean field and the 2D behaviors. As a result of the mean field theory, the mixed phase region appeared. It was absent in the 2D case of the AT model whereas in [1] the existence of this region was confirmed in the 3D case but its boundaries could not be unambigously determined. In this paper we have adapted our MC method proposed in [2] to check the type of ordering and to determine the character of phase transitions and the positions of the boundaries of this specific region obtaining some preliminary results.

[1] R.V. Ditzian, J.R. Banavar, G.S. Grest, L.P. Kadanoff, Phys.Rev.B **22**, 2542 (1980).
[2] G. Musiał, L. Dębski, Lect. Notes in Comp. Scie., Springer ser., accepted

13.4 cm

Subject category :

5. Phase Transitions and Critical Phenomena

Presentation mode :
oral

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