VERIFICATION OF THE THREE-CLUSTER MEAN-FIELD RENORMALIZATION GROUP APPROACH FOR THE ISING MODEL

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9.7 cm

The mean-field renormalization group (MFRG) method of computation of non-classical critical properties of lattice models is attractive [1] because of its efficiency and simplicity, and because it is easily applicable to bulk critical phenomena as well as to surface, random and dynamic effects. The consequences of its basic assumptions are analysed previously [2] using the two-cluster approach and sequences of cluster sizes $L \leq 11$ which were not large enough to get the definite conclusions. Here, a modified transfer matrix approach has been worked out to test the predictions of the improved three-step MFRG method [1] for square Ising clusters as large as $L = 18$. Performing the asymptotic analysis, the convergence of the finite-size critical couplings and the critical exponents towards the exact values is shown.

[1] K. Croes, J.O. Indekeu, Mod. Phys. Lett. **B7**, 699 (1993)
[2] G. Kamieniarz, Physica **A256**, 211 (1999)

13.4 cm

Subject category :

5. Phase Transitions and Critical Phenomena

Presentation mode :
oral

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