

The transfer-matrix study of the critical properties of the Ising model following from the MFRG.

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Using a transfer matrix technique [1] and the Ising model, the predictions of the MFRG concept [2] for clusters with linear size up to 18 have been tested for the three-cluster MFRG approach [3], which corrected the deficiency of the earlier approach. Even for small sizes of the clusters the three-cluster estimates of critical couplings give the accuracy level equal to that of two-cluster renormalization for much greater sizes. Performing the asymptotic analysis, the convergence of the finite-size critical couplings and the critical exponents towards the exact values is illustrated. Our improved method has enabled us to obtain the results for clusters with substantially greater sizes, to accelerate the calculations and also to confirm the reliability of the MFRG method for the Ising model.

[1] G. Kamieniarz, *Physica A***256**, 211 (1998)

[2] J.O. Indekeu, A. Maritan, A. Stella, *Phys. Rev. B***35**, 305 (1987)

[3] K. Croes, J.O. Indekeu, *Mod. Phys. Lett. B***7**, 699 (1993)

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