Verifying of nonuniversal behavior in the 3D Ashkin–Teller model

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The Ashkin-Teller (AT) model [1,2] is one of the most important in statistical physics and every year a dozen works are devoted to it. The aim of this study was to investigate precisely the phase transition line in the 3D AT model phase diagram, in which the universality class of phase transitions has not been clearly resolved yet [1,2]. This paper presents the results for the transitions between paramagnetic and Baxter phases for negative coupling between neighboring spin pairs. This is the most complex area in the phase transition diagram. The results published so far [1,2] suggest occurring of the nonuniversal behavior here. For this analysis we used cumulants of the type of Binder Q_L and Challa V_L, and also U_L proposed by Lee and Kosterlitz [3], all modified by Musial [1] and applied to the AT model. Our Monte Carlo experiment results confirm the existence of the continuous phase transitions in this area and explain the reasons for the ambiguity data obtained so far (see [1,2] and the papers cited therein).

References:

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