Journal of Statistical Physics, Vol. 119, Nos. 1/2, April 2005 (© 2005)
DOI: 10.1007/s10955-004-2049-2

Erratum on "Mean-field Behavior for the Survival Probability and the Percolation Point-to-Surface Connectivity"

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Received October 11, 2004; accepted October 12, 2004

The purpose of this note is to correct some statement (not the main statement) in the paper.[2]

In ref. 2, we considered the critical survival probability (up to time t) for oriented percolation and the contact process, and the point-to-surface (of the ball of radius t) connectivity for critical percolation. Since the survival probability is a time-oriented version of the point-to-surface connectivity, we denote both quantities by θ_t for convenience. The main statement of the paper[2] is that, if there is a ρ such that $\theta_t / t^{-\rho}$ is bounded away from zero and infinity for all t, and if both the two-point function and its restricted version exhibit the same mean-field behavior (cf., Assumption 2.1[2]), then ρ also takes on its mean-field value ρ_{MF} in high dimensions, i.e., $\rho = 1$ for the time-oriented models with $d > 4$ and $\rho = 2$ for percolation with $d > 7$.

In Section 3.1[2], we proved that the mean-field behavior for the two-point function (i.e., (2.4) and (2.9) in ref. 2 with $\eta = 0$) implies $\rho \leqslant \rho_{\mathrm{MF}}$. This is correct, except that d has to be greater than 4 for percolation. However, the main statement is not affected by this additional condition since $d > 7$ for percolation, and remains correct.

The above additional condition is due to applying Proposition 1.7(i) of ref. 1 in order to bound the sum $\sum_{z \in \mathbb{Z}^d} |||x - z|||^{2-d} |||y - z|||^{2-d}$ in the right-hand side of (3.6) in ref. 2. To apply Proposition 1.7(i) in ref. 1, the sum of the power exponents $2(2-d)$ has to be less than $-d$, and therefore

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$d > 4$. Heuristically, this can be explained by considering the tail of the convolution $\sum_{z:|z-x|>2R} |||x-z|||^{2-d} |||y-z|||^{2-d}$, where $R = |x-y|$. By using $|y-z| \geqslant \frac{1}{2}|x-z|$, this tail is bounded by $O(R^{4-d})$ if $d > 4$, and diverges otherwise.

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