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Erratum: Size Dependence of Self-Diffusion in the Hard-Square Lattice Gas[1]

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In the proof of the absence of a threshold for rectangular-cluster percolation given in the Appendix, the lower bound (A4) to the probability for obtaining a covering cluster of size $L \times L$ is not correct. The reason is that the two factors (A2) and (A3) are not the probabilities of statistically independent events. The defect can be easily cured, however, following a suggestion by Reiter[(1)] to introduce a third length. After dividing the total $L \times L$ lattice into $L/2$ subsystems of size $(2L)^{1/2} \times (2L)^{1/2}$ we split each of the subsystems into four equal parts of size $(L/2)^{1/2} \times (L/2)^{1/2}$. [We assume that $(L/2)^{1/2}$ is an integer.] In each subsystem we mark the part in the lower left corner. Figure 1 shows this subdivision for $L = 18$. The probability that at least one of the $L/2$ parts percolates is given by

$$1 - [1 - p_{(L/2)^{1/2}}(c_h)]^{L/2} \tag{A2$'$}$$

which differs from (A2) only by $L/2$ replacing L. It therefore tends to unity for $L \to \infty$ as well. A lower bound to the probability that one of the percolating $(L/2)^{1/2} \times (L/2)^{1/2}$ clusters grows to the size of the whole $L \times L$ lattice is obtained by considering a modified growth process. Here only the occupation of those $k(l)$ sites along an edge of the growing $l \times l$ square is taken into account, which do not belong to any of the marked $(L/2)^{1/2} \times (L/2)^{1/2}$ blocks. (In the figure the dashed lines mark these sites for two different l values. Note that periodic boundary conditions are assumed.) Since

$$k(l) \geqslant \alpha l \qquad \text{with} \quad \alpha = 2/5$$

holds, a lower bound to the probability for this growth process to occur is given by

$$p'_L / p'_{(L/2)^{1/2}} \tag{A3$'$}$$

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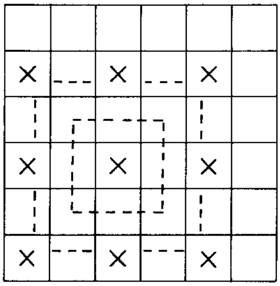

Fig. 1. Subdivision of 18×18 lattice and sites considered in modified growth process (dashed lines). Each block itself is a subsystem of size 3×3.

where the probabilities p'_l satisfy the recurrence relation

$$p'_{l+2} = p'_l[1-(1-c_h)^{\alpha l}]^4 \tag{A1'}$$

This differs from the recurrence relation (A1) only in the exponent αl which replaces l. In the same way as for p_l, it can be shown that p'_l converges to a nonzero limit $p'_\infty > 0$. Therefore the factor (A3′) converges to one for $L \to \infty$, from which the proof follows.

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REFERENCE

1. J. Reiter, *J. Chem. Phys.*, to appear.