Comment on "Corrections to scaling for branched polymers and gels"

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In a recent Rapid Communication Margolina, Djordjevic, Stauffer, and Stanley presented new series data for the correction to the scaling exponent Ω for percolation (gels). They did not obtain highly accurate values from their series data. I report on my analysis, which gives Ω in agreement with their Monte Carlo estimate.

New data for the correction-to-scaling exponent Ω have recently been obtained and analyzed. Both Monte Carlo and new series results were given for lattice animals (branched polymers) but for percolation (gels) Margolina, Djordjevic, Stauffer, and Stanley[1] stated that "even the extended series do not provide highly accurate estimates of Ω_p." It is, thus, of interest to see whether alternative methods of analysis are able to provide accurate estimates. In this Comment I report my analysis of their extended 15-term power series for the percolation "magnetic field" singularity on a triangular lattice and obtain an Ω_p value that is in excellent agreement with their value

$$\Omega_p = 0.64 \pm 0.08 \tag{1}$$

from the Monte Carlo data.

The 14-term series[2] for this singularity was analyzed by Adler, Moshe, and Privman[3] (AMP), who found $\Omega = 0.66 \pm 0.07$, slightly above the value quoted above. This analysis was done using methods developed by AMP[4] and is fully discussed in Ref. 3. The method involves following Ref. 2 and transforming the series for the percolation "free energy" (the generating function for the mean number of finite clusters) $k(p,\lambda)$, where p is the probability that a bond is occupied and $\lambda = e^{-H}$, to one for the percolation probability

$$P(p,\lambda) = 1 - (\lambda/p)(\partial k/\partial\lambda) \ . \tag{2}$$

This should have the leading critical behavior of the form (at P_c and near λ_c) of

$$P(p_c,\lambda) \approx c_\delta(1-\lambda)^{1/\delta}[1 + a_{\delta_1}(1-\lambda)^{\Omega} + \cdots] \ . \tag{3}$$

We then transform the series using our generalization[3,4] of the Roskies[5] transformation and obtain a graph of the dominant exponent as a function of Ω (Fig. 1). The different

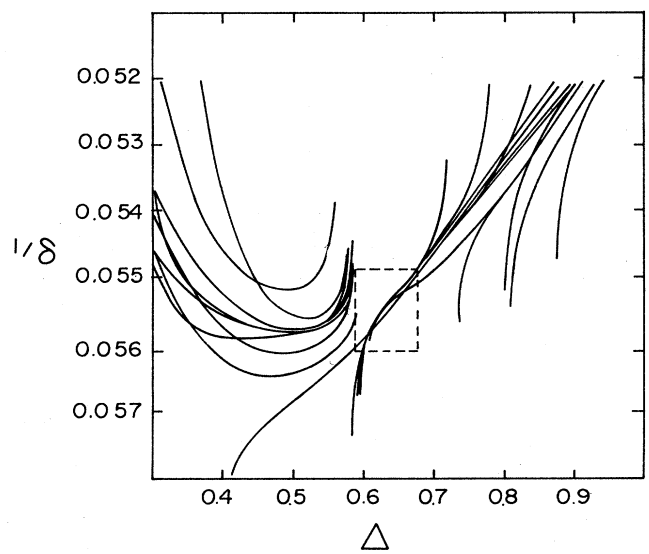

FIG. 1. $\delta(\Omega)$ curves for $d=2$ site percolation on a triangular lattice.

curves intersect within the boxed region and we can read off the values $1/\delta = 0.0555 \pm 0.0006$, $\Omega = 0.63 \pm 0.05$. The value is in good agreement with Eq. (1) and with the Aharony-Fisher[1,6] correction $\Omega = 0.604$, while the $1/\delta$ range includes the exact value of 0.054 95.

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