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Critical points of coupled Potts models and correlated percolation

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The idea that ferromagnetic transitions correspond to the percolation of clusters of like spins has been present since the early days of the theory of critical phenomena. It turned out, however, that its implementation requires trading the obvious spin clusters for a more sophisticated version known as Fortuin-Kasteleyn clusters. It has been conjectured for long time that in the two-dimensional q -state Potts model the critical properties of Fortuin-Kasteleyn and spin clusters are related by analytical continuation. We access for the first time in an exact way the relevant renormalization group fixed points and show that the conjecture does not in general hold.

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