



First-order transition in Potts models with "invisible" states: Rigorous proofs

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In some recent papers by Tamura, Tanaka and Kawashima [arXiv:1102.5475, arXiv:1012.4254], a class of Potts models with "invisible" states was introduced, for which the authors argued by numerical arguments and by a mean-field analysis that a first-order transition occurs. Here we show that the existence of this first-order transition can be proven rigorously, by relatively minor adaptations of existing proofs for ordinary Potts models. In our argument we present a random-cluster representation for the model, which might be of independent interest.

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