A Monotonicity Result for Hard-core and Widom-Rowlinson Models on Certain d-dimensional Lattices

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Abstract

For each $dgeq 2$, we give examples of d-dimensional periodic lattices on which the hard-core and Widom-Rowlinson models exhibit a phase transition which is monotonic, in the sense that there exists a critical value $lambda_c$ for the activity parameter $lambda$, such that there is a unique Gibbs measure (resp. multiple Gibbs measures) whenever $lambda$ is less than $lambda_c$ (resp. $lambda$ greater than $lambda_c$). This contrasts with earlier examples of such lattices, where the phase transition failed to be monotonic. The case of the cubic lattice Z^d remains an open problem.

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