

Rigorous Description of Collective Surface Diffusion Coefficient Near a First-Order Phase Transition

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We present a microscopic statistical-mechanical theory from which the collective (or chemical) surface diffusion coefficient can be obtained in the hydrodynamic limit, assuming that the system of a finite size undergoes a first-order phase transition between two phases. We also show the behavior of the thermodynamic factor near such a transition. Explicit formulas for the dependencies of these quantities on the chemical potential, coverage, and size of the system are presented. The general results are applied to simple two-dimensional lattice models on the triangular and hexagonal lattices.