Asymptotics of discrete interfaces

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ABSTRACT

This is joint work with Andrei Okounkov. We study a model of energy-minimizing surfaces in R^3 which arise in simple models of crystalline interfaces. Specifically our surfaces come from limits of discrete interfaces in the dimer model (domino tiling model). These discrete interfaces can be viewed as a higher-dimensional generalization of the simple random walk, where the domain is (part of) Z^2 instead of Z. We are interested in the behavior of these surfaces in the scaling limit (limit when the mesh tends to zero): the limit surfaces minimize a certain surface tension functional which arises from purely entropic considerations. Remarkably, the limit surfaces, which are solutions of a nonlinear PDE, can be parametrized by analytic functions and may contain facets in certain rational directions.