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Dimers and the complex Burgers equation

We study a simple model of crystalline surfaces in R^3 . Microscopically, these are random discrete surfaces, arising in the so-called dimer model, or domino tiling model. The law of large numbers implies that at large scales the surfaces take on definite shapes, which are smooth surfaces satisfying a certain PDE, related to the complex Burgers equation. We show how this equation can be solved via complex analytic functions, and investigate the behavior of solutions, in particular the formation of facets. This is the first model of facet formation which can be analytically solved.

This is joint work with Andrei Okounkov.