
RICHARD KENYON, UBC, Vancouver, BC

Dimers and Limit shapes

We study a natural family of smooth surfaces in \mathbb{R}^3 arising as limits of random discrete “stepped” surfaces. For fixed boundary conditions, the law of large numbers for stepped surfaces leads to a PDE for the limit surfaces (when the lattice spacing tends to zero). This PDE is a variant of the complex Burgers equation and can be solved analytically via holomorphic functions. This is surprising since the surfaces generically have both smooth parts and facets. The interplay between analytic (even algebraic) functions and facet formation in the surfaces leads to some interesting questions in real algebraic geometry.