1050-82-124 **Richard Kenyon***, Mathematics Dept., 151 Thayer St., Providence, RI 02912. *Limit shapes and the complex Burgers equation.*

This is joint work with Andrei Okounkov. We study surfaces in R^3 that arise as limit shapes in random surface models related to planar dimers. These limit shapes are *surface tension minimizers*, that is, they minimize a functional of the form $\int \sigma(\nabla h)\, dx\, dy$ among all Lipschitz functions h taking given values on the boundary of the domain. The surface tension σ has singularities and is not strictly convex, which leads to formation of *facets* and *edges* in the limit shapes.

We find a change of variables that reduces the Euler-Lagrange equation for the variational problem to the complex inviscid Burgers equation. The equation can thus be solved in terms of an arbitrary holomorphic function, which is somewhat similar in spirit to Weierstrass parametrization of minimal surfaces. We further show that for a natural dense set of boundary conditions, the holomorphic function in question is, in fact, *algebraic*. The tools of algebraic geometry can thus be brought in to study the minimizers and, especially, the formation of their singularities. (Received March 02, 2009)