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**Shuwang Li\*** ([sli@math.iit.edu](mailto:sli@math.iit.edu)), Room 208, Engineering 1 Bldg, 10 West 32nd Street,  
Chicago, IL 60616. *A boundary integral method for simulating the dynamics of an epitaxial island.*

We present a boundary integral method for computing the quasi-steady evolution of an epitaxial island. The problem consists of an adatom diffusion equation (with desorption) on terrace and a kinetic boundary condition at the step (island boundary). The normal velocity for the step motion is determined by a two-sided flux. The boundary integral formulation of the problem yields a Fredholm type integral equation including both double and single layer potentials. Numerical tests on a growing/shrink circular island are in excellent agreement with the analytical solution and demonstrate that the method is stable, efficient and spectrally accurate in space. Nonlinear simulations for perturbed circular islands show that sharp tips and facets will form during growth instead of the usual tip-splitting events for isotropic Laplacian growth. The numerical techniques presented here can be applied generally to a class of free/moving boundary problems in physical and medical science. (Received August 18, 2010)