Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

One-dimensional model of interacting-step fluctuations on vicinal surfaces: Analytical formulas and kinetic Monte-Carlo simulations[1]
PAUL PATRONE, T.L. EINSTEIN, U. of Maryland, College Park, DIONISIOS MARGETIS, Math Dept., U. of Maryland, College Park — We study a 1+1D, stochastic, Burton-Cabrera-Frank (BCF) model of interacting steps fluctuating on a vicinal crystal. The step energy accounts for entropic and nearest-neighbor elastic-dipole interactions. Our goal is to formulate and validate a self-consistent mean-field (MF) formalism to approximately solve the system of coupled, nonlinear stochastic differential equations (SDEs) governing fluctuations in surface motion. We derive formulas for the time-dependent terrace width distribution (TWD) and its steady-state limit. By comparison with kinetic Monte-Carlo simulations, we show that our MF formalism improves upon models in which step interactions are linearized. We also indicate how fitting parameters of our steady state MF TWD may be used to determine the mass transport regime and step interaction energy of certain experimental systems.[2]

[1]PP and TLE supported by NSF MRSEC under Grant DMR 05-20471 at U. of Maryland; DM supported by NSF under Grant DMS 08-47587.
[2]P. Patrone, T. L. Einstein, D. Margetis, Phys. Rev. E, in press.

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Date submitted: 18 Nov 2010 Electronic form version 1.4