Abstract Submitted
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Mean field approach to fluctuations of surface line defects[1] DIONISIOS MARGETIS, Department of Mathematics, University of Maryland — Below the roughening transition temperature, the dynamics of crystal surfaces are driven by the motion of line defects (steps) of atomic size. According to the celebrated Burton Cabrera-Frank (BCF) model, the steps move by mass conservation, as adsorbed atoms (adatoms) diffuse on terraces and attach/detach at step edges. The resulting deterministic equations of motion incorporate nonlinear couplings due to entropic and elastic-dipole step-step interactions. In this talk, I will discuss a formal theory for stochastic aspects of step motion by adding noise to the BCF model in 1+1 dimensions. I will define systematically a "mean field" that enables the conversion of the coupled, nonlinear stochastic equations for the distance between neighboring steps (terrace widths) to a single Langevin-type equation for an effective terrace width. In the course of my study, I invoke the Bogoliubov-Born-Green Kirkwood-Yvon (BBGKY) hierarchy for joint terrace-width probability densities and a decorrelation ansatz for terrace widths. By using an example drawn from epitaxial growth (with material deposition from above), I will compare the mean field approach to an exact result from a linearized growth model. [D. Margetis, J. Phys A: Math. Theor. 43, 065003 (2010).]

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Dionisios Margetis
Department of Mathematics, University of Maryland

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