APPLIED MATHEMATICS COLLOQUIUM

DISCRETE AND CONTINUOUS MODELS OF STEP BUNCHING ON VICINAL SURFACES

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ABSTRACT:

Vicinal crystal surfaces characterized by a small miscut relative to a high symmetry orientation are attractive templates for the formation of self-organized nanostructures and nanopatterns. In particular, step bunching instabilities can be exploited to create regular periodic patterns of high step density regions separated by large atomically flat terraces. The talk will describe a number of mechanisms leading to step bunching, and show how discrete step dynamical equations can be derived from the underlying atomistics. In certain parameter regimes it is possible to pass from the discrete dynamics to a continuous description in a systematic way, and various scaling relations for the bunch profiles can be obtained [1,2]. In other regimes genuinely discrete phenomena have so far prevented a continuous description. In the specific case of electromigration-induced step bunching, both regimes are predicted to be experimentally accessible [3].

The talk is based on joint work with V. Popkov, S. Stoyanov and V. Tonchev.

[1] J. Krug, V. Tonchev, S. Stoyanov, A. Pimpinelli, Phys. Rev. B 71, 045412 (2005).
[2] V. Popkov, J. Krug, Europhys. Lett. 72, 1025 (2005)
[3] V. Popkov, J. Krug, preprint cond-mat/0602216

MONDAY, MARCH 20, 2006
4:30 PM
Building 2, Room 105

Reception at 4:00 PM in Building 4, Room 174.
(Math Majors Lounge)

Applied Math Colloquium: http://www-math.mit.edu/amc/spring06
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