PHYSICAL MATHEMATICS SEMINAR

PULLING BUBBLES AND PATTERNING FILMS

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ABSTRACT:

The deposition of bubbles on the walls of an emptied reservoir is a phenomenon observed with many common beverages --- beer, milk, or coffee, for instance. It is also of great importance to the many industrial processes where the uniformity of a coating is desirable. I will discuss work on an idealized version of this situation, the drag-out of a single bubble in Landau-Levich--Derjaguin flow. A well-defined critical wall speed is found to govern bubble deposition, and experimental and theoretical results are obtained for the scaling of this threshold.

Another interfacial flow of interest is the rupture of thin liquid films on solid substrates with chemical heterogeneity. This is a situation that occurs frequently in lithographic printing, semiconductor fabrication, and microfluidic devices. It is shown that the spinodal (van der Waals) instability of thin films experiences a resonance effect when the substrate is chemically patterned, and that film shapes obey an imperfect bifurcation. Previously reported effects in experiments and simulations are explained in terms of this theoretical framework.

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TUESDAY, APRIL 27, 2010
2:30 PM
Building 2, Room 105

Refreshments at 3:30 PM in Building 2, Room 290
(Math Department - Common Room)

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