Applied Mathematics

McGill & CRM Applied Mathematics Seminar

2:35 pm Monday 9th February 2004
At McGill, Burnside Hall 1205

"Blowing-up exact solutions of long-wave unstable thin film equations"

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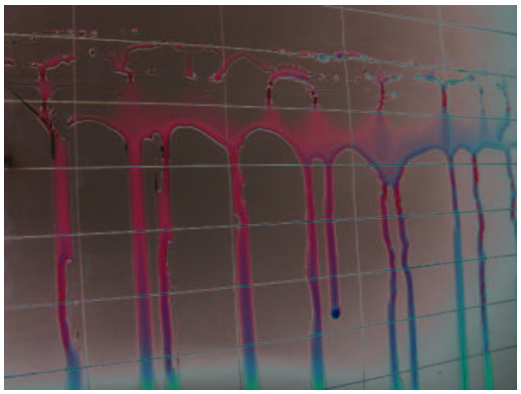
Coffee and refreshments will be served after the seminar

Abstract: Long-wave unstable thin film equations

$$h_t = (h^n h_x x x)_x - B(h^m h_x)_x$$

are a fourth-order analogue of the the semilinear heat equation. A "reaction" term destabilizes a "diffusion" term, allowing for a competition between effects. This competition admits a variety of steady states and temporal behaviors, depending on whether the equation is subcritical, critical, or supercritical (as determined by m and n).

Bertozzi and I proved that if $n = 1$ then the initial value problem can yield solutions that blow up in finite time in the critical ($m = 3$) and super-critical ($m > 3$) cases. Witelski, Bertozzi, and Bernoff have done extensive computations and asymptotics on the $n = 1$ case suggesting this blow-up is self-similar. In this talk, I will present recent work with Dejan Slepcev (University of Toronto) in which we consider the critical ($m = n + 2$) case and present exact solutions with compact support and zero contact angles that blow up in a self-similar manner.



Glycerol Capstone, Thin Film
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