

Meeting: 1004, Bowling Green, Kentucky, SS 13A, Special Session on Nonlinear Analysis and Applied Mathematics

1004-35-36 **Thomas P Witelski*** (witelski@math.duke.edu), Duke University, Dept of Math, Physics
Bldg, Room 121, Box 90320, Durham, NC 27708-0320. *Dynamics of a critical-case generalized thin
film equation.*

We examine the dynamics of blow-up singularities in a critical-case unstable thin film equation. This is a nonlinear fourth-order degenerate parabolic PDE derived from a generalized model for the free-surface evolution of lubrication flows of thin viscous films. For a special balance between destabilizing second-order terms and regularizing fourth-order terms, this equation has a very rich set of dynamics including families of similarity solutions for finite-time blow-up and infinite-time spreading. The structure and stability of the steady-states and the compactly-supported similarity solutions is studied. This is joint work done with Andrew Bernoff and Andrea Bertozzi. (Received January 06, 2005)