

MATHEMATICS DEPARTMENT
North Carolina State University

DIFFERENTIAL EQUATIONS SEMINAR

Wednesday, March 22, 2006
3:00 p.m. 330 Harrelson Hall

Richard Kollar
University of Michigan

“Linear stability of stratified fluids and the associated nonlinear eigenvalue problem”

It's a problem that has long puzzled fluid dynamicists: How long does it take the waves in a container of fluid to settle? To date there is no complete mathematical analysis; the air/liquid/wall contact line and surface tension complicate things. But for “supercritical” fluids at high pressure (important in several industrial processes, such as decaffeination of coffee) modeled by the incompressible Navier-Stokes equations, the sharp distinction between liquid and vapor disappears. Viscosity can be expected to damp internal waves with a characteristic exponential relaxation time associated with the slowest decaying mode of the system. This work proves that, surprisingly, there is no slowest decaying mode in such stratified fluids. The proof relies on the theory of indefinite metric spaces, which turns out to be an extremely useful tool in many other unrelated stability problems, particularly in connection with the Evans function technique.

This is a joint work with R. L. Pego and K. F. Gurski.

Graduate students are invited to attend.

For questions, comments, and offers to talk, contact Steve Schechter, schechter@math.ncsu.edu. Please visit the DE Seminar web page at www.math.ncsu.edu/seminars.html.