# abstract

MATHEMATICAL PHYSICS SEMINAR
Topic:

Speaker:

Affiliation:

Date:

Time/Room:

We discuss the global regularity vs. finite time breakdown in nonlinear convection driven by different models of forcing. Finite time breakdown depends on whether the initial configuration crosses intrinsic, O(1) critical thresholds (CT). Our approach is based on spectral dynamics, tracing the eigenvalues of the velocity gradient which determine the boundaries of CT surfaces in configuration space.

We demonstrate this critical threshold phenomena with several n-dimensional prototype models. For n=2 we show that when rotational forcing dominates the pressure it prolongs the life-span of sub-critical 2D shallow-water solutions. We present a stability theory for vanishing viscosity solutions of the 2D nonlinear □pressureless□ convection. We revisit the 3D restricted Euler and Euler-Poisson equations, and we obtain a surprising global existence result for a large set of sub-critical initial data in the 4D case.