RYERSON UNIVERSITY

DEPARTMENT OF MATHEMATICS BIOMATHEMATICS & FLUIDS SEMINAR

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Date: Thursday, April 11, 2013
Time: 2:10pm
Location: ENG 210

Transient turbulence and homoclinic tangles in channel flow

Abstract:

The motion of a fluid trapped between two parallel, moving walls, otherwise known as Couette flow, is known to be laminar at small forcing and turbulent at large forcing. However, the laminar state is a linearly stable equilibrium at all Reynolds numbers. There is no generally accepted theory for the transition to turbulence in the absence of a critical Reynolds number, at which travelling waves or periodic solutions branch off the laminar state. In this presentation I will review some proposed theories, focussing on the "edge state" hypothesis, which asserts that the transition is regulated by simple, saddle-type invariant solutions. In particular, I will focus on the recent discovery of solutions homoclinic to edge states. Such solutions might explain irregular turbulent bursting near the transition threshold and the complicated dependence on initial conditions of the flow. I will discuss how the homoclinic tangle depends on the Reynolds number and how it is tied in with recently uncovered routes to transient chaos in Couette flow.

All Faculty, staff, students and guests are welcome to attend