



Speaker: Walter Craig
McMaster University

Wednesday, April 27, 2016

4:00 PM

117 Hayes-Healy Hall

Title: Vortex filament dynamics

Abstract:

Vortex filament dynamics An problem in mathematical hydrodynamics addresses the evolution of vortex filaments. These are solutions of the Euler equations for an incompressible fluid such as water, for which the vorticity is localized onto curves that then evolve in the fluid. Equations that model vortex dynamics have a strong analogy to Hamiltonian dynamical systems. I will describe a system of equations that are derived to model the dynamics of nearly parallel vortex filaments in a three dimensional fluid. These equations have a formulation as a Hamiltonian system of partial differential equations, and my talk will describe some aspects of a phase space analysis of solutions. Finer aspects include the construction of periodic and quasi-periodic orbits of this dynamical system via a version of KAM theory for PDEs, and a topological principle to count the multiplicity of solutions. This is ongoing joint work with C. Garcia (UNAM) and C.-R. Yang (McMaster and the Fields Institute)