

Thesis Presentations

First Speaker:

Peter O'Reilly
Memorial University

Supervisors:

H. Kunduri & I. Booth

Monday, April 28, 2014
10:30 a.m., HH-3017

Dynamical Trapping Horizons of Collapsing Null Fluids

Abstract:

We investigate the behaviours of marginally trapped tubes using the accretion of a mass function possessing polytropic equation of state, $P = kp^a$. Solutions are characterized by the mass function which, dependent on certain critical values, will be spacelike or timelike. Given certain values of the equation of state parameters, horizons which are solely timelike or spacelike can be found. Of greater interest are examples of apparent horizons which possess the property of being *both* timelike and spacelike. This behaviour is demonstrated within both the asymptotically flat and cosmological regimes.

Second Speaker:

Raymond Walsh
Memorial University

Supervisor:

J. Alam

Monday, April 28, 2014
10:30 a.m., HH-3017

Numerical Modeling of CO₂ Migration in Porous Media

Abstract:

Carbon capture and storage (CCS) is relatively new process designed to prevent the CO₂ byproduct of oil extraction from entering the atmosphere. Enhanced oil recovery is a process whereby the CO₂ by product is injected back into the oil reservoir to help with oil recovery process. Mathematically the CCS and enhanced oil recovery are closely related. In this talk we will discuss a generalized upscaling approach to derive the governing equations and present a solution technique based off a combination of the Crank-Nicolson temporal discretization, the jacobian free Newton- Krylov (JFNK) method for non-linear systems, and the collocation method of spiral discretization. We will analyze the accuracy of this technique and demonstrate the applicability by showing a simulated solution of a model problem.