Mathematics, Statistics, and Computer Science **@ UIC**

Analysis and Applied Mathematics Seminar

A convergent boundary integral method for 3D interfacial flow with surface tension

David Ambrose (Drexel University)

Abstract: In this talk, we will discuss the initial value problem for 3D interfacial fluid flow with surface tension. We will emphasize the case in which the fluid velocities are given by Darcy's Law; this can serve as a model for intefacial flow in a porous medium. We will discuss a well-posedness proof for the problem, with the initial data in Sobolev spaces. We will also discuss a non-stiff numerical method; this is similar in spirit to the method of Hou, Lowengrub, and Shelley for the corresponding 2D problem. Finally, we will give some of the details of a convergence proof for a variant of this numerical method; this convergence proof requires estimates which are similar in spirit to the estimates required to demonstrate well-posedness. While convergence proofs for boundary integral methods had been developed previously for 2D flows with or without surface tension or for 3D flows without surface tension, this is the first convergence result for a boundary integral method for a 3D flow with surface tension. The results discussed include joint work with Yang Liu, Nader Masmoudi, Michael Siegel, and Svetlana Tlupova.

Monday, April 4 at 4:00 PM in SEO 636