Department of Mathematics and Statistics Colloquium

A Poroelastic, Multiscale Model of Intestinal Edema

Abstract: Intestinal edema is a medical condition referring to the accumulation of excess fluid in the spaces between cells in the intestinal wall. This swelling causes the muscle cells in the intestine to stop contracting, creating health problems for the patient. However, the link between edema and reduced muscle contractility is unknown. To study this phenomenon, we developed a computational, poroelastic model of edema formation in the intestinal wall. Partial differential equations are used to describe the deformation, fluid volume changes, and pressure changes in the intestinal wall as the edema forms. The problem is solved using a discontinuous Galerkin method. To validate the initial model, simulation results are compared to results from experimental data.

To truly understand the edema-muscle relationship, we need a multiscale model that spans from organ to cell level. A novel continuum-microscopic approach, utilizing probability theory, will be described for a model a problem, with an outline of how this method will be applied to the edema problem in future work.

The speaker is a candidate for an open position in the Department of Mathematics and Statistics. For reason's of confidentiality, the speaker's name and institutional affiliation have been suppressed.

Monday, January 23 at 4:15 in Roop 103.

Refreshments at 4:00.