Colloquium

Numerical Methods for Hyperelastic Image Registration

Lars Ruthotto

University of British Columbia

Abstract: Image registration is an essential task in almost all areas involving imaging techniques. The goal of image registration is to find geometrical correspondences between two or more images. Image registration is commonly phrased as a variational problem that is known to be ill-posed and thus regularization is commonly used to ensure existence of solutions and/or introduce prior knowledge about the application in mind.

This talk presents a nonlinear regularization functional based on the theory of hyperelastic materials, which overcomes limitations of the most commonly used linear elastic model. In particular, the hyperelastic regularization functional guarantees that solutions to the variational problem exist and are one-to-one correspondences between the images, which is a key concern in most applications. The focus of this talk is on accurate and fast numerical methods for solving hyperelastic image registration problems. Further, the potential of hyperelastic schemes is demonstrated for real-life medical imaging problems.

Friday, January 31, 2014, 3:00 pm

Mathematics and Science Center: W201

Mathematics and Computer Science
Emory University