New hybrid methods in medical imaging utilizing ultrasound data

organiser: J. McLaughlin, *Rensselaer Polytechnic Institute, USA*

Abstract

This minisymposium is directed toward two new imaging modalities for use as medical diagnostic tools. The first is elastography, where images of shear stiffness are created by a variety of experiments including: (1) the tissue is compressed; (2) a single frequency time harmonic excitation creates a time harmonic oscillating shear vibration in the tissue; and (3) a shear wave is initiated along a line or at a point in the tissue. The change in displacement in the tissue is then measured by a second experiment, either with MR or ultrasound, or ultrasound based new imaging systems. Shear stiffness changes significantly in abnormal tissue and the goal is to make an image that reflects this change and can then be used for diagnostic purposes.

The second imaging modality that will be represented in this minisymposium is thermoacoustic tomography. Here in the first step input energy is deposited throughout the imaging object, causing a small amount of thermal expansion. Cancerous masses absorb more of that energy and expand quickly creating a shock wave that is detected by ultrasound transducers at the edge of the object. The goal then is to construct the location, and give an image of the abnormal tissue.

Speakers in this minisymposium will be both experimentalists and applied mathematicians.