RECONSTRUCTION OF ELASTIC MODULUS FROM ULTRASOUND IMAGES

N. H. Gokhale[a], **A. A. Oberai**[b], and **P. E. Barbone**[c]

Department of Aerospace and Mechanical Engineering
Boston University
110 Cummington Street, Boston, MA 02215
[a]gokhalen@bu.edu
[b]oberai@bu.edu
[c]barbone@bu.edu

Elasticity Imaging is an emerging imaging technique with applications in diagnosis of breast cancer, atherosclerosis and thrombosis. This techniques involves three steps: (1) generating tissue images (ultrasound) before and after deforming the tissue, (2) registering these images to obtain the underlying displacement field, and (3) calculating the elastic modulus from the displacement field by solving an inverse problem.

We describe a new, more efficient, approach to elasticity imaging, wherein the image registration and modulus reconstruction steps are combined. This is accomplished by formulating and solving an inverse problem that utilizes the images themselves as measured data. We formulate the inverse problem and present efficient algorithms to solve it. In addition we consider examples that demonstrate the efficacy of our approach.