

Meeting: 1003, Atlanta, Georgia, SS 4A, AMS-SIAM Special Session on Theoretical and Computational Aspects of Inverse Problems, I

1003-35-1221 **Jeong-Rock Yoon*** (yoonj@rpi.edu), Department of Mathematical Sciences, Rensselaer Polytechnic Institute, 110 8th Street, Troy, NY 12180, and **Joyce McLaughlin** and **Daniel Renzi**. *Imaging elastic anisotropy for tumor identification.*

Elastography is an innovative new medical imaging technique that provides high resolution/contrast images of elastic stiffness identifying abnormalities not seen by standard ultrasound. Our data is the time dependent (8000 frames/sec) interior displacements (0.4mm grid spacing) initiated by a short-time pulse. For the isotropic model [Inverse Problems 2003; Inverse Problems 2004], a series of uniqueness results for our inverse problem are proved, a fast stable algorithm to reconstruct the shear wavespeed based on a propagating front in the data is successfully demonstrated by numerical simulations and phantom experiment data.

Since real biological tissue is anisotropic due to the alignment of fibers and cells, and some tumors exhibit anisotropy, it is important to consider anisotropic tissue models. For example, in incompressible transversely isotropic models the unknowns of our inverse problem are two Young's moduli, one shear modulus, and the fiber direction. Here the structure of fiber orientation as well as the ratio of elastic parameters are important to decide the malignancy of tumor. In this talk, we present how many measurements are required to guarantee the uniqueness and how to reconstruct fiber directions and corresponding elastic parameters. (Received October 04, 2004)