Joyce McLaughlin (RPI)

Title: Interior Elastodynamics inverse problems: Finding
 shearwave speed from interior displacements

Lecture I: Problem description; uniqueness and well posedness results
 for isotropic models; extension of unique continuation theory needed
 to establish algorithms;

  Relevant papers: "Interior Elastodynamics Inverse Problems: Shear Wave
   Speed Reconstruction in Transient Elastography", (L.Ji, J.
   McLaughlin,D. Renzi, J-R Yoon), Inverse Problems, Vol. 19, No. 6, Dec.
   2003, pp. s1-s29.

   "Unique identifiability of elastic parameters from time-dependent
    interior displacement measurement, (J. McLaughlin, J-R Yoon), Inverse
    Problems, Vol. 20, No.1, February 2004, pp. 25-46.

Lecture II: Arrival time algorithm for isotropic models; distance and
    level curve methods; justification and performance; alternative
    algorithms based on statistical justification of differentiation of
    noisy data.

   Relevant papers: "Shear Wavespeed Recovery in Transient Elastography
    using Level Set Based Inversion of Arrival Times, I and II", (J.
    McLaughlin and D. Renzi) see
    http://eaton.math.rpi.edu/faculty/J.McLaughlin/mclauj.html

    possible posting of additional paper on the alternate algorithm

Lecture III: Anisotropic models (and if time permits viscoelastic
    models); wellposedness results, algorithms; open problems;
    alternate experiments leading to additional mathematical and
    algorithmic questions.

   "Anisotropy Reconstruction for Acoustic Equation in Transversely
    Isotropic media", (J McLaughlin, D. Renzi and J-R Yoon) to be posted
    on website above

Texts on tissue modeling:
· Foundations of Solid Mechanics, Y.C. Fung, Prentice Hall, 1965.
· Biomechanics: mechanical properties of living tissue, Y.C. Fung, Springer
   Verlag, 1993.

Texts on level set algorithms:

- Level set methods and fast marching methods, J. Sethian, Cambridge University Press, 1999.
- Level set methods and dynamic implicit surfaces, S. Osher and R. Fedkew, Springer-Verlag, 2003.

Texts on partial differential equations:

- The analysis of Linear Partial Differential Operators, III, L. Hormander, Springer-Verlag, Berlin, 1985
- Partial Differential Equations, L.C. Evans, AMS, 1998.