Meeting: 999, Nashville, Tennessee, SS 9A, Special Session on Inverse Problems

999-35-24 **Lizabeth V Rachele*** (rachel@rpi.edu), Mathematical Sciences, Rensselaer Polytechnic Institute, Troy, NY 12180. *Inverse Problems for Anisotropic Elastic Media.*

We consider the dynamic parameter identification problem for bounded, three-dimensional anisotropic elastic media with smoothly varying density and elastic properties. Displacement-to-traction surface data for the inverse problem is modeled by the Dirichlet-to-Neumann map on a finite time interval.

We first show that there is an obstruction to uniqueness in the inverse problem; in fact, we show that the elastic medium with density ρ and elasticity $\mathbf{C}$ has the same displacement-to-traction surface measurements as the medium with density $(\det D\psi)(\rho \circ \psi)$ and elasticity $(\det D\psi)(\psi^*\mathbf{C})$, where ψ is any diffeomorphism of the domain that fixes the boundary to first order. A consequence of the obstruction to uniqueness is that uniqueness for isotropic elastodynamics may be extended to partial uniqueness for the anisotropic elastic media in the orbit (under the action of pullback by diffeomorphisms) of isotropic elastic media.

We also introduce a class of transversely isotropic elastic media with geodesic wave propagation. We study the dynamic inverse problem for these anisotropic elastic media.

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