1106-92-373 **Sunnie Joshi*** (sjoshi@temple.edu), 1523 Green Street, Unit 1, Philadelphia, PA 19130.
Estimating Residual Stresses in Arteries by an Inverse Spectral Technique.

It is known that residual stresses play a significant role in determining the overall stress distribution in soft tissues. A mathematical model is studied to estimate residual stress field in the arterial wall by making use of intravascular ultrasound (IVUS) imaging techniques. The arterial wall is modeled as a nonlinear, isotropic, slightly compressible elastic body. A boundary value problem is formulated for the residually stressed arterial wall, the boundary of which is subjected to a quasi-static blood pressure, and then an idealized model for the IVUS interrogation is constructed by superimposing small amplitude time harmonic infinitesimal vibrations on large deformations. The analysis leads to a system of second order differential equations with homogeneous boundary conditions of Sturm-Liouville type. By making use of the classical theory of inverse Sturm-Liouville problems, and root finding and optimization techniques, an inverse spectral algorithm is developed to approximate the residual stress distribution in the arterial wall, given the first few eigenfrequencies of several induced blood pressures. (Received August 25, 2014)