1077-VG-1208 **Kun Gou*** (kunjuzi@yahoo.com), Department of Mathematics, Mail Stop 3368, Texas A&M University, College Station, TX 77843. *Estimating the stiffness of healthy arteries via multi-dimensional secant method.*

An inverse spectral technique via multi-dimensional secant method is developed for recovering the shear modulus expressing the stiffness of soft tissue. The research is motivated by a novel use of the intravascular ultrasound technique to image arteries. Shear modulus is approximated to reflect the variation of stiffness of the arterial wall along the radial direction. The arterial wall is idealized as a nonlinear isotropic cylindrical hyperelastic body. First, boundary value problems are formulated for the response of the arterial wall within a specific class of static deformations by steady blood pressures. Then another category of boundary value problems is developed from intravascular ultrasound interrogation generating small amplitude, high frequency time harmonic vibration superimposed on the static finite deformations via an asymptotic construction of the solutions. This leads to a system of second order ordinary differential equations known as Sturm-Liouville problems, which are then employed to reconstruct the shear modulus in a nonlinear approach by an inverse spectral technique through multi-dimensional secant method. (Received September 18, 2011)