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**Anthony J Romano\*** (anthony.romano@nr1.navy.mil), 4555 Overlook Ave., SW,  
WASHINGTON, DC 20375. *An Overview of Waveguide Elastography and its Application to White  
Matter Classification.*

Waveguide Elastography is a noninvasive method which evaluates the anisotropic material parameters of fibrous structures. It requires knowledge of the pathways along which elastic waves may travel (provided by Diffusion Tensor Imaging) as well as a measurement of the dynamic elastic displacements within the volume surrounding the pathways (provided by Magnetic Resonance Elastography). With knowledge of the position vectors of the pathways, a spatial-spectral filter is applied to the measured displacements to identify only those waves which are traveling at particular angles to, and along the fibers at every point. At this time as well, a Helmholtz decomposition is implemented which separates the total field into its longitudinal and transverse components. An Orthotropic inversion is then performed along the fibers to evaluate the stiffness values. By filtering along six specific directions within the local reference frame of the fibers, the equations of motion decouple allowing for each of the nine elastic coefficients to be solved for independently of one another. This method will be demonstrated in the brains of healthy human volunteers as well as in patients suffering from neurological conditions such as Amyotrophic Lateral Sclerosis and Traumatic Brain Injury. (Received January 15, 2015)