Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Effect of Isotropic Assumption on Material Property Reconstructions of the Human Brain using Magnetic Resonance Elastography AARON ANDERSON, CURTIS JOHNSON, JOSEPH HOLTROP, Univ of Illinois - Urbana, MATHEW MCGARRY, KEITH PAULSEN, Dartmouth College, BRADLEY SUTTON, Univ of Illinois - Urbana, ELIJAH VAN HOUTEN, Université de Sherbrooke, JOHN GEORGIADIS, Univ of Illinois - Urbana — Neurodegenerative diseases affect the microstructure of the brain and thus have a significant effect on the tissue mechanical properties. In vivo techniques, like magnetic resonance elastography (MRE), have shown promise as a contrast technique for disease detection. MRE is a non-invasive technique for measuring the viscoelastic mechanical properties of biological tissue by applying a low-amplitude shear wave, capturing the wave patterns with specialized magnetic resonance imaging techniques, and employing an isotropic nonlinear inversion (NLI) material property reconstruction. When distinctly different shear wave patterns are applied, NLI reconstructs differences in the real component of the shear modulus of ~ 2 [kPa] within well ordered white matter (WM). The difference is significant due to the human brain only having a range of real shear modulus from 0 [kPa] (cerebral spinal fluid) to ~ 5 [kPa] (white matter). The focus of this investigation is to quantify the effect of propagation direction on the reconstructed material properties and examine their relationship to the underlying microstructure in a well ordered, WM regions of the brain (corpus callosum).

Aaron Anderson
Univ of Illinois - Urbana

Date submitted: 14 Nov 2014 Electronic form version 1.4