Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Strain-softening elasticity model of the encapsulation of an ultrasound contrast microbubble SHIRSHENDU PAUL, KAUSIK SARKAR, University of Delaware, FLEMMING FORSBERG, Thomas Jefferson University — Micron size bubbles have been clinically approved as contrast agents in diagnostic ultrasound imaging. These bubbles are stabilized with an encapsulation made of surface-active materials such as surfactants, lipids or proteins. We have developed interfacial viscoelastic models for the encapsulation and determined the material properties of commercial contrast agents. Now, we modify this model to account for strain softening in large nonlinear bubble oscillation. Two non-linear models– interfacial elasticity varying linearly and exponentially with area fraction–are developed. The model parameters are determined using experimentally measured attenuation of ultrasound through a solution of contrast agent Sonazoid. Models are then investigated for their ability to compare with experimentally observed scattered non-linear response. They also display recently observed "compression-only" behavior and skewed-resonance. The model response is discussed in detail along with a comparison with the model due to Marmottant et al.

Kausik Sarkar
University of Delaware

Date submitted: 04 Aug 2010 Electronic form version 1.4