Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

**Suppression of shocked-bubble dynamics by tissue confinement**[1]
JONATHAN FREUND, RATNESH SHUKLA, University of Illinois at Urbana-Champaign — Estimates are made of the effect of confinement by tissues on the action of small bubbles when subjected to strong pressure waves. The applications of interest are biomedical procedures involving short strong ultrasound bursts or weak shocks of the kind delivered in shock-wave lithotripsy. Confinement is anticipated to be important in suppressing mechanical injury and slowing the rate of its spread. We consider bubbles in a liquid such as blood within a small vessel in the tissue. A generalization of the Rayleigh-Plesset equation allows us to estimate the effect of the elasticity and viscosity of the surrounding tissue. Ranges of soft-tissue properties are estimated from a variety of different measurements available in the literature. Solutions suggest that elasticity is insufficient to significantly alter bubble dynamics but that viscosities from the mid-to-high range of those suggested might play a significant role in suppressing bubble action. Simulations in two space dimensions of a shocked bubble in a water-like fluid interacting with a viscous material show that the much more complicated bubble jetting dynamics in this configuration are also significantly suppressed. The dynamics of this suppression are investigated.

[1]Partially supported by NIH

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Date submitted: 04 Aug 2008 Electronic form version 1.4