Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Nonlinear Analysis of Nanomechanical Biosensors in Viscous Fluids AGNES KALINOWSKI, Department of Biomedical Engineering, Boston University, Boston, MA 02215, SHYAM ERRAMILLI, Department of Physics and Department of Biomedical Engineering, Boston University, Boston, MA 02215, PRITIRAJ MOHANTY, Department of Physics, Boston University, Boston, MA 02215 — Current analytical techniques, such as thin beam approximations, inviscid models and finite element simulations fail to accurately model the behavior of nanomechanical structures such as singly- and doubly-clamped beams, coupled linear structures and beam arrays in viscous fluid. We report the nonlinear analysis of elastic nanomechanical structures in highly viscous, laminar flow fluids. The change in resonant frequency of these nanomechanical structures resulting from surrounding fluid dynamics is compared with fluid-structure analysis using the finite element method. This work is supported by the Department of Defense (CDMRP) and the National Science Foundation.

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Date submitted: 01 Dec 2004 Electronic form version 1.4