Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Study of dynamic fluid-structure coupling with application to human phonation[1] SHAKTI SAURABH, JUSTIN FABER, DANIEL BODONY, University of Illinois at Urbana-Champaign — Two-dimensional direct numerical simulations of a compressible, viscous fluid interacting with a non-linear, viscoelastic solid are used to study the generation of the human voice. The vocal fold (VF) tissues are modeled using a finite-strain fractional derivative constitutive model implemented in a quadratic finite element code and coupled to a high-order compressible Navier-Stokes solver through a boundary-fitted fluid-solid interface. The viscoelastic solver is validated through in-house experiments using Agarose Gel, a human tissue simulant, undergoing static and harmonic deformation measured with load cell and optical diagnostics. The phonation simulations highlight the role tissue nonlinearity and viscosity play in the glottal jet dynamics and in the radiated sound.

[1]Supported by the National Science Foundation (CAREER award number 1150439).

Shakti Saurabh
University of Illinois at Urbana-Champaign

Date submitted: 31 Jul 2013 Electronic form version 1.4