Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Fluid-Structure Interactions in a Scaled-Up Human Vocal Fold Model. KEITH PETERSON, Rensselaer Polytechnic Institute, MICHAEL KRANE, Penn State University, TIMOTHY WEI, Rensselaer Polytechnic Institute — Experiments using a simplified, self-oscillating, scale model of the human vocal folds are presented. The vocal fold models were thin sheets of flexible stainless steel with pliable PVC ends. The mass and spring constants could be tuned to match Strouhal and Reynolds numbers characteristic of human phonation; dynamic similarity to life scale motions was maintained. DPIV and DPIA (Digital Particle Image Accelerometry) measurements were taken conducted in the RPI free surface water tunnel to record the motion of both the fluid motion and the model vocal folds. The mechanical vibration behavior of the model vocal folds was also measured independently. This fully-coupled fluid-structure-interaction experiment has a dynamic richness surpassing stationary or forced vibration experiments. Cycle-to-cycle variations and flow asymmetries will be presented and discussed. The use of these measurements to estimate the energy budget of the fluid-structure interaction will also be discussed. * *supported by the NIH*

Timothy Wei
Rensselaer Polytechnic Institute

Date submitted: 03 Aug 2007 Electronic form version 1.4