Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Glottal jet measurements in synthetic, MRI-based human vocal fold models[1] SCOTT THOMSON, BRIAN PICKUP, PAUL GOLLNICK, Brigham Young University — Human vocal fold vibration generates a time-varying elliptically-shaped glottal jet that produces sound in speech. Improved understanding of glottal jet dynamics can yield insight into voice production mechanisms and improve the diagnosis and treatment of voice disorders. Experiments using recently developed life-sized synthetic models of the vocal folds are presented. The fabrication process of converting MRI images to synthetic models is described. The process allows for varying the Young's modulus of the models, allowing for asymmetric conditions to be created by casting opposing vocal folds using materials of different stiffness. The models are shown to oscillate at frequencies, pressures, and flow rates typical of human speech. Phase-locked particle image velocimetry (PIV) results are presented which characterize the glottal jet, including jet direction, vortical structures, and turbulence levels. Results are shown for symmetric and asymmetric vocal fold models. The degree of material asymmetry required to cause significant asymmetry in the glottal jet is reported.

[1]Supported by NIH/NIDCD grants R03 DC008200 and R01 DC05788

Scott Thomson
Brigham Young University

Date submitted: 08 Aug 2007 Electronic form version 1.4