Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Fluid-acoustic interactions and their impact on pathological voiced speech[1] BYRON D. ERATH, The George Washington University, MATIAS ZANARTU, Universidad Tecnica Federico Santa María, SEAN D. PETERSON, University of Waterloo, MICHAEL W. PLESNIAK, The George Washington University — Voiced speech is produced by vibration of the vocal fold structures. Vocal fold dynamics arise from aerodynamic pressure loadings, tissue properties, and acoustic modulation of the driving pressures. Recent speech science advancements have produced a physiologically-realistic fluid flow solver (BLEAP) capable of prescribing asymmetric intraglottal flow attachment that can be easily assimilated into reduced order models of speech. The BLEAP flow solver is extended to incorporate acoustic loading and sound propagation in the vocal tract by implementing a wave reflection analog approach for sound propagation based on the governing BLEAP equations. This enhanced physiological description of the physics of voiced speech is implemented into a two-mass model of speech. The impact of fluid-acoustic interactions on vocal fold dynamics is elucidated for both normal and pathological speech through linear and nonlinear analysis techniques.

[1]Supported by NSF Grant CBET-1036280.

Michael W. Plesniak
The George Washington University

Date submitted: 12 Aug 2011 Electronic form version 1.4