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Computational Analysis of Glottal Aerodynamics and Vocal Fold Vibrations during Phonation XUDONG ZHENG, HAOXIANG LUO, RAJAT MITTAL, The George Washington University — Phonation is a complex biological phenomenon which results from a highly coupled biomechanical interaction between glottal aerodynamics and vocal fold tissue. During phonation, a self-sustained vocal fold vibration is observed and a turbulent jet is formed between the vibrating vocal folds. However, due to the complexity of human airway and nonlinearity of flow-tissue interaction, the physics of phonation is still not well understood. In this study, a high fidelity computational model is used to study this problem. Several key features are incorporated in the current study including (a) the use of modern computer graphic reconstruction technology for reconstructing the 3D human airway from CT-scan data, (b) accurate Immersed Boundary Method (IBM) for the glottal flow and (c) A three-layer finite-element anisotropic vocal fold tissue model for modeling the vocal fold vibration. Results from this study are presented with emphasis on the glottal aerodynamics and associated vocal-fold vibrations. This research is funded by NIH (NIDCD grant R01 DC007125-01A1)

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