Abstract Submitted
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Aeroacoustic simulation for phonation modeling[1] JEFFREY IRWIN, AMANDA HANFORD, BRENT CRAVEN, MICHAEL KRANE, ARL Penn State — The phonation process occurs as air expelled from the lungs creates a pressure drop and a subsequent air flow across the larynx. The fluid-structure interaction between the turbulent air flow and oscillating vocal folds, combined with additional resonance in the oral and nasal cavities, creates much of what we hear in the human voice. As many voice-related disorders can be traced to irregular vocal tract shape or motion, it is important to understand in detail the physics involved in the phonation process. To numerically compute the physics of phonation, a solver must be able to accurately model acoustic airflow through a moving domain. The open-source CFD package OpenFOAM is currently being used to evaluate existing solvers against simple acoustic test cases, including an open-ended resonator and an expansion chamber, both of which utilize boundary conditions simulating acoustic sources as well as anechoic termination. Results of these test cases will be presented and compared with theory, and the future development of a three-dimensional vocal tract model and custom-mode acoustic solver will be discussed.

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