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Simulation of Vocal Folds: A Fluid-Induced Self-Oscillating Problem XINGSHI WANG, LUCY ZHANG, Department of Mechanical, Aerospace & Nuclear Engineering Rensselaer Polytechnic Institute — The goal of this study is to investigate the process of voice production by simulating the motion and deformation of human vocal folds. The vocal folds are oscillated by a constant lung pressure driven airflow in the throat. The system is modeled in 2-D using the immersed finite element method to simulate and study the fluid-structure interaction mechanism. From our numerical results, the glottal jets are identified. Several parameters such as the Reynolds number, Strouhal number, vocal folds stiffness, density ratio between the fluid and the structure are addressed and compared with experimental results. The frequency of the vocal folds vibration, fluid flow rate and pressure distribution are also investigated. In addition, the energy transfer between the fluid domain and the solid domain are analyzed to assist in explaining the underlying physical mechanism for this fluid-induced self-oscillating vocal folds.

Xingshi Wang
Department of Mechanical, Aerospace & Nuclear Engineering
Rensselaer Polytechnic Institute

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