Abstract Submitted
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A budget of energy transfer in a sustained vocal folds vibration in glottis[1] LUCY ZHANG, JUBIAO YANG, Rensselaer Polytechnic Institute, MICHAEL KRANE, Pennsylvania State University — A set of force and energy balance equations using the control volume approach is derived based on the first principles of physics for a sustained vocal folds vibration in glottis. The control volume analysis is done for compressible airflow in a moving and deforming control volume in the vicinity of the vocal folds. The interaction between laryngeal airflow and vocal folds are successfully simulated using the modified Immersed Finite Element Method (mIFEM), a fully coupled approach to simulate fluid-structure interactions. Detailed mathematical terms are separated out for deeper physical understanding and utilization of mechanical energy is quantified with the derived equation. The results show that majority of energy input is consumed for driving laryngeal airflow, while a smaller portion is for compensating viscous losses in and sustaining the vibration of the vocal folds.

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