Abstract Submitted
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Experimental study of the flow-induced vibration of a flexible duct[1] BENJAMIN COHEN, TIMOTHY WEI, RPI, MICHAEL KRANE, Penn State - ARL — Experiments were conducted in a compliant, self-oscillating model of the glottis in a large free-surface water tunnel. The in vitro model was geometrically similar to the human vocal folds, allowing a greater understanding of fluid-solid coupling, but was not dynamically similar. The experimental measurement technique presented was developed to quantify the pertinent system parameters of the fully coupled vibration. DPIV imaging on the 2D mid-plane allowed the velocity vector field of the fluid surrounding of the model to be measured. Gradient-based image processing yields information regarding the shape and location of the structure. Characterizing the temporal variations of both these quantities is required to experimentally validate existing theories and increase our understanding of phonation. The models vibrational motion was shown to be periodic and asymmetric both temporally and spatially. Two separate modes of vibration were characterized using simplified measures of the models shape and spectral analysis. Additionally, the cyclic formation and advection of coherent vortices was shown to coincide with the models closure.

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