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**Fluid-Structure Interactions as Flow Propagates Tangentially Over a Flexible Plate with Application to Voiced Speech Production** ANDREA WESTERVELT, BYRON ERATH, Clarkson University — Voiced speech is produced by fluid-structure interactions that drive vocal fold motion. Viscous flow features influence the pressure in the gap between the vocal folds (i.e. glottis), thereby altering vocal fold dynamics and the sound that is produced. During the closing phases of the phonatory cycle, vortices form as a result of flow separation as air passes through the divergent glottis. It is hypothesized that the reduced pressure within a vortex core will alter the pressure distribution along the vocal fold surface, thereby aiding in vocal fold closure. The objective of this study is to determine the impact of intraglottal vortices on the fluid-structure interactions of voiced speech by investigating how the dynamics of a flexible plate are influenced by a vortex ring passing tangentially over it. A flexible plate, which models the medial vocal fold surface, is placed in a water-filled tank and positioned parallel to the exit of a vortex generator. The physical parameters of plate stiffness and vortex circulation are scaled with physiological values. As vortices propagate over the plate, particle image velocimetry measurements are captured to analyze the energy exchange between the fluid and flexible plate. The investigations are performed over a range of vortex formation numbers, and lateral displacements of the plate from the centerline of the vortex trajectory. Observations show plate oscillations with displacements directly correlated with the vortex core location.

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