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The impact of intraglottal vortices on vocal fold dynamics[1] BYRON ERATH, ALIREZA PIRNIA, Clarkson University, SEAN PETERSON, University of Waterloo — During voiced speech a critical pressure is produced in the lungs that separates the vocal folds and creates a passage (the glottis) for airflow. As air passes through the vocal folds the resulting aerodynamic loading, coupled with the tissue properties of the vocal folds, produces self-sustained oscillations. Throughout each cycle a complex flow field develops, characterized by a plethora of viscous flow phenomena. Air passing through the glottis creates a jet, with periodically-shed vortices developing due to flow separation and the Kelvin-Helmholtz instability in the shear layer. These vortices have been hypothesized to be a crucial mechanism for producing vocal fold vibrations. In this study the effect of vortices on the vocal fold dynamics is investigated experimentally by passing a vortex ring over a flexible beam with the same non-dimensional mechanical properties as the vocal folds. Synchronized particle image velocimetry data are acquired in tandem with the beam dynamics. The resulting impact of the vortex ring loading on vocal fold dynamics is discussed in detail.

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