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Time-Resolved Intraglottal Pressure Distributions in a Self-Oscillating, Hemi-Laryngeal, Synthetic Silicone Model of the Vocal Folds[1]
MOHSEN MOTIE-SHIRAZI, Clarkson University, SEAN PETERSON, University of Waterloo, MATíAS ZAÑARTU, Universidad Técnica Federico Santa María, BYRON ERATH, Clarkson University — Accurate measures of the glottal pressure field are needed to yield insight into the flow-induced oscillations of the vocal folds (VFs) during phonation. These studies have historically been performed with static models under steady flow conditions, which neglects both the changing VF geometry and the unsteady behavior of the flow. The objective of this study is to resolve, for the first time, the temporally and spatially-varying intraglottal pressure field using a multi-layer, self-oscillating, hemilaryngeal silicone model of the VFs. Both the intraglottal aerodynamic and collision pressures are measured in the inferior-superior direction within the glottis with an inferior-superior spatial resolution of 0.254 mm, at four discrete locations in the anterior-posterior direction. In contrast to prior static model investigations, the aerodynamic pressure during the opening phase decreases when the glottal area increases, indicating the importance of unsteady flow effects. Moreover, a 25% difference was observed between the aerodynamic pressure magnitudes in the anterior-posterior direction, suggesting that three-dimensional flow effects are significant.

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