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Measurements of phonatory aeroacoustic source strengths in a physical model MICHAEL KRANE, MICHAEL MCPHAIL, Penn State University — Aeroacoustic sources due to flow-induced vibration of a compliant constriction in a duct were characterized experimentally. The principal goal of this study is to estimate the character and level of the various sources of sound in human voice production. Measurements were performed in a model of the human airway, constructed to human dimensions, but with an idealized geometry. The airway duct models the passage from the trachea to the mouth, as a constant-area (7.64cm^2) square cross-section, interrupted only by the model vocal folds. These were fabricated in two layers of soft silicone rubber. Time-resolved measurements included subglottal and supraglottal absolute pressure, sound pressure at the model vocal tract "mouth," and high-speed video of the model vocal folds. These were sampled synchronously at 22 kHz. Steady-state measurements included subglottal pressure and volume flow rate. Measurements were conducted over a subglottal pressures range of 2.25-2.80 kPa. Source strengths were estimated by theoretical expressions, using the measured pressures and glottal area as inputs. Results show that the dipole source typically associated with vocal fold drag is the dominant source. Furthermore, for the vibration pattern observed in these experiments, glottal jet turbulence dominates the dipole source above approximately 1 kHz.

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