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Experimental study of the flow-induced vibration of a flexible duct constriction B. Cohen, M. Krane, T. Wei Rutgers University, Piscataway, NJ BENJAMIN COHEN, MICHAEL KRANE, TIMOTHY WEI, Rutgers University — Measurements of the motion of a flexible-walled duct constriction and the flow with which it interacts are presented. The current study focuses on proof-of-concept of the measurement technique for studying the fully-coupled flow-induced vibration of scaled-up models of the human vocal folds. The constriction model is a pair of sheets of visco-elastic material, each bent into a horseshoe shape. Video image sequences record of the wall and flow tracer particles in the flow. The flow velocity field is estimated using a DPIV processing technique. An edge detection scheme is used to find the shape of the wall in each image. From these measurements, a single cycle of vibration is constructed. The modes of vibration of the wall are shown, as well as the structure of the jet issuing from the downstream side of the constriction. It is shown that both the flow and the motion of the wall can be characterized sufficiently to allow estimates of the energy exchange between the flow and the structure.

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