Abstract Submitted
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Study of non-linear deformation of vocal folds in simulations of human phonation[1] SHAKTI SAURABH, DANIEL BODONY, Univ of Illinois - Urbana — Direct numerical simulation is performed on a two-dimensional compressible, viscous fluid interacting with a non-linear, viscoelastic solid as a model for the generation of the human voice. The vocal fold (VF) tissues are modeled as multi-layered with varying stiffness in each layer and using a finite-strain Standard Linear Solid (SLS) constitutive model implemented in a quadratic finite element code and coupled to a high-order compressible Navier-Stokes solver through a boundary-fitted fluid-solid interface. The large non-linear mesh deformation is handled using an elliptic/poisson smoothening technique. Supra-glottal flow shows asymmetry in the flow, which in turn has a coupling effect on the motion of the VF. The fully compressible simulations gives direct insight into the sound produced as pressure distributions and the vocal fold deformation helps study the unsteady vortical flow resulting from the fluid-structure interaction along the full phonation cycle.

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