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Study of human phonation in a full-body domain[1] SHAKTI SAURABH, DANIEL BODONY, Univ of Illinois - Urbana — The generation and propagation of the human voice is studied in two-dimensions using a full-body domain, using direct numerical simulation. The fluid/air in the vocal tract is modeled as a compressible and viscous fluid interacting with the non-linear, viscoelastic vocal folds (VF). The VF tissue material properties are multi-layered, with varying stiffness, and a finite-strain model is utilized and implemented in a quadratic finite element code. The fluid-solid domains are coupled through a boundary-fitted interface and utilize a Poisson equation-based mesh deformation method. The full-body domain includes the near VF region, the vocal tract, a simplified model of the soft palate and mouth, and extends out into the acoustic far-field. A new kind of inflow boundary condition based upon a quasi-one-dimensional formulation with constant sub-glottal volume velocity, which is linked to the VF movement, has been adopted. The sound pressure levels (SPL) measured are realistic and we analyze their connection to the VF dynamics and glottal and vocal tract geometries.

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