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Computational aeroacoustics of human vocal tract model flow JUNGSOO SUH, STEVEN FRANKEL, LUC MONGEAU, MICHAEL PLESNIAK, Purdue University — Computational aeroacoustics studies of flow through the human vocal tract, here modeled as a planar channel with an orifice, hence referred to as the glottis, are conducted using large eddy simulation (LES). Comparisons between LES predictions and experimental wall pressure measurements and particle-imaging-velocimetry flow fields will be presented. The compressible Navier-Stokes equations are accurately and efficiently integrated for the low Mach number flow through the use of an additive semi-implicit Runge-Kutta method and high-order compact finite-difference schemes for spatial discretization. Characteristic-based non-reflecting boundary conditions are used together with an exit zone in the context of a multi-block approach. An acoustic analogy based on the Ffowcs Williams–Hawkings equation will be applied to decompose the near-field acoustic source into its monopole, dipole, and quadrupole contributions to assess glottal geometry effects on far-field sound.

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