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Acoustic coupling effect on glottal dynamics during phonation.¹ DARIUSH BODAGHI, WEILI JIANG, QIAN XUE, XUDONG ZHENG, University of Maine — In this study, a two-dimensional flow-structure-acoustics interaction computational model was utilized to examine the effect of the acoustic coupling on glottal dynamics during normal human phonation. An incompressible Navier-Stokes equation based flow solver, three mass based vocal fold model and a hydro/acoustic splitting method based acoustics solver were coupled for simulating the three-way interaction. The hydro/acoustic splitting method is first verified for low Mach number wall bounded flow against compressible N-S solutions obtained by using Fluent. Two simulation cases, with and without the acoustic coupling, were studied to identify the role of the acoustic coupling in normal phonation. The results indicate that, while the incompressible flow model could roughly capture basic glottal dynamics, the acoustic coupling has noticeable effects on both glottal flow and vocal fold dynamics.

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