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The impact of asymmetric flows on pathological speech¹ BYRON D. ERATH, George Washington University, SEAN D. PETERSON, University of Waterloo, MICHAEL W. PLESNIAK, George Washington University — In voiced speech the vocal folds form a divergent glottal passage during the closing phases of the phonatory cycle. Due to the adverse pressure gradient, asymmetric flow develops within the glottis causing the glottal jet to separate from one vocal fold wall, and fully-attach to the opposing wall. The asymmetric pressures that arise from this flow configuration directly influence the vocal fold energy exchange process, and are expected to have the greatest influence on vocal fold motion when pathologies that affect the vocal fold musculature are present. A theoretical flow solution that produces the pressure distributions arising from asymmetric glottal flows is implemented into a two-mass model of speech. The impact of flow asymmetries on pathological vocal fold motion is investigated by modifying the tissue parameters of the speech model to represent unilateral paralysis. The influence of asymmetric flow behavior on pathological vocal fold motion is quantified and compared to the commonly-reported simplified case involving symmetric flow behavior.

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