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Sound and vibration produced by an airfoil tip in a turbulent boundary layer flow with an elastic end wall. PAUL SLABOCH, SCOTT MORRIS, University of Notre Dame — Predicting the far field acoustics of an airfoil tip immersed in a turbulent boundary layer over an elastic end plate is a complicated problem. The unsteady lift of the airfoil and the local end wall vibration pattern form a coupled system of hydrodynamic and acoustic pressures. An experiment has been performed, incorporating as much of the flow physics as possible while maintaining the simplest possible boundary conditions. Specifically, a stationary airfoil tip in a turbulent boundary layer over an elastic end wall was used in an anechoic wind tunnel to relate the unsteady lift of the airfoil to the vibration patterns of the end wall. The vibration patterns were acquired using a scanning laser Doppler vibrometer. This talk will present results of experiments completed with both a rigid and elastic end wall. Preliminary data suggest that the unsteady lift of the airfoil is dependent upon the vibrational characteristics of the end wall.

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