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Unsteady-wall-pressure and velocity measurements in a low-Mach-number flow over a shallow axisymmetric cavity.¹ KE ZHANG, AHMED NAGUIB, Michigan State University, MI-48824 — The unsteady floor pressure and velocity were measured in the flow over a cavity with different widthto-depth, and length-to-depth ratios at very low Mach number (M<0.1). For turbulent boundary layer conditions at separation, the pressure fluctuations acting on the floor of the cavity were measured using a microphone array, while the associated velocity field was captured employing simultaneous hotwire measurements at the same streamwise and spanwise locations as the wall microphones but at different heights above the cavity floor. A unique aspect of the present study is that it employs an axisymmetric cavity geometry with and without end walls in order to examine the flow in finite-width and azimuthally-uniform cavities respectively. Amongst other findings, the results show that for sufficiently high Reynolds numbers, the cavity width has a significant influence on the establishment/cessation of self-sustained oscillation modes.

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