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Unsteadiness of low-Reynolds-number shock / boundary layer interactions VENKATESWARAN NARAYANASWAMY, NOEL CLEMENS, The University of Texas at Austin — Low Re shock wave / boundary layer interactions (SWBLI) generated by compression ramps in a Mach 3 flow are studied experimentally. Ramp angles ranging from 16° to 24° are used to produce separated flows of varying strength (or length-scale). The upstream boundary layers are turbulent with $Re_\theta \approx 3000$ - 5500. This study aims to understand the dominant mechanisms that drive the low-frequency oscillations of the separation bubble as a function of separated flow scale. The organization of the separation bubble is studied using simultaneous wall pressure measurements underneath the separation bubble. Coherence and magnitude of cross correlation between pressure fluctuations in the intermittent region and inside separation bubble is found to be between those of low Re impinging SWBLI and high Re SWBLI. Simultaneous PIV in the upstream boundary layer and wall pressure measurements are used to characterize the influence of the incoming boundary layer fluctuations on the separation bubble dynamics. Furthermore, correlations between the velocity within the separated flow and wall pressure fluctuations are used to study instabilities intrinsic to the separated flow.

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