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The Effect of Configuration on Shock/Boundary Layer Interaction Unsteadiness JAMES THREADGILL, University of Arizona, PAUL BRUCE, Imperial College London — Low-frequency flow unsteadiness associated with shock/boundary layer interactions (SBLIs) remain poorly understood. Upstream and downstream mechanisms have been observed to drive the dynamics, with the latter more prevalent in higher strength interactions. Studies have typically focused on single SBLI configurations within a given environment, limiting identification of unique characteristic behaviors. An investigation has been conducted to assess the unsteady behavior of various 2D SBLIs, each with a range of interaction strengths, all tested within a single facility. Experiments were conducted in Mach 2 flow with $\mathrm{Re}_\theta = 8000$, featuring 14° and 20° compression ramps, and impinging shock reflections from 7°, 8°, 9°, and 10° shock generators. Resultant SBLIs were analyzed using high-speed planar PIV and a streamwise array of fast-response wall-pressure transducers. High-frequency energy content of the shock motion is observed to be independent of the configuration. The dominance of the downstream mechanism in low-frequency unsteadiness is related to the SBLI configuration as well as the interaction strength. In addition, correlations between shock position and angle, and the separated near-wall flow structure are directly established.

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