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Discrete surface roughness effects on a blunt hypersonic cone in a quiet tunnel NICOLE SHARP, EDWARD WHITE, Texas A&M University — The mechanisms by which surface roughness creates boundary-layer disturbances in hypersonic flow are little understood. Work by Reshotko (AIAA 2008-4294) and others suggests that transient growth, resulting from the superposition of decaying non-orthogonal modes, may be responsible. The present study examines transient growth experimentally using a smooth 5-degree half-angle conic frustum paired with blunted nosetips with and without an azimuthal array of discrete roughness elements. A combination of hotwire anemometry and Pitot measurements in the low-disturbance Mach 6 Quiet Tunnel are used for boundary layer profiles downstream of the ring of roughness elements as well as azimuthal measurements to examine the high- and low-speed streaks characteristic of transient growth of stationary roughness-induced disturbances.

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