Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Surface roughness effects on a blunt hypersonic cone[1] NICOLE SHARP, JERROD HOFFERTH, EDWARD WHITE, Texas A&M University — The mechanisms through which distributed surface roughness produces boundary-layer disturbances in hypersonic flow are poorly understood. Previous work by Reshotko (AIAA 2008-4294) 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 quasi-random distributed roughness. Hotwire anemometry in the low-disturbance Texas A&M Mach 6 Quiet Tunnel shows a slight growth of fluctuations as well as vertical offset due to surface roughness at a range of unit Reynolds numbers. Spectral measurements indicate that the model is subcritical with respect to second mode growth, and azimuthal measurements are used to examine the high- and low-speed streaks characteristic of transient growth of stationary disturbances.

[1]Support from the AFOSR/NASA National Center for Hypersonic Research in Laminar-Turbulent Transition through Grant FA9550-09-1-0341 is gratefully acknowledged.

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Date submitted: 07 Aug 2012 Electronic form version 1.4