Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Boundary-layer transition on a flared cone in a Mach 6 quiet wind tunnel[1] JERROD HOFFERTH, WILLIAM SARIC, Texas A&M University — The Mach 6 Quiet Tunnel at Texas A&M is a low-disturbance blowdown facility suitable for boundary-layer stability and transition research. Following its reactivation in 2009, initial testing confirmed the presence of low-disturbance ($< 0.1\%$ P_t'/P_t) freestream flow at select locations on the centerline of the nozzle for settling chamber pressures up to 10 atm, and a fully-traversed freestream flow-quality assessment is currently underway. As a third performance benchmark to complement these direct measurements, the present work measures the transition location on the NASA Langley 93-10 flared-cone model. This model has a 0.5m length, beginning as a 5° half-angle circular cone. At the $X = 254$mm station, a flare of surface radius 2.35m begins which is intended to induce transition within the quiet test core. Boundary-layer transition is detected on the thin-walled model by an observed surface temperature rise using an array of 51 embedded thermocouples. Transition data are presented for a sharp (2.5 μm) nose-tip radius case for comparison with the Lachowicz & Chokani (1996 data). Data for larger-radius nose-tips are also presented.

[1]Work supported by AFOSR Grant FA9550-09-1-0341; AFOSR/NASA National Hypersonic Research Center in Laminar-Turbulent Transition.

William Saric
Texas A&M University

Date submitted: 06 Aug 2010 Electronic form version 1.4