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Experimental study of crossflow instability on a Mach 6 yawed cone STUART CRAIG, WILLIAM SARIC, Texas A&M University — Boundary-layer stability and transition represents a key challenge for the designer of hypersonic vehicles, which typically feature highly-swept and conical features inclined to the free stream. The transition process on each of these geometries is typically dominated by the three-dimensional crossflow instability. In order to advance the goal of a physics-based transition prediction method, crossflow experiments were undertaken in the Mach 6 Quiet Tunnel at Texas A&M University. Detailed boundary-layer measurements were performed on a 7-degree cone at a 6-degree angle of incidence using constant-temperature hot-wire anemometry (CTA) to produce boundary-layer contours at constant axial location. These contours illustrate the characteristic streamwise vortex pattern and mean-flow distortion characteristic of crossflow-dominated flows. Additionally, the high frequency response of the CTA system allows for analysis of the spectral content of the flow. These measurements show a high degree of qualitative agreement with analogous studies performed in low-speed flows.

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