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Stationary-Traveling Cross-Flow Transition Study on a Sharp Cone at Mach 6[1] ERIC MATLIS, ALEXANDER ARNDT, THOMAS CORKE, University of Notre Dame, MICHAEL SEMPER, United States AirForce Academy
— Experiments at Mach 6 in the 3-D boundary layer on a right-circular cone at an angle of attack have revealed evidence of a nonlinear (quadratic) interaction between stationary and traveling cross-flow modes that affect the boundary layer transition Reynolds number. The wavenumber of the stationary modes was controlled by passive patterned roughness located at Branch I. A glow-discharge electrode surface actuator was sputter-deposited just upstream of the patterned roughness to excite the traveling modes at a particular frequency. The observed stationary-traveling interaction was documented with miniature Kulite probes and appeared as an azimuthal variation in the amplitude of the traveling cross-flow mode with azimuthal wavenumbers that corresponded to the sum and difference of the azimuthal wavenumbers of the primary stationary and traveling modes. Cross-bicoherence verified a triple phase locking between the two primary modes and the summed mode for both the "critical" and "subcritical" roughness cases.

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