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Transition delay in hypervelocity boundary layers via CO2 injection J.S. JEWELL, California Institute of Technology, I.A. LEYVA, Air Force Research Laboratory, N.J. PARZIALE, H.G. HORNUNG, J.E. SHEPHERD, California Institute of Technology — A novel method to delay transition in hypervelocity flows in air over slender bodies by injecting CO2 into the boundary layer is demonstrated and investigated. Experimental data were obtained in Caltech's T5 reflected shock tunnel. The experimental model was a 5 degree half-angle sharp cone instrumented with thermocouples, providing heat transfer measurements from which transition locations were determined by comparison with laminar and turbulent heat flux correlations. An appropriate injector was designed, and the efficacy of injecting CO2 in delaying transition was gauged at various mass flow rates, and compared with both no injection and Ar injection cases. At an enthalpy of approximately 6 MJ/kg, no transition delay due to CO2 was observed, but for an enthalpy of approximately 10 MJ/kg, transition delays of up to 100% in terms of Reynolds number were repeatedly documented.

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