Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

A Computational Study of Hypervelocity Boundary Layer Stability by Means of Carbon Dioxide Injection ROSS WAGNILD, GRAHAM CANDLER, University of Minnesota — An experimental method for introducing carbon dioxide as a means of stabilizing a hypervelocity boundary layer over a slender bodied vehicle is investigated through the use of numerical simulations. The motivation for this concept is derived from the results of previous experiments and calculations which demonstrated the ability of fluid flows in chemical and thermal non-equilibrium to absorb energy from acoustic disturbances, particularly flows involving carbon dioxide. In the current study, the computational model is a five-degree half-angle cone with a single row of injector ports. The effect of the injection and the transition location are determined by solving the parabolized stability equations and using the semi-empirical eN method. The preliminary results show a delay in the transition location as compared to a cone without injection under the same flight conditions.

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Date submitted: 07 Aug 2009 Electronic form version 1.4