Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Characterization of the Shear Layer in a Mach 3 Shock/Turbulent Boundary Layer Interaction CLARA HELM, STEPHAN PRIEBE, JUSTINE LI, University of Maryland, PIERRE DUPONT, Aix-Marseille Universite, PINO MARTIN, University of Maryland — The unsteady motion of fully separated shock and turbulent boundary layers interactions (STBLIs) is characterized by an energized low-frequency motion that is two orders of magnitude lower than that of the incoming turbulence. In addition, the spectra shows significant energy content at frequency that is between the characteristic low frequency and the higher frequency motions of the incoming turbulence. The intermediate frequency content is hypothesized to be associated with the existence of Kelvin-Helmholtz type structures, which form in the shear layer downstream of the separation shock and are shed near the reattachment point downstream of the interaction. The current research is concerned with investigating the origins of the intermediate frequencies, and how they may be related to or possibly influence the low-frequency unsteadiness. Specifically, LES data of a Mach 3 STBLI over a 24o ramp are used to estimate convection velocities within the shear layer downstream of the shock. In addition, Brown and Thomas type correlations are used to estimate time and length scales of the eddies in the shear layer. This work is supported by the Air Force Office of Scientific Research under grant AF/9550-10-1-0164.

Clara Helm
University of Maryland

Date submitted: 02 Aug 2013 Electronic form version 1.4