Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Mean and Unsteady Characteristics of Swept SBLIs[1] SATHYAN PADMANABHAN, JORGE CASTRO MALDONADO, JAMES THREADGILL, JESSE LITTLE, University of Arizona — An experimental study has been conducted on swept impinging oblique shock turbulent boundary layer interactions (SBLIs) generated by 12.5° shock generators at various sweep angles in Mach 2.3 flow. Mean and unsteady features are examined using oil flow visualization, mean pressure measurements, and high bandwidth pressure transducers. Mean results show the flow is fully separated, and for higher sweep angles, exhibits a spanwise growth of the interaction, displaying a conical behavior away from the inception region. Unsteady pressure measurements reveal low-frequency unsteadiness along the separation shock foot, with reduced amplitude in comparison to similar strength unswept interactions. Separation shock motion is coherent along the span in lower frequencies while spanwise traveling ripples present in the shock foot accelerate from the root towards the tip over the range of 15-25% of U_∞. Minor correlation is observed between shock motion and pressure disturbances directly upstream in the incoming boundary layer, but this becomes negligible when offset in the spanwise direction. This suggests that shock rippling is not driven by upstream disturbances, but instead associated with a time scale inherent to the interaction.

[1]Air Force Office of Scientific Research (FA9550-15-1-0430)

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Date submitted: 01 Aug 2019 Electronic form version 1.4