# PhD Dissertation Defense Announcement
# Mechanical and Aerospace Engineering Department
# University of Texas at Arlington

## TURBULENT SHOCKWAVE/BOUNDARY-LAYER INTERACTIONS GENERATED BY SHARP SWEPT FINS


**By: DUSTIN OTTEN**

Thesis Advisor: Frank K Lu, Ph.D.


10:00 a.m., Friday, November 3rd

Nedderman Hall, 604


Abstract

The shock/turbulent boundary layer interaction (STBLI) generated by a sharp fin with a 60 deg leading edge sweep mounted above a flat plate at Mach 2.5 was studied numerically. Incipient separation due to this highly swept fin was determined by varying the fin angle to the incoming freestream. The effect of a small fin/plate gap on STBLI incipient separation was established. Sweeping the fin increases the deflection required for incipient separation as the sweep reduces the interaction strength. A gap causes flow leakage under the fin, further reducing the interaction strength on the windward side. The incipient angle of attack is increased when the gap is large enough. All gaps investigated produced incipient separation.

The effect of gap height on the STBLI upstream influence line, primary separation, and attachment angles was compared to empirical relations. For the gaps investigated, no change in the inviscid shock angle was observed and so no significant changes in the upstream influence line, primary separation, or attachment angles were observed.

The same sharp fin was deflected 12 deg and mounted above a body of revolution at Mach 2.5. The results were compared to the same fin mounted above a flat plate, and showed similar lines of upstream influence, primary separation, and inviscid shock angles. However, the body of revolution caused these lines to curve rather than maintain a constant slope in the farfield region. This is at odds with the quasiconical flow observed by the fin on the flat plate, but is consistent with results from other studies. The peak and plateau normalized surface pressures within the separation region were observed to be less on the surface of the cylinder compared to the surface on the flat plate. These features can be attributed to the transverse curvature of the body of revolution.