



# Aerospace and Mechanical Engineering Seminar

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## **On Controlling the Flow in a Turbulent Mixing Layer Downstream of a "A" Notch**

Turbulent mixing layers are a fundamental problem in turbulence research with many engineering applications as it dominates the initial flow patterns in jets and wakes. This research is an experimental investigation focusing on the three-dimensional aspects of a turbulent mixing layer created downstream of a "A" notch splitter plate. The features of a "A" notch, namely, its swept trailing edges in conjunction with the notch, effect the development of the flow downstream and is fundamental to three-dimensional mixing layer research. To evaluate the potential for controlling this flow, flaperons were hinged at the trailing edge that oscillated uniformly across the span to study the sensitivity of the development of the mixing layer to these perturbations.

The mixing layer downstream of a "A" notch generates a pair of streamwise counter-rotating vortices that can force the center of the mixing layer to penetrate into the high-speed stream. In the absence of periodic excitation, the mixing layer spreads linearly in the streamwise direction at the same rate as the two-dimensional mixing layer. The spread rate of the unforced mixing layer was independent of both the spanwise location and the initial thickness of the boundary layer profile at the trailing edge of the splitter plate. Spanwise periodic excitation affected the spread rate and varied in both streamwise and spanwise directions depending on forcing frequency and the phase angle between the two oscillating flaperons on either side of the notch. Interactions existing between the waves emanating from the two trailing edges can have a considerable effect on the spread rate within the notch region. An understanding of the behavior and interactions of these waves can give further insight into the mechanisms that govern the downstream evolution of three-dimensional mixing layers and strategies to control them.

### **Bio:**

Emile Suehiro is a PhD candidate in the University of Arizona Department of Aerospace and Mechanical Engineering under the supervision of professor Israel Wygnanski. He received his BS in aerospace engineering from Embry-Riddle Aeronautical University and MS from the University of California, San Diego. He worked at NASA Dryden (currently Armstrong) Flight Research Center before coming to the UA in 2012.

**AME Lecture Hall, Room S212**

**Thursday, March 23, 2017**

**4 p.m.**

**Refreshments and socializing 3:45 p.m. at the east end of the AME Courtyard.**