

# Weekly CEA FM Seminar: Fall 2014



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& Applied Fluid Mechanics

Date: **Friday, November 7, 2014**

Time: 11:00 AM

Location: Gilman Hall # 132

Speaker: **Prof. William S. Saric** (Texas A&M University)

Title: ***"Flight Experiments on the Effects of 2-D Excrescences on Swept-Wing Boundary-Layer Transition"***

## Abstract

A 30° swept-wing model with a movable leading-edge extending to 15% chord is used in flight and in a low-disturbance wind-tunnel to study the effect of 2 D step excrescences in a 3-D boundary layer. Forward- and aft-facing steps are modulated during the tests. Pressure measurements are compared with computational results, infrared thermography is used to globally detect boundary-layer transition, and hotwire measurements provide details of the boundary-layer profiles in the vicinity of the steps. Image processing techniques are developed in order to objectively determine transition location. An analysis of the results is provided that includes comparisons with experimental studies of an unswept model of similar 2 D pressure gradient. It is shown that the crossflow instability dominates the transition process up to the critical step height, while the shear-layer instability dominates above the critical step height. The critical step height was found to be a function of unit Reynolds number. The addition of leading-edge sweep with a similar 2 D pressure gradient substantially lowers the local Reynolds-based critical step height for forward-facing steps, while it is similar to the unswept case for the aft-facing steps.

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