

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

3-D Stall Cell Inducement Using Static Trips on a NACA0015 Airfoil¹ HALEY DELL'ORSO, MICHAEL AMITAY, RPI — Stall cells typically occur at high angles of attack and moderate to high Reynolds numbers (10^5 to 10^6), which are applicable to High Altitude Long Endurance (HALE) vehicles. Under certain conditions stall cells can form abruptly and have a severe and detrimental impact on flight. In order to better understand this phenomenon, stall cell formation is studied using oil flow visualization and SPIV on a NACA0015 airfoil with $AR = 2.67$. It was shown that there is a critical Reynolds number above which stall cells begin to form, and that Re_{crit} varies with angle of attack. Zig-zag tape and balsa wood trips were used to induce stall cells at lower Reynolds numbers than they would otherwise be present. This will aid in understanding the formation mechanism of these cells. It was also demonstrated that, in the case of full span trips, stall cells are induced by the 3-D nature of zig-zag trips and did not appear when balsa wood trips were used. This suggests that the formation of the stall cell might be due to 3-D disturbances that are naturally present in a flow field.

¹AFOSR Grant Number FA9550-13-1-0059

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Date submitted: 13 Jul 2015

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