

Abstract Submitted
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**Wake Vortex Alleviation Using Rapidly Actuated Segmented
Gurney Flaps** CLAUDE MATALANIS, JOHN EATON¹, Stanford University —

A study to assess the potential for using rapidly actuated segmented Gurney flaps, also known as Miniature Trailing Edge Effectors (MiTEs), for active wake vortex alleviation is conducted using a half-span model wing with NACA 0012 shape and an aspect ratio of 4.1. All tests are performed with the wing at an 8.9 degree angle of attack and chord based Reynolds number around 350,000. The wing is equipped with an array of 13 MiTE pairs. Each MiTE has a flap that in the neutral position rests behind the blunt trailing edge of the wing, and in the down position extends 0.015 chord lengths perpendicular to the freestream on the pressure side of the wing. Dynamic PIV is used to measure the time dependent response of the vortex in the intermediate wake to various MiTE actuation schemes that deflect the vortex in both the spanwise and liftwise directions. A maximum spanwise deflection of 0.041 chord lengths is possible while nearly conserving lift. These intermediate wake results as well as pressure profile, five-hole probe, and static PIV measurements are used to form complete, experimentally-based initial conditions for vortex filament computations that are used to compute the far wake evolution. Results from these computations show that the perturbations created by MiTEs can be used to excite vortex instability.

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