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**Toward an Autonomous Micro-Air Vehicle Wing** TAMANIKA MARTIN, ANTOINE GUITTON, MARK GLAUSER, Syracuse University, RYAN SCHMIT, Air Force Research Laboratories — The purpose of the current research is to develop a Micro-Air Vehicle wing that actively responds to wind gusts. As a first step in this approach, it is necessary to estimate the flow conditions in the immediate vicinity of the wing. Previous estimation procedures have included the use of low dimensional tools such as the POD, LSE, and the Complementary techniques. The heart of Complementary technique lies in its ability to use dynamic strain measurements from the wing to estimate the velocity flow field, and having demonstrated this ability, we now use piezoelectric actuators to actively change the structural dynamics of the wing. When comparing the strain spectrum from the MAV wing between measurements made both with and without piezoelectric actuation, we find that we are able to change the strain spectrum in such a way to suggest that we can obtain significant control authority of the structural dynamics of the wing. Although the fore mentioned control authority was established in an open loop sense, we aim toward the development of a closed feedback control loop, wherein the MAV Wing will be able to autonomously change its shape when encountering wind gusts.

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