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Optimization of Zero Net-mass Flow Actuators for Aero-optics Applications JONATHAN MIHALY, MOIRA DENATALE, MARLYN ANDINO, MARK GLAUSER, Syracuse University — We are working to optimize zero net-mass flow actuators to manipulate flow around an airborne laser turret in order to reduce destructive aero-optics effects. Synthetic jets are created by 50mm piezoelectric disk actuators. Our optimization process involves setting the actuator's cavity size, frequency, and amplitude to achieve the strongest, most consistent jet possible. We are also investigating the affects of driving a single actuator verses driving two actuators in or out of phase with one another. Hotwires are used to collect data and time series for the velocity profile of each actuator. Our approach in initially determining cavity depth has been to use a resonance frequency equation which estimates the cavity depth for a given frequency characteristic to the actuator. The length and area of our opening slot are being held constant throughout our optimization process; however, we are considering the effects of having a sloped opening slot at an angle of 30 degrees to the flow, thus changing the length and area of that particular opening slot. Results from our study will be applied to the actuators used in the turret of the airborne laser at high velocities.

Mark Glauser
Syracuse University

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