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A Closed-loop Suction Flow Control Study over a Pitching Turret RYAN WALLACE, PATRICK SHEA, Syracuse University, VAITHIANATHAN THIRUNAVUKKARASU, Clear Science Corp, RYAN SCHMIT, AFRL/RBAI, HAL CARLSON, Clear Science Corp, MARK GLAUSER, Syracuse University — Active flow control was implemented over a dynamically pitching hemispherical turret with a flat aperture in order to reduce the amount of turbulent fluctuations within the wake region. In this study unsteady suction was utilized as the control input for both open loop and closed loop control cases. The experiments were performed at the Subsonic Research Laboratory wind tunnel at Wright-Patterson Air Force Base at a high Reynolds number flow in which compressibility effects are present. It was clearly demonstrated with the open loop control cases that the suction had enough control authority to effect the baseline flow. The closed-loop control cases explored the effects of various low dimensional feedback systems, utilizing measurement-based estimation and regulators to control either fluctuating velocity or the mean velocity. The ultimate goal of the closed-loop control cases was to observe a reduction in turbulent fluctuations in the wake while reducing the amount of control input.

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