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Characterization of an Actively Controlled Three-Dimensional Turret Wake PATRICK SHEA, MARK GLAUSER, Syracuse University — Three-dimensional turrets are commonly used for housing optical systems on airborne platforms. As bluff bodies, these geometries generate highly turbulent wakes that decrease the performance of the optical systems and the aircraft. The current experimental study looked to use dynamic suction in both open and closed-loop control configurations to actively control the turret wake. The flow field was characterized using dynamic pressure and stereoscopic PIV measurements in the wake of the turret. Results showed that the suction system was able to manipulate the wake region of the turret and could alter not only the spatial structure of the wake, but also the temporal behavior of the wake flow field. Closed-loop, feedback control techniques were used to determine a more optimal control input for the flow control. Similar control effects were seen for both the steady open-loop control case and the closed-loop feedback control configuration with a 45% reduction in the suction levels when comparing the closed-loop to the open-loop case. These results provide unique information regarding the development of the baseline three-dimensional wake and the wake with three different active flow control configurations.

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