Active Flow Control over a 3D Articulating Turret

RYAN D. WALLACE, PATRICK R. SHEA, Syracuse University, VAITHI THIRUNAVUKKARASU, HENRY CARLSON, Clear Science Corp, MARK N. GLAUSER, Syracuse University — An investigation of active flow control was conducted on an articulating 3D turret with a flat aperture using suction as the control input. Observability of the system was obtained by simultaneously sampled dynamic surface pressure at multiple locations around the aperture along with velocity flow field at the center plane of the turret. Both open-loop and closed-loop control cases are examined for the purpose of reducing the turbulent fluctuations directly over the aperture. Open-loop control reduces the separation in the flow and decreases the levels of turbulence above the aperture. The large database of no-control and open-loop control also provides a basis to develop closed-loop control. For closed-loop control, a simple proportional controller will feed back a low dimensional estimation of the flow based on dynamic surface pressure and velocity in an effort to improve upon the open-control cases.

Ryan D. Wallace
Syracuse University

Date submitted: 11 Aug 2009

Electronic form version 1.4