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Low dimensional analysis of the flow over a three dimensional turret MARLYN ANDINO, MARK GLAUSER, Syracuse University — The presence of turbulent flows in the path of a collimated beam produces degradation in its intensity hence abating its performance. A study of the flow physics around a cylindrical turret with the application of open-loop control has been performed. The evaluation of flow control performance is accomplished by analyzing the changes in the turbulent flow time/length scales across the turret surface for three cases. Even though these quantities are not direct measures of the aero-optics, literature suggest there is a strong relationship between them. Open-loop results demonstrate reductions in both RMS and Reynolds shear stress over the separated region. Results of the autocorrelations of the unsteady pressure sensors for the actuated low speed tests exhibit a more organized almost periodic behavior. We are interested in developing a low dimensional description of the flow field over a 3D turret through the use of velocity and unsteady surface pressure measurements. This will incorporate velocity/pressure correlations and mathematical tools such as Proper Orthogonal Decomposition and Modified Linear Stochastic Measurements to construct a low dimensional velocity-based closed-loop flow control model to estimate the flow states in real-time.

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