Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Characterization of a Three-Dimensional Turret Wake for Active Flow Control Part I: Simulation CHRISTOPHER RUSCHER, PATRICK SHEA, RYAN WALLACE, JOHN DANNENHOFFER, III, MARK GLAUSER, Syracuse University — The use of airborne optical devices has led to an increased need to study the flow around a turret. Separation around the turret causes density fluctuations that degrade the performance of the optical device. The separation region can be decreased using different methods of flow control, such as suction. A computational fluid dynamics code that employed Reynolds Averaged Navier-Stokes turbulence models was used to estimate the flow field around a turret and was compared with particle image velocimetry data for validation. The k-ω model performed better than the commonly used k-ε turbulence model when comparing the separation area and separation strength (integral of the negative streamwise component of velocity) on the center plane of a turret. The k-ε model predicted the separation area with an error of 74% and the k-ω model predicted the separation area with an error of 13%. Separation Strength was predicted with an error of 83% and 25% by the k-ε model and the k-ω model respectively. The more accurate k-ω model will be used to guide future flow control experiments.

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Date submitted: 06 Aug 2010 Electronic form version 1.4