Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

**Open Loop Forced Experimental Investigation of Optical Beam Propagation through a Free Shear Layer** CASEY FAGLEY, STEFAN SIEGEL, JURGEN SEIDEL, THOMAS MCLAUGHLIN, US Air Force Academy — The performance of airborne platforms emitting or receiving light beams is severely hampered by the flow field around the turret mounted on the air vehicle. From a fluid dynamics point of view, the flow separating from the turret develops large, coherent structures. From an optical point of view, these structures due to their associated density variations, cause large optical distortions since the index of refraction is a function of density. The goal of this research is to reduce optical distortions by mitigating these structures using feedback flow control. A blowing and suction slot along the top of the backwards facing step allows for actuation of the flow field. A study varying open loop forcing frequency and amplitude of the actuation signal shows the influence on the natural shedding frequency responsible for the large coherent structures. Initial findings support that forcing with more than twice the natural frequency does not produce structures that increase the optical path difference (OPD), measured by a Malley probe, while hot film measurements show that structures at the forcing frequency are present. The differences between these OPD and hot film measurements will be demonstrated and supported with simulation results.

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Date submitted: 07 Aug 2009 Electronic form version 1.4