

Abstract Submitted  
for the DFD09 Meeting of  
The American Physical Society

**Trailing vortices from low speed flyers**<sup>1</sup> RYE WALDMAN, JUN KUDO, KENNETH BREUER, Brown University — The structure and strength of the vortex wake behind a airplane or animal flying with a fixed or flapping wing contains valuable information about the aerodynamic load history. However, the amount of vorticity measured in the trailing vortex is not always in agreement with the known lift generated, and the behavior of these vortices at relatively low Reynolds numbers is also not well-understood. We present the results from a series of wind tunnel PIV experiments conducted behind a low-aspect ratio rectangular wing at a chord-Reynolds numbers of 30,000. In addition to wake PIV measurements measured in the cross-stream (Trefftz) plane, we measure the lift and drag directly using a six-axis force-torque transducer. We discuss how vortex size, shape, strength and position vary in time and downstream location, as well as the challenges associated with the use of PIV wake measurements to accurately determine aerodynamic forces.

<sup>1</sup>Supported by AFOSR.

Kenneth Breuer  
Brown University

Date submitted: 11 Aug 2009

Electronic form version 1.4