

Abstract Submitted  
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**The Structure of a Trailing Vortex from a Perturbed Wing** GREGORY FISHMAN, DONALD ROCKWELL, Lehigh University — The unsteady structure of a trailing vortex may be interpreted as a three-dimensional gust. Such a vortex, or gust, potentially impinges upon a follower wing positioned on or near its trajectory, thereby giving rise to unsteady buffeting of its surface and/or disruption of its flight path. Stereoscopic particle image velocimetry and a three-dimensional construction technique are employed to characterize the structure of a trailing vortex from a wing subjected to displacement perturbations in the heaving mode with an amplitude an order of magnitude smaller than the diameter of the vortex and a wavelength two orders of magnitude greater than the diameter of the vortex. This perturbation leads to relatively large undulations of axial velocity deficit within, and circulation of, the vortex. Along the axis of the vortex, these fluctuations are associated with alternating regions of low and high values of swirl ratio. This results in an internal vortex structure comprised of successive regions of instability separated by stabilized regions. These mechanisms are therefore linked to the origin of the large gust-like fluctuations of axial velocity deficit and circulation.

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