Abstract Submitted for the DFD07 Meeting of The American Physical Society

Stability of the Leading Edge Vortex on Insect Wings B. BUSH, University of Maryland, K. DURAISAMY, University of Glasgow, J. BAEDER, University of Maryland — A defining characteristic of the flowfield associated with insect flight is a stable leading edge vortex that persists over a majority of the flapping stroke. While it is known that spanwise flow, coupled with the effect of wing rotation and interaction with the tip vortex can result in stability, the specific mechanisms by which this stability is achieved have not been clearly identified. Towards a clarification of this issue, two idealized cases are computationally simulated. First, computations of the flow over a rectangular plate in linear translation are compared with experimental data to provide both code validation and a basis for comparison with the rotational cases. Secondly, a model wing, similar in planform to a fruit fly (Drosophila), is simulated both in steady translation and in an impulsively started steady rotation at a constant angle of attack. The stability of the resulting vortex system is compared against the translational cases at various Reynolds numbers and angles of attack to better understand the role that rotation and planform shape play in the leading edge vortex development and stability.

> Brandon Bush University of Maryland

Date submitted: 08 Aug 2007

Electronic form version 1.4