Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Lift production through asymmetric flapping SHREYAS JALIKOP, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, K.R. SREENIVAS, Jawaharlal Nehru Centre for Advanced Scientific Research —
At present, there is a strong interest in developing Micro Air Vehicles (MAV) for applications like disaster management and aerial surveys. At these small length scales, the flight of insects and small birds suggests that unsteady aerodynamics of flapping wings can offer many advantages over fixed wing flight, such as hovering-flight, high maneuverability and high lift at large angles of attack. Various lift generating mechanims such as delayed stall, wake capture and wing rotation contribute towards our understanding of insect flight. We address the effect of *asymmetric* flapping of wings on lift production. By visualising the flow around a pair of rectangular wings flapping in a water tank and numerically computing the flow using a discrete vortex method, we demonstrate that net lift can be produced by introducing an asymmetry in the upstroke-to-downstroke velocity profile of the flapping wings. The competition between generation of upstroke and downstroke tip vortices appears to hold the key to understanding this lift generation mechanism.

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Date submitted: 11 Aug 2009 Electronic form version 1.4