

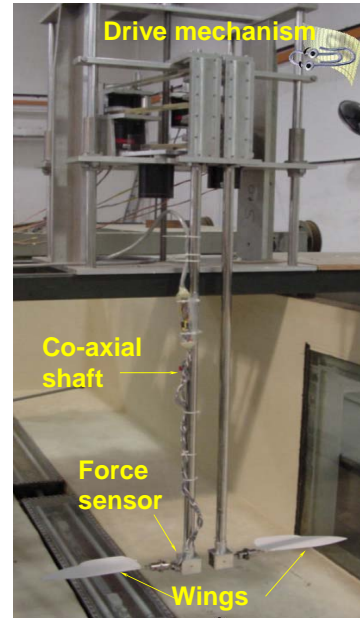
Unsteady Aerodynamics of Micro Flyers

Objective : To study aerodynamic force characteristics of 3-D flapping wings.

Relevance : Micro Air Vehicle

Method : Studies are conducted using 3-D flapping mechanism with built-in force sensor capable of measuring forces in 2 axes and moments in 3 axes. The mechanism can execute any predetermined flapping motion.

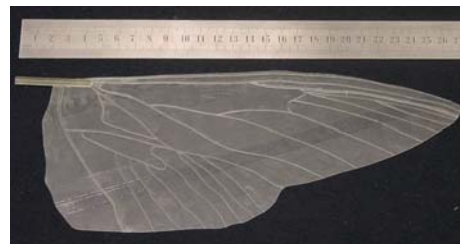
Here, we measure aerodynamic forces acting on a hawkmoth-like wing executing hawkmoth hovering motion.



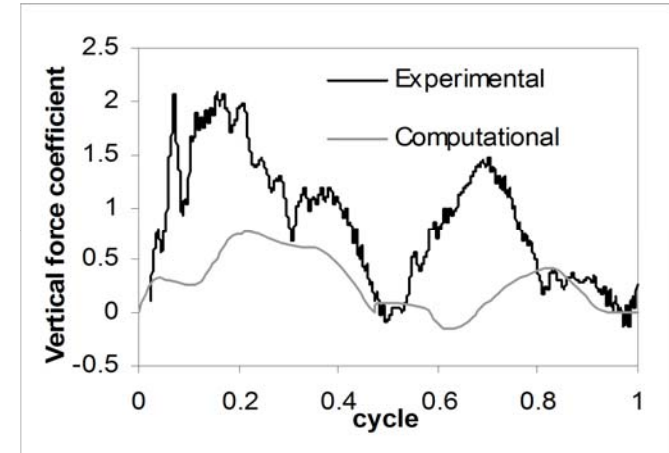
3-D Flapping Mechanism



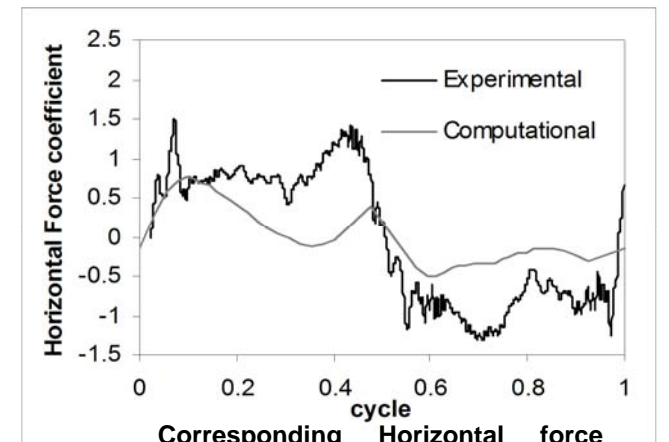
The hawkmoth *Manduca sexta*.
(courtesy of Armin Hinterwirth; Dept of Biology, University of Washington)



The hawkmoth *Manduca sexta* wing planform.



Vertical force coefficient (parallel to gravity) of a rigid hawkmoth-like wing executing hawkmoth hovering motion



Corresponding Horizontal force coefficient.

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