



## Flight of the Fruit Fly

There comes a time in each of our lives where we grab a thick section of the morning paper, roll it up and set off to do battle with one of nature's most accomplished aviators - the fly. If however, instead of swatting we could magnify our view and experience the world in slow motion we would be privy to a world-class ballet full of graceful figure-eight wing strokes, effortless pirouettes, and astonishing acrobatics. After watching such a magnificent display, who among us could destroy this virtuoso? How do flies produce acrobatic maneuvers with such precision? What control mechanisms do they need to maneuver? More abstractly, what problem are they solving as they fly? Despite pioneering studies of flight control in tethered insects, robotic wing experiments, and fluid dynamics simulations that have revealed basic mechanisms for unsteady force generation during steady flight, the answers to these questions remain elusive. In this talk I will discuss our strategy for investigating these unanswered questions. I will begin by describing our automated apparatus for recording the free flight of fruit flies and our technique called Hull Reconstruction Motion Tracking (HRMT) for backing out the wing and body kinematics. I will then show that these techniques can be used to reveal the underlying mechanisms for flight maneuvers, wing actuation, and flight stability. Finally, I will comment on the implications of these discoveries for investigations aimed at elucidating the evolution of flight.

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