

Abstract Submitted
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Roll Dynamics in a Free Flying Dragonfly JAMES MELFI, Cornell University, ANTHONY LEONARDO, Janelia Farms Research Campus, Z. JANE WANG, Cornell University — Dragonflies are capable of executing fast turning maneuvers. A typical free-flight maneuver includes rotations in all three degrees of freedom; yaw, pitch, and roll. This makes it difficult to identify the key changes to wing kinematics responsible for controlling each degree of freedom. Therefore we focus on a single motion; roll about the body longitudinal axis in a combined experimental and computational study. To induce rolling, a dragonfly is released from a magnetic tether while inverted. Both wing and body kinematics are recorded using multiple high speed cameras. The kinematics are replayed in a computer simulation of the flight, with forces and torques based on quasi-steady aerodynamics. By examining the effect of each kinematic change individually, we determine the key changes a dragonfly uses to both instigate, maintain, and end a rolling motion.

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