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Effect of shape on wing kinematics control in dragonfly maneuvering flight[1] AYODEJI BODE-OKE, SAMANE ZEYGHAMI, HAIBO DONG, University of Virginia, FSRG TEAM — Flying insects execute aerial maneuvers through fine modulations in their wing kinematics. It's yet not known that to what extend the wing kinematics can be controlled and altered by the insect. To investigate the question, we recorded a yaw turn maneuver of a dragonfly in free flight. Our measurements show that this flight consists of two kinematically and dynamically distinct phases; acceleration and deceleration. In a systematic study, we first clipped the left forewing and then the right forewing of the same dragonfly and recorded its yaw turn maneuver. The signatures (in kinematics and dynamics) of the two identified phases stay unchanged by wing damage but the duration of both phases extends. The rotational velocity of the body drops dramatically by wing damage which implies the dragonfly is incapable of controlling the wing kinematics to achieve similar performance as in the intact wing. Our results suggest that the wing kinematics control is tightly influenced by the wing shapes and the aerodynamics of flapping flight.

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