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Passive Wing Rotation in Dragonfly Flight ATTILA BERGOU, SHENG XU, Z. JANE WANG, Cornell University — We study the aerodynamic force, torque and power calculated from wing kinematics measured for a tethered dragonfly, *Libellula pulchella*. This is done using two methods – by directly solving the Navier-Stokes equations employing the 2D immersed interface method, and a quasi-steady ODE model. Of considerable interest in our results is the wing pitch reversal, the rapid change of angle of attack near stroke transition. Past work has found that this sudden pitching of the wing can play a significant role in lift production during flight, as well as the ability of the insect to maneuver effectively during flight. By analyzing the power requirements of the motion, we find strong evidence that the wing is turned by the fluid torque and requires no additional external power. This passive mechanism for wing rotation suggests an efficient method for reversing wing pitch in flapping flight.

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