

Abstract Submitted  
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**Rotational timing and the alteration of aerodynamic forces in insect flight** Y. SUDHAKAR, Research Scholar, S. VENGADESAN, IIT Madras, Chennai -36 — Delayed pronation and advanced supination enable the insects using inclined stroke plane motion to generate forces substantially higher than those predicted using quasi-steady aerodynamic principles. Insects, by controlling the timing of wing rotation, subtly modulate the magnitude and direction of aerodynamics forces generated by them, and can perform complex aerial maneuvers by adjusting the timing of rotation in each wing independently. The goal of the present study is to investigate the fluid dynamic changes and the corresponding alterations in forces generated by their flapping wings. The Immersed Boundary Method is used to simulate the flow field over a 2D flat plate of thickness ratio 0.02 undergoing prescribed wing kinematics along the  $45^0$  inclined stroke plane at  $Re=100$ . The pronation and supination timings are varied independently and the influence of these changes on the force production is investigated. In all the simulations, the downstroke and upstroke angle of attack are held constant.

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