

Abstract Submitted  
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**The effect of chordwise flexibility on flapping foil propulsion in quiescent fluid** SACHIN SHINDE, JAYWANT ARAKERI, Indian Institute of Science, Bangalore-12 — Motivated to understand the role of wing flexibility of flying creatures during hovering, we experimentally study the effect of chordwise flexibility on the flow generated in quiescent fluid by a sinusoidally pitching rigid symmetrical foil with a flexible flap attached at the trailing edge. This foil produces a narrow, coherent jet containing reverse Karman vortex street, and a corresponding thrust. The thrust and flow is similar to that produced by a hovering bird or insect, however the mechanism seems to be different from known hovering mechanisms. Novelty of the present hovering mechanism is that the thrust generation is due to the coordinated pushing action of rigid foil and flexible flap. We identify the flow and vortex generation mechanism. This foil produces jet flows over a range of flapping frequencies and amplitudes. In contrast, the foil without flap i.e. with rigid trailing edge produces a weak, divergent jet that meanders randomly. Appending a flexible flap to the foil suppresses jet-meandering and strengthens the jet. Flexibility of flap is crucial in determining the flow structure. This study is useful in designing MAVs and thrusters.

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