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**WITHDRAWN: Vortical structures generated by wings performing single flap motions** LAURA GUGLIELMINI, PAOLO BLONDEAUX, University of Genoa, MICHAEL TRIANTAFYLLOU, Massachusetts Institute of Technology — Experiments on swimming fish reveal that they often make simple flap of their tail, or two flaps in quick succession, to change direction or rapidly accelerate, with the so called fast- starting and rapid maneuvers. These have the effect of producing individual vortices with ‘optimal’ characteristics, that is vortices which have maximum efficiency, in the sense of maximum thrust for a given expenditure of energy. It has been suggested that in this like in other biological systems the same principles of optimal vortex ring formation discovered in laboratory experiments occur. In the present work we study numerically the flow fields generated by short aspect ratio foils performing biologically inspired kinematics, like aperiodic, single or double stoke motions. We concentrate on the comprehension of the complex dynamics of the vortical structures shed in the flow and on the evaluation of the forces acting on the foil. We also consider different foil geometries, rectangular, elliptical and lunate cross-sections, to get some insight into the apparent evolutionary convergence of the fish tail towards a lunate form and/or suggest different forms able to give optimal efficiency.

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