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Vortex Formation in the Starting Flow of Rotating Low-Aspect-Ratio Plates ADAM DEVORIA, MATTHEW RINGUETTE, State University of New York at Buffalo — We investigate the unsteady flow of fish fin-like plates accelerating from rest through various angular velocity profiles. The objective is to gain an understanding of the connection among the prescribed kinematics and resulting vortex formation; a relationship which has not currently been thoroughly explored. The root-to-tip flow that is induced by the plate motion is expected to have significant effects on the vortex formation. Additionally, different plate shapes are studied to compare the effects of geometrical changes. The experiments are conducted in a water tank, and the plates have a fixed axis of rotation. Digital particle image velocimetry (DPIV) is used to measure the flow velocity in a symmetry plane through the plates. Vorticity and circulation are subsequently computed and vortices are distinguished from surrounding flow structures using vortex identification schemes. Carefully incorporating these techniques will aid the development of scaling laws to characterize the vortex formation with maximum attainable vortex strength.

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