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3D vortex formation of drag-based propulsors DAEGYOUM KIM, MORTEZA GHARIB, California Institute of Technology — Three dimensional vortex formation mechanism of impulsively rotating plates is studied experimentally using defocusing digital particle image velocimetry. The plate face is normal to the moving direction to simulate drag-based propulsion and only one power stroke is considered. In order to compare the effect of shape on vortex generation, three different shapes of plate (rectangular, triangular and duck's webbed-foot shapes) are used. These three cases show striking differences in vortex formation process during power stroke. Axial flow is shown to play an important role in the tip vortex formation. Correlation between hydrodynamic forces acting on the plate and vortex formation processes is described.

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