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Investigating wake patterns and propulsive frequencies of a flat plate under pitching motion. JOSEPH MOUBOGHA MOUBOGHA[1], JACQUES ANDRE ASTOLFI[2], French Naval Academy Institute - IRENav — Fundamental mechanisms of swimming are explored using a simple geometry device - flat plate - in pure-pitching motion in a hydrodynamic tunnel. The experiments are carried out at different Reynolds numbers based on the plate length c. Pitching motion is generated for reduced frequencies k between 0 and 2 and for an angular amplitude of 10 deg. Velocity fields are obtained in the wake of the plate using Particle Image Velocimetry and measurements of drag coefficients are estimated from mean velocity profiles. This study confirms the occurrence of a threshold oscillation frequency beyond which the plate enters a propulsive regime and the wake features organized structures. In this case an inversion of the typical Karman vortex street is observed. The evolution of mean transverse velocity profiles in the wake of the plate shows that the usual wake profile with velocity deficit - plate with drag - can be transformed into a jet - plate with thrust - above a certain reduced frequency.

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