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Hydrodynamics of penguin wing models FLAVIO NOCA, hepia, NHUT CUONG DUONG, EPFL, JEROME HERPICH, hepia — The three-dimensional kinematics of penguin wings were obtained from movie footage in aquariums. A 1:1 scale model of the penguin wing (with an identical planform but with a flat section profile and a rigid configuration) was actuated with a robotic arm in a water channel. The experiments were performed at a chord Reynolds number of about 10^4 (an order of magnitude lower than for the observed penguin). The dynamics of the wing were analyzed with force and flowfield measurements. The two main results are: 1. a net thrust on both the upstroke and downstroke movement; 2. the occurence of a leading edge vortex (LEV) along the wing span. The effects of section profile, wing flexibility, and a higher Reynolds number will be investigated in the future.

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