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Volumetric PIV Behind a Flapping Wing in an Incoming Vortex Flow OSCAR CURET, CYNDEE FINKEL, KARL VON ELLENRIEDER, Florida Atlantic University, DANIEL BISSELL, TSI — The propulsive surfaces of flying and swimming animals interact with vortices shed by their own bodies or other animals, if they are traveling in groups. The interaction of the propulsive surface with these structured vortices might be fundamental for stability and/or decreasing the cost of transport. In this work, we investigate the wake generated by a flapping wing in an incoming vortex flow. We used a NACA0012 wing model with aspect ratio of 2, and a d-profile cylinder to generated the incoming vortices. The model was tested in a water channel at a Reynolds number of approximately 10,000, which is relevant to many biological swimmers and flyers. The flow structure generated by the flapping wing was measured using three-dimensional Particle Image Velocimetry (3-D PIV). A series of experiments were performed for different Strouhal numbers, $St = fL/U$, where f is the flapping frequency, L is the amplitude of oscillation, and U is the incoming flow speed. We present the 3-D flow field of the flapping wing in an incoming vortex flow and compare it with the structure of a flapping wing with an undisturbed incoming flow.

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