



## FLOW STRUCTURES IN THE NEAR-WAKE OF A WING PITCHING UP IN STEADY CURRENT

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### KEYWORDS:

**Main subjects:** bio-inspired flows, flow visualization

**Fluid:** low-speed aerodynamics

**Visualization method(s):** DPIV

**Other keywords:** leading edge vortex, flow structure interaction, image processing

**ABSTRACT:** The flow fields in the near wake of a wing undergoing a pitch up motion has been investigated using a Digital Particle Image Velocimetry (DPIV) system. The wing has an aspect ratio of 4 or 6, pitches up to 45° for different durations of motion, in the presence of steady current with a Reynolds number of 10 000. The wing is either a rectangular plate or an SD7003 airfoil. For the rectangular plate cases, the effect of both sharp and rounded edges has been investigated. Finally the pivot point is another parameter of the study; the wing rotates around either the leading edge or quarter chord from. The evolution of the flow structures has been studied for the aforementioned cases and the effect of the selected parameters has been identified.

In Figure 1, the flow structures are visualized for a wing of rectangular cross section with either a sharp or rounded edges, at the end of its pitch up motion which is achieved in one or six chord lengths of travel relative to fluid, around its leading edge or quarter chord from.

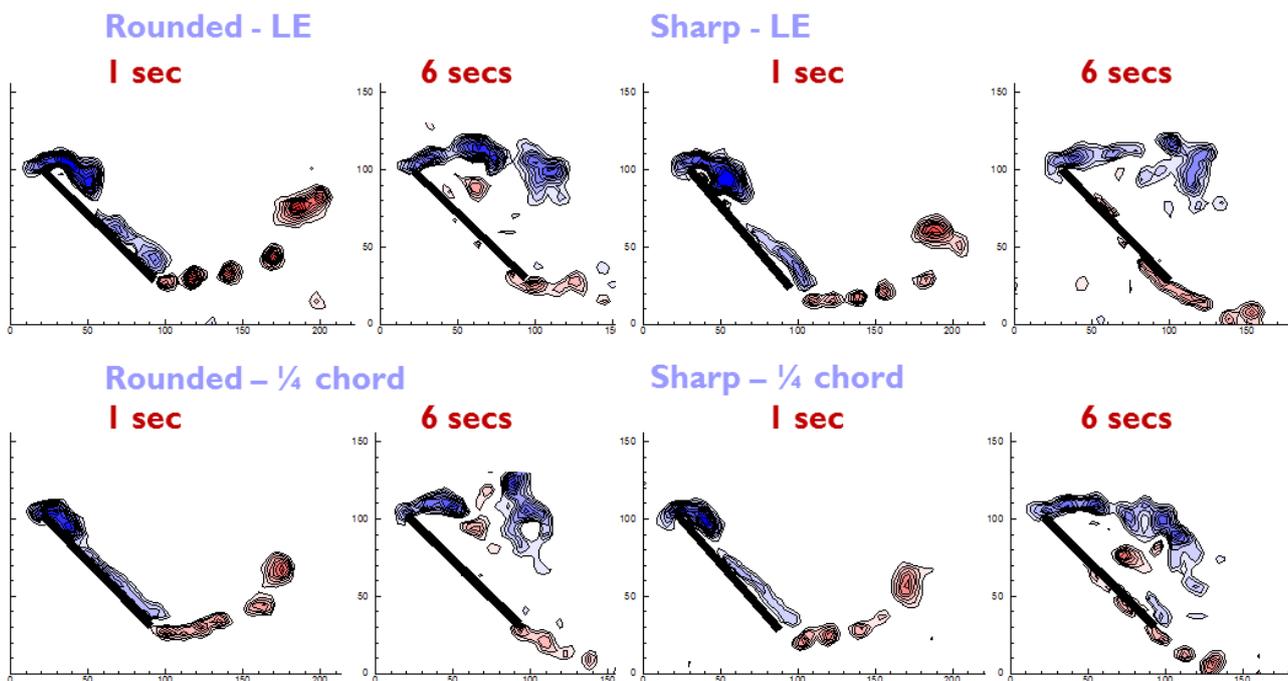


Fig. 1 Preliminary results for a rectangular plate