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Effect of low-amplitude vibrations on impulsively-started wings[1]
JESSICA SHANG, HOLGER BABINSKY, University of Cambridge — The development and shedding of leading edge vortices (LEVs) over wings is crucial to lift generation in the flapping flight of birds and insects. Many studies have investigated the flow field empirically by means of wing models that approximate or reproduce the wing kinematics. Wing models are often made of stiff materials (e.g. aluminum, steel) or are intentionally flexible to examine aeroelastic properties. However, even stiff wings will vibrate under forces induced by accelerations, which may modify the flow field and the LEV shedding frequency. This study investigates the effects of start-up vibrations of impulsively started flat plates of different materials (Re = 60,000) at a post-stall angle of attack. Wing vibration was recorded with high-speed imaging and the flow field was analyzed with particle image velocimetry. Results do not eliminate the possibility of lock-on between the wing's natural frequency and the LEV shedding frequency.

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