

Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Flow Structure and Forces on an Airfoil Pitching Asymmetrically at High Reduced Frequency¹ PATRICK HAMMER, AHMED NAGUIB, MANOOCH EHR KOOCHESFAHANI, Michigan State University — Previous experimental work has shown that non-sinusoidal oscillation of a pitching airfoil can greatly alter the vortical flow structure in the wake. The current study focuses on characterizing the corresponding changes in the resulting force on the airfoil. High-order computations are carried out using the FDL3DI solver developed by Visbal's group at the Air Force Research Laboratory. We will describe the influence of various computational parameters on the ability to capture with high fidelity the vortical flow structure observed experimentally. Results will be presented for the history of lift and drag forces on the airfoil, along with their mean values, and their connection to the motion history.

¹This work was supported by AFOSR grant number FA9550-10-1-0342.

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Date submitted: 01 Aug 2013

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