

Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Unsteadiness of Flow Structure on Low Swept Delta Wing¹ MOHAMMADREZA ZHARFA, ILHAN OZTURK, MEHMET METIN YAVUZ, Middle East Technical University — The flow structure of low-sweep 35 degree delta wing has been analyzed experimentally using flow visualization and flow measurement techniques. Laser illuminated smoke visualization, Laser Doppler Anemometry (LDA), and surface pressure measurements are performed to understand the steady and unsteady behavior of the flow regimes. Reynolds number varying from 10,000 to 100,000 and attack angles varying from 3 to 10 are tested. For the corresponding Reynolds Numbers and attack angles, prestall and poststall regimes are identified. The amplitude and frequency of the pressure and velocity fluctuations at different locations are compared with the regions of reattachment, vortex breakdown, and stall. Using statistics and spectral analysis, the unsteadiness of flow is studied in detail. Both the lift performance of the wing and the regions possibly exposed to surface buffeting are tried to be interpreted. Using the results of the study, an effective active flow control strategy to delay stall and to reduce surface buffeting is going to be determined next.

¹The project was supported by the Turkish Scientific and Technological Research Council of Turkey (3501 - 111M732).

Mohammadreza Zharfa
Middle East Technical University

Date submitted: 01 Aug 2013

Electronic form version 1.4