Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Force generation in transient deployment of square or triangular flat panels in the presence of a wall[1] ALEXIS PIERIDES, YIANNIS ANDREOPOULOS, City College of CUNY — We investigate the force generated by square or tringular flaps hinged at the wall beneath a flow during their transient deployment with an angular velocity between 10 and 100 rad/s. The objective of this study is to understand the mechanisms of unsteady flapping-wings motion and the system of vortices generated. The transient flow field has been simulated experimentally in a low speed wind tunnel and computationally by using CFD with moving boundaries capabilities. The results indicated that all lift and drag force coefficients during the transient deployment are different than the corresponding coefficients under stationary conditions at the same deployment angle after adjusting for inertial effects. These dynamic effects depend on the Strouhal number which can be considered as the ratio the Stokes to Reynolds number of the flow. It was found that these effects are augmented with increasing Strouhal number and decrease with increasing boundary layer thickness. Reasonable agreement has been found between computational and experimental data.

[1]The work is supported by ARO Grant # W119NF-04-3229.

Yiannis Andreopoulos
City College of CUNY

Date submitted: 11 Jul 2007 Electronic form version 1.4