Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Vortex shedding and aerodynamic performance of an airfoil with multi-scale trailing edge modifications JOVAN NEDIC, J. CHRISTOS VASSILICOS, Imperial College London — An experimental investigation was conducted into the aerodynamic performance and nature of the vortex shedding generated by truncated and non-flat serrated trailing edges of a NACA 0012 wing section. The truncated trailing edge generates a significant amount of vortex shedding, whilst increasing both the maximum lift and drag coefficients, resulting in an overall reduction in the maximum lift-to-drag ratio (L/D) compared to a plain NACA0012 wing section. By decreasing the chevron angle (ϕ) of the non-flat trailing edge serrations (i.e. by making them sharper), the energy of the vortex shedding significantly decreases and L/D increase compared to a plain NACA0012 wing section. Fractal/multi-scale patterns were also investigated with a view to further improve performance. It was found that the energy of the vortex shedding increases with increasing fractal iteration if the chevron is broad ($\phi \approx 65°$), but decreases for sharper chevrons ($\phi = 45°$). It is believed that if ϕ is too big, the multi-scale trailing edges are too far away from each other to interact and break down the vortex shedding mechanism. Fractal/multi-scale trailing edges are also able to improve aerodynamic performance compared to the NACA 0012 wing section.

Jovan Nedic
Imperial College London

Date submitted: 29 Jul 2014 Electronic form version 1.4