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Direct Numerical Simulations of Aerofoils with Serrated Trailing-Edge Extensions MUHAMMAD FARRUKH SHAHAB, MOHAMMAD OMIDYEGANEH, ALFREDO PINELLI, Department of Mechanical and Aeronautical Engineering, City University of London. UK — Owl-feather-inspired technology motivates engineers to develop quieter wings. Direct numerical simulations of NACA-4412 aerofoil with retrofitted flat plate, serrated sawtooth shaped and porous (serrations with filaments) extensions have been performed to study the effects of these modifications on the hydrodynamic characteristics of the turbulent wake and their upstream influence on the interacting boundary layer. A chord based Reynolds number of 100,000 and an angle of attack of 5° has been chosen for all simulations, moreover the surface boundary layers are tripped using a a volume forcing method. This contribution will present a detailed statistical analysis of the mean and fluctuating behaviour of the flow and the key differences in the flow topologies will be highlighted. . The preliminary analysis of results identifies a system of counter rotating streamwise vortices for the case of saw-tooth shaped serrations. The presence of the latter is generally considered responsible for an increased parasitic higher frequency noise for serrated aerofoils. To palliate the effect of aforementioned system of streamwise vortices, a filamentous layer occupying the voids of the serrations has been added which is expected to improve the aeroacoustic performance of the system.

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