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Wake development and control for an airfoil with blunt and divergent trailing edge M. EL GAMMAL, H. HANGAN, The Boundary Layer Wind Tunnel Laboratory, The University of Western Ontario, B.E. THOMPSON — The wake development downstream of an airfoil with a blunt and divergent trailing edge is experimentally investigated with conventional hot-wire anemometry. Two distinct wake development regions are identified. (i) a near-wake region where the vortex shedding is robust, the wake is highly asymmetric and the wake mean flow direction is curved; (ii) a far-wake region where momentum thickness reaches an asymptotic value, distributions of mean flow and turbulence quantities are almost symmetric, curvature of the mean flow becomes negligible and self-preserving state is reached. The effect of attaching rectangular vortex generators to the pressure and suction sides of the blunt trailing edge on the vortex shedding phenomena is quantified. The results clearly indicate vortex shedding suppression when the vortex generators are placed at a distance that equals twice the integral length scale in the spanwise direction. Based on these results, it is concluded that the streamwise components of the horseshoe vorticies generated by the vortex generators are responsible for the early suppression of the von Karman rolls; hence weakening the vortex shedding and accelerating the flow transition toward the far wake state. The effectiveness of this mechanism depends on the vortex generators placement in the spanwise direction.

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