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Aerodynamic and Aeroacoustic Tests of a Flatback Version of the DU97-W-300 Airfoil

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Abstract

Results from an experimental study of the aerodynamic and aeroacoustic properties of a flatback version of the TU Delft DU97-W-300 airfoil are presented. Measurements were made for both the original DU97-W-300 and the flatback version. The chord Reynolds number varied from 1.6×10^6 to 3.2×10^6 . The data were gathered in the Virginia Tech Stability Wind Tunnel, which includes a special aeroacoustic test section to enable measurements of airfoil self-noise. Corrected wind tunnel aerodynamic measurements for the DU97-W-300 are compared to previous solid wall wind tunnel data and are shown to give good agreement. Force coefficient and surface pressure distributions are compared for the flatback and the original airfoil for both free-transition and tripped boundary layer configurations. Aeroacoustic data are presented for the flatback airfoil, with a focus on the amplitude and frequency of noise associated with the vortex-shedding tone from the blunt trailing edge wake. The effect of a splitter plate trailing edge attachment on both drag and noise of the flatback airfoil is also investigated.