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DES of Turbulent Flow Past a Wall-Mounted Wing

JOONGCHEOL PAIK, Georgia Institute of Technology, FOTIS SOTIROPOULOS
— In a pioneering experimental study, Devenport and Simpson (J. Fluid Mech. Vol. 210, p. 23, 1990) showed experimentally that the horseshoe vortex system in the leading edge region of a symmetric wing mounted on a flat plate is dominated by low-frequency, coherent unsteadiness. These slowly evolving coherent vortices were shown to account for a considerable portion of the total production of turbulence kinetic energy and to give rise to bi-modal velocity pdfs. We carry out Detached Eddy Simulation (Spalart et al. in Advance in DNS/LES, 1997) of the flow past the Devenport and Simpsons wing using an overset grid approach that locally embeds fine mesh resolution in the vicinity of the horseshoe vortex system. The computed results confirm the experimental findings concerning the low frequency, rich dynamics of the horseshoe vortex system. Detailed quantitative comparisons with the measurements and analysis of the 3D structure of the coherent structures in the flow will be presented at the conference.

Liang Ge
Georgia Institute of Technology

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