

Investigations of Turbulent Flow over Solid Wavy Boundary

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Abstract

The flows over a wavy wall play quite important roles in engineering and scientific applications. Since wavy wall can increase boundary's surface and speed up radiation, therefore wavy wall flows can be applied in the area of heat conduction. Moreover a concave-convex thin film coating was developed and applied on the external surface of an Airbus A320 test airplane. The experiment results indicate that a surface coverage of 70% could achieve a fuel savings of 1-2%. In the direct simulation methods of supersonic and subsonic flows over a wavy wall, Weighted Essentially Non-Oscillatory by the compressible flow domain was selected to solve Navier-Stokes equation. And the LU-SSOR method was applied to increase numerical stability and converging of the formula. A good agreement was found between simulation analysis results based on the WENO method and the experimental values and compare with Tsai[1], Kim[2] and Cherukat et al.[3]. The simulation analysis of supersonic and subsonic has accurately predicted the fluid separation and superposition of the return flow in the wavy wall downhill areas. Comparison with supersonic and subsonic flow over a wavy wall streamwise velocity distribution, spanwise velocity distribution, streamline velocity distribution, pressure curve etc.

Keyword : Keywords: Wavy wall, Supersonic, Subsonic, WENO scheme.