Numerical simulation of three-dimensional turbulent separated and reattaching flows using a modified turbulence model

鄭藏勝,楊偉仁
Mechanical Engineering
Engineering
tscheng@chu.edu.tw

Abstract

A modified version of k-ε model is proposed through modification of the damping function of eddy viscosity that incorporates the effect of wall proximity in the near the wall region and the effect of non-equilibrium away from the wall together with the simple model functions in the ε equation. The proposed turbulence model is validated with the available experimental data of reattachment length, mean streamwise velocity distribution, turbulence intensity profile, and wall static pressure coefficient in the turbulent backward-facing step flows. The predicted results with the present model are in good agreement with the experiments. Computed results reveal that the reattachment length (recirculation zone) and the wall static pressure are decreased with increasing inlet velocity. And the asymmetric distributions of the reattachment point, cross-section view of velocity vector, streamwise skin friction coefficient, and turbulent kinetic energy demonstrate the important three-dimensional side-wall effect in an insufficient aspect ratio channel flow.

Keyword：Turbelence model, Wall damping function, Backward-facing step flow,

Reattachment length