The Low-Reynolds-Number Turbulence Model of Compressible Flow

邱聖棻、謝其源

E-mail: 8812467@mail.dyu.edu.tw

ABSTRACT

The purpose of this work is to discuss the analysis of Low-Reynolds-Number turbulent model for compressible flow. In order to overcome the difficulty of complex geometry and complexity within the boundary layer , the robust Low-Reynolds-Number turbulence model is used. Due to the viscous sublayer , the near wall grid is very fine . This causes the problem of convergence. Therefore the numerical scheme is extremely important. For laminar flow, the implicit、LU-SSOR、time marching and finite volume method is taken. For turbulent flow, the finite difference 、implicit、 ADI and LU scheme is used to figure out the turbulent viscous effect. The turbulent viscous effect is then employed to modify the original governing equation. The final convergent result is the turbulent flow solution. Finally, the numerical solution is compared with theoretical result. The comparisons of the boundary layer thickness and drag coefficient between numerical and theoretical solutions are quite well. This proves that the numerical scheme is quite acceptable. And the turbulence effect is important as far as the drag is concerned.

Keywords : compressible flow ; turbulence effect ; turbulence model ; robust low-reynolds-number turbulence model ; CFD

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