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用隐式多重网格法计算三维粘性流动

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COMPUTING THE THREE DIMENSIONAL VISCOUS FLOWS WITH THE IMPLICIT MULTIGRID METHOD

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摘要

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摘要

求解高雷诺湍流流动时, 边界层法向网格间距较流向和展向相比非常小, 因此边界层中存在高度伸缩的网络, 这将大大降低多重网格的求解效率。通过协调的处理多重网格过程的各个细节, 既提高了解的精度, 又克服了网格展弦比的影响, 使得计算效率提高了6~7倍。

关键词: 计算网格 纳维-斯托克斯方程 计算流体动力学

Abstract:

Extremely fine meshes are required to resolve the flow in the thin shear layer regions present in high Reynolds number turbulent flows. In addition, such fine spacings normal to the body surfaces result in very high aspect ratio cells in the shear layers, which generally degrades the efficiency of the multigrid scheme. Details of the acceleration techniques, which are important for convergence on meshes with such high aspect ration cells, are discussed. The multigrid technique developed here is shown to result in a significant reduction in computer time to achieve converged solutions, as compared to the basic diagonalized Beam Warming schemes.

Keywords: computational gr ids Navier-Stokes equation computat ional fluid dynamics

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