航空学报
ACTA AERONAUTICA ET ASTRONAUTICA SINICA
ISSN 1000-6893
CN 11-1929/V

航空学报 » 1996, Vol. 17 » Issue (1) :9-17 DOI:

模拟高度复杂流动的自适应网格算法

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AN ADAPTIVE-GRID ALGORITHM FOR COMPUTING HIGH SPEED COMPLEX FLOWS

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摘要 提出一种基于对等弧分布律进行扭转修正的自适应网格算法。该方法将三维网格系统分裂为3个单方向自适应网格子系统，在计算中与主控方程的求解格式相耦合，交替地使用。应用所构造的算法结合MacCormack显式格式对喷流/绕流干扰流场进行了雷诺平均N－S方程模拟，给出了清晰的剪切层与激波波系结构。计算结果表明，该自适应网格算法可较大程度地提高MacCormack格式的分辨率。

关键词： 纳斯-斯托克斯方程 喷射混合流 高分辨率 数值分析

Abstract： The present paper present an adaptive-grid technique based on a torsion-correction of the arc-equidistribution principle. The technique splits a three-dimensional grid system into a set of three unidimensional,adaptive grid subsystems.By coupling with the governing equation solver,the grid system is generated adaptively using an alternative direction procedure in accordance with some specified local-scaling criteria based on the gradients of certain flow variables. The technique is applied in conjunction with MacCormack's explicit scheme to simulate the jet/external flow interaction using Reynolds averaged Navier-Stokes equations.The computations yield comparatively high resolutions to those flow structures of the shear layers as well as the shock systems,which demonstrates that the present technique can increase substantially the resolution of the MacCormack Scheme.

Keywords： Navier-Stokes equation jet mixing flow high resolution numerical analysis

Received 1993-12-13; published 1996-02-25

引用本文:

李椿萱;杨弘炜. 模拟高度复杂流动的自适应网格算法[J]. 航空学报, 1996, 17(1): 9-17.

Li Chunxuan;Yang Hongwei. AN ADAPTIVE-GRID ALGORITHM FOR COMPUTING HIGH SPEED COMPLEX FLOWS[J]. Acta Aeronautica et Astronautica Sinica, 1996, 17(1): 9-17.