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

航空学报 » 1996, Vol. 17 » Issue (6) :21-25 DOI:

非结构网格下Euler方程的高分辨率高精度解

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HIGH RESOLUTION AND HIGH ORDER ACCURATE FINITE VOLUME SOLUTION OF EULER EQUATIONS ON UNSTRUCTURED MESHES

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摘要 提出了一种非结构网格下求解Ｅｕｌｅｒ方程的高分辨率高精度迎风格式。以Ｒｏｅ的矢通量差分分裂为基础，吸收了ＮＮＤ格式的优点，使其具有捕捉激波和滑移线的良好性能；在时间方向上采用Ｊａｍｅｓｏｎ的Ｒｕｎｇｅ－Ｋｕｔａ积分，并结合局部最大时间步长和残差光滑技术加速收敛。最后成功地完成了二维平板激波反射、跨音速Ｌａｖａｌ喷管内的流动和ＧＡＭＭ超音速前台阶绕流等算例，显示了该方法的有效性

关键词： 欧拉运动方程 网格生成 有限体积法 龙格－库塔法

Abstract： A High resolution and high order accurate upwind scheme is presented for solving Euler equations on unstructured meshes. The spatial discretization is accomplished by a cell centered finite volume formulation using Roe s characteristic based flux difference splitting.High order accuracy is achieved by a multidimensional linear reconstruction process. Solutions are advanced in time by a four stage Runge Kutta time stepping scheme with convergence accelerated to steady state by local time stepping and implicit residual smoothing. This approach ensures good shock capturing properties and produces sharp tangential discontinuities without oscillations. Numerical examples to illustrate the performance of the proposed schemes are given.

Keywords： Euler equation of motion grid generation(mathematic) finite volume theory Runge-Kutta method

Received 1995-06-05; published 1996-12-25

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沈孟育;曾扬兵;王保国;刘秋生. 非结构网格下Euler方程的高分辨率高精度解[J]. 航空学报, 1996, 17(6): 21-25.

Shen Mengyu;Zeng Yangbing;Wang Baoguo;Liu Qiusheng. HIGH RESOLUTION AND HIGH ORDER ACCURATE FINITE VOLUME SOLUTION OF EULER EQUATIONS ON UNSTRUCTURED MESHES[J]. Acta Aeronautica et Astronautica Sinica, 1996, 17(6): 21-25.