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<< ◀◀ 前一篇 | 后一篇 ▶▶ >>

解对流扩散方程的有限元逆风因子法

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A FINITE ELEMENT SCHEME FOR SOLVING CONVECTION-DIFFUSION EQUATIONS--UPWIND FACTOR METHOD

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摘要 本文提出了一种解对流扩散方程的有限元逆风因子法。这种格式的数值解的稳定性很强,计算收敛速度很快,所引入的虚假扩散较少。一系列的数值试验证实了上述结论。

关键词：

Abstract： As a finite element scheme to solve convection-diffusion equations, the upwind factor method is presented, which introduces an optimum upwind factor to ensure the stability at any Peclet number. It neither changes the location of Gauss points along the stream line, nor adopts unsymmetri-cal shape function to discretize the convection term. It features simplicity in concept, efficiency in convergence, rather high accuracy and stability since it introduces the artificial diffusion necessary not only for the stability but also for the accuracy of computation.Numerical experiments demonstrate that the scheme is very robust at any Peclet number, it converges very fast with relaxation factor up to 1.0, and the scheme introduces less false diffusion than Spalding's, so its results approximate to the analytical ones.

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