

Darcy-Stokes问题的统一稳定化有限体积法分析

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ANALYSIS OF A UNIFIED STABILIZED FINITE VOLUME METHOD FOR THE DARCY-STOKES PROBLEM

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全文: PDF (373 KB) HTML (1 KB) 输出: BibTeX | EndNote (RIS) 背景资料

摘要

本文对Darcy-Stokes问题提出了一种统一的稳定化有限体积法. 在离散问题中, 采用两种剖分, 一种为三角形剖分, 一种为其对偶四边形剖分. 速度及压力分别采用非协调线性元及分片常数元来做逼近. 经证明, 文中的统一格式, 具有稳定性及最优误差估计. 最后用数值算例验证了本文的理论结果.

关键词: 有限体积法 Darcy-Stokes问题 稳定化

Abstract:

A unified stabilized finite volume element method is proposed for the Darcy-Stokes problem. For the discretization form, two grids are needed; one is triangulation and the other is quadrilateral meshes. The velocity is approximated using nonconforming piecewise linears and the pressure piecewise constants. The proposed unified method in this paper is shown to be stable and optimally convergent for both the velocity and the pressure. Moreover, numerical experiments are given to demonstrate the theoretical results.

Key words: finite volume element the Darcy-Stokes problem stabilization

收稿日期: 2009-09-10;





基金资助:

四川省科技攻关课题(编号05GG006-006-2)资助项目.

引用本文:

. Darcy-Stokes问题的统一稳定化有限体积法分析[J]. 计算数学, 2011, 33(2): 133-144.










. ANALYSIS OF A UNIFIED STABILIZED FINITE VOLUME METHOD FOR THE DARCY-STOKES PROBLEM[J]. Mathematica Numerica Sinica, 2011, 33(2): 133-144.

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