

# Residual a Posteriori Error Estimate of a New Two-Level Method for Steady Navier-Stokes Equations

Chunfeng Ren, Yichen Ma

College of Science, X'an Jiaotong University, Xi'an, 710049, China

收稿日期 2005-3-29 修回日期 网络版发布日期 2007-1-29 接受日期

**摘要** Residual-based a posteriori error estimate for conforming finite element solutions of incompressible Navier-Stokes equations, which is computed with a new two-level method that is different from Volker John, is derived. A posteriori error estimate contains additional terms in comparison to the estimate for the solution obtained by the standard finite element method. The importance of the additional terms in the error estimates is investigated by studying their asymptotic behavior. For optimal scaled meshes, these bounds are not of higher order than the convergence of discrete solution. The two-level method aims to solve the nonlinear problem on a coarse grid with less computational work, then to solve the linear problem on a fine grid, which is superior to the usual finite element method solving a similar nonlinear problem on the fine grid.

**关键词** [Finite element method](#) [Navier-Stokes equations](#) [residual-based a posteriori error estimate](#) [two-level method](#)

分类号

## Residual a Posteriori Error Estimate of a New Two-Level Method for Steady Navier-Stokes Equations

Chunfeng Ren, Yichen Ma

College of Science, X'an Jiaotong University, Xi'an, 710049, China

**Abstract** Residual-based a posteriori error estimate for conforming finite element solutions of incompressible Navier-Stokes equations, which is computed with a new two-level method that is different from Volker John, is derived. A posteriori error estimate contains additional terms in comparison to the estimate for the solution obtained by the standard finite element method. The importance of the additional terms in the error estimates is investigated by studying their asymptotic behavior. For optimal scaled meshes, these bounds are not of higher order than the convergence of discrete solution. The two-level method aims to solve the nonlinear problem on a coarse grid with less computational work, then to solve the linear problem on a fine grid, which is superior to the usual finite element method solving a similar nonlinear problem on the fine grid.

**Key words** [Finite element method](#) [Navier-Stokes equations](#) [residual-based a posteriori error estimate](#) [two-level method](#)

DOI:

通讯作者

### 扩展功能

#### 本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(0KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [参考文献](#)

#### 服务与反馈

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [复制索引](#)
- ▶ [Email Alert](#)
- ▶ [文章反馈](#)
- ▶ [浏览反馈信息](#)

#### 相关信息

- ▶ 本刊中 包含 "[Finite element method](#)"的 [相关文章](#)
- ▶ 本文作者相关文章

- [Chunfeng Ren](#)
- [Yichen Ma](#)