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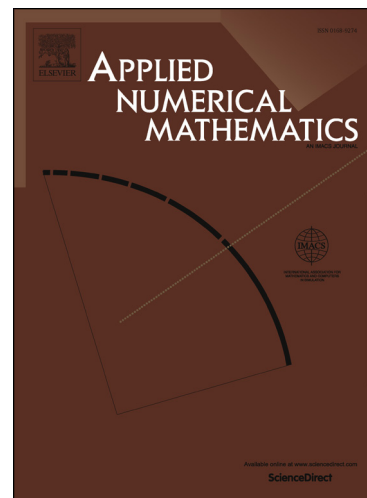
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Two-step algorithms for the stationary incompressible Navier-Stokes equations with friction boundary conditions

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Abstract

Two-step algorithms for the stationary incompressible Navier-Stokes equations with friction boundary conditions are considered in this paper. Our algorithms consist of solving one Navier-Stokes variational inequality problem used the linear equal-order finite element pair (i.e., $P_1 - P_1$) and then solving a linearization variational inequality problem used the quadratic equal-order finite element pair (i.e., $P_2 - P_2$). Moreover, the stability and convergence of our two-step algorithms are derived. Finally, numerical tests are presented to check theoretical results.

Keywords: Navier-Stokes equations, Friction boundary conditions, Linear equal-order pair, Quadratic equal-order pair, Two-step strategy, Error estimate.

1. Introduction

Incompressible viscous flow with friction boundary conditions has been successfully applied to some flow phenomena in environmental and medical problems such as oil flow over or beneath sand layer and blood flow in the thoracic aorta [7]. The governing equations are the following incompressible

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