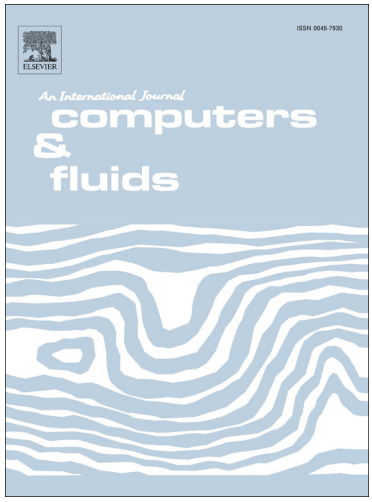

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A quadratic equal-order stabilized finite element method for the conduction-convection equations☆

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Abstract

A quadratic equal-order stabilized finite element method is considered for the stationary conduction-convection equations, based on two local Gauss integrations. The stabilized method is characterized by the feature that it offsets the discrete pressure gradient space by the residual of the simple and symmetry term at element level to circumvent the inf-sup condition. The stability and error estimates are analyzed, which show that the presented method is stable and has good precision. Numerical results are shown to support the developed theory analysis and demonstrate the good effectiveness of the given method.

Keywords: Quadratic equal-order stabilized method, Conduction-convection equations, Two local Gauss integrations, Stability, Error estimates, Numerical experiments

1. Introduction

The conduction-convection equations constitute an important system of equations in atmospheric dynamics and a dissipative nonlinear system of equations. Since this system does not only incorporate the velocity vector field as well as the pressure field but also

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