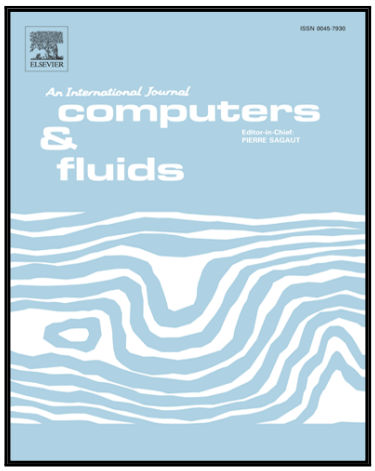

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A two-level consistent splitting scheme for the Navier-Stokes equations *

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Abstract

A fully discrete two-level consistent splitting scheme is considered for solving the time-dependent Navier-Stokes equations. To overcome the incompressible constraint which couples the velocity and the pressure, we apply the consistent splitting scheme which is a projection type method to decouple the velocity and the pressure. To overcome the difficulty caused by nonlinearity, we consider a two-level method which only solves a nonlinear equation in the coarse-level subspace and a linear problem in the fine-level subspace. The analysis shows that our method can reach the same accuracy as the one-level method with a very fine mesh size h by an appropriate choice of coarse mesh size H. Numerical examples are provided that confirm both the theoretical analysis and the corresponding improvement in computational efficiency.

Key words: two-level method; consistent splitting scheme; Navier-Stokes equations; numerical tests

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