

**Clercx, H. J. H.**

**A spectral solver for the Navier-Stokes equations in the velocity-vorticity formulation for flows with two nonperiodic directions.** (English) Zbl 0904.76058

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A novel pseudospectral scheme for the Navier-Stokes equations with two nonperiodic directions is proposed. An influence matrix technique is employed to elicit the a priori lacking boundary conditions for the vorticity. The spatial discretization is based on a two-dimensional Chebyshev expansion on a non-staggered grid of collocation points. The time marching scheme is Adams-Bashforth for the advective term and Crank-Nicholson for the viscous term. Divergence-free flow fields are achieved within machine accuracy.

Reviewer: [W.Heinrichs \(Essen\)](#)

**MSC:**

- 76M25 Other numerical methods (fluid mechanics) (MSC2010)
- 76D05 Navier-Stokes equations for incompressible viscous fluids
- 65M70 Spectral, collocation and related methods for initial value and initial-boundary value problems involving PDEs

Cited in **21** Documents

**Keywords:**

pseudospectral scheme; influence matrix technique; Chebyshev expansion; time marching scheme; non-staggered grid

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