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Least squares spectral method for the two-dimensional Stokes interface problems. (English)


Summary: This paper deals with the pseudo-spectral least squares method to approximate the solution of the Stokes interface problem, that is, the Stokes equations with discontinuous viscosity and singular source term. The Stokes interface equations are adjusted in each sub-domain along with the interface conditions. Then the equations are reformulated as a first order system by introducing stress tensor as a new independent variable. The continuous and discrete norm least squares functionals using Legendre and Chebyshev weights for the first order system are defined and shown to be equivalent to appropriate product norms. The spectral convergence of the proposed method is presented. Numerical examples are also given to demonstrate the method and analysis.

MSC:

65N35 Spectral, collocation and related methods for boundary value problems involving PDEs
76D07 Stokes and related (Oseen, etc.) flows
76M22 Spectral methods applied to problems in fluid mechanics
65N12 Stability and convergence of numerical methods for boundary value problems involving PDEs

Keywords:
Stokes equations; first order system least squares method; interface problem; pseudo-spectral method

Full Text: DOI

References:
