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Recycling augmented Lagrangian preconditioner in an incompressible fluid solver. (English)
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Summary: The paper discusses a reuse of matrix factorization as a building block in the Augmented Lagrangian (AL) and modified AL preconditioners for nonsymmetric saddle point linear algebraic systems. The strategy is applied to solve two-dimensional incompressible fluid problems with efficiency rates independent of the Reynolds number. The solver is then tested to simulate motion of a surface fluid, an example of a two-dimensional flow motivated by an interest in lateral fluidity of inextensible viscous membranes. Numerical examples include the Kelvin-Helmholtz instability problem posed on the sphere and on the torus. Some new eigenvalue estimates for the AL preconditioner are derived.

**MSC:**
65F08 Preconditioners for iterative methods
76D05 Navier-Stokes equations for incompressible viscous fluids

**Keywords:**
augmented Lagrangian preconditioner; fluidic membranes; grad-div stabilization; Kelvin-Helmholtz instability; surface fluids; trace finite element method

**Full Text:** DOI