

IMPLICITLY PRECONDITIONED AND GLOBALIZED RESIDUAL METHOD FOR SOLVING STEADY FLUID FLOWS*

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Dedicated to Víctor Pereyra on the occasion of his 70th birthday

Abstract. We develop a derivative-free preconditioned residual method for solving nonlinear steady fluid flows. The new scheme is based on a variable implicit preconditioning technique associated with the globalized spectral residual method. The new scheme is robust and allows numerical computation of the steady state of the two-dimensional incompressible Navier-Stokes equations (NSE), which we consider here in both primary variables and streamfunction-vorticity formulations. The results are encouraging and agree with those reported in the literature.

Key words. nonlinear systems of equations, residual methods, globalization strategies, preconditioning, Navier-Stokes equations.

AMS subject classifications. 76D05, 65H10, 76M20, 90C30

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