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A New Stabilized Formulation for the Stokes Problem

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I shall introduce a new formulation for the Stokes problem, stemming from the consistent splitting scheme for the time-dependent Navier-Stokes equations introduced by Guermond–Shen (JCP, 2003). I shall present ample numerical results, using spectral and finite element methods, to show that the new formulation leads to positive definite systems and does not require the usual inf-sup condition between the discrete spaces for the velocity and pressure.