

A comparison of time-discretization/linearization approaches for the incompressible Navier-Stokes equations

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This talk presents a numerical study of two ways for discretizing and linearizing the time-dependent incompressible Navier-Stokes equations. One approach consists in first applying a semi-discretization in time by a fully implicit θ -scheme. Then, in each discrete time, the equations are linearized by a fixed point iteration. The number of iterations to reach a given stopping criterion is a priori unknown in this approach. In the second approach, Rosenbrock schemes with s stages are used as temporal discretization. The non-linearity of the Navier-Stokes equations is treated internally in the Rosenbrock methods. In each discrete time, exactly s linear systems of equations have to be solved. The numerical study considers five two-dimensional problems with distinct features. Four implicit time stepping schemes and five Rosenbrock methods are involved.

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