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NUMERICAL STUDY OF A DISCRETE PROJECTION METHOD FOR ROTATING INCOMPRESSIBLE FLOWS*

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Abstract. This paper presents a numerical analysis for complex 3D simulations of the Stirred Tank Reactor (STR) model by a modified discrete projection method (DPM) for rotating incompressible flow. For several prototypical configurations of the STR model, we examine the multigrid behavior for momentum and pressure Poisson subproblems for different values of the time step, the angular velocity, etc., and we give examples of the convergence behavior of the (outer) DPM scheme. For a prototypical application, we visualize the complex flow behavior by injecting sources of particle tracers into the obtained flow field to observe their mixing distribution.

Key words. Navier–Stokes equations, Coriolis force, discrete projection method, pressure Schur complement

AMS subject classifications. 35Q30, 76D05, 76D07

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