

# Higher order discontinuous Galerkin methods in time and pressure-robust finite element discretizations applied to time-dependent Stokes problems

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We analyze finite element discretizations of the time-dependent Stokes equations that are based on discontinuous Galerkin time stepping schemes in combination with pressure-robust inf-sup stable finite element methods in space. The pressure-robustness enables error estimates for the velocity that are completely independent of the pressure. We prove optimal convergence orders in space and time for both velocity and pressure. Moreover, a cheap postprocessing allows to improve the temporal accuracy of the velocity, again with error constants independent of the pressure. Numerical examples illustrate our theoretical findings.

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