A pressure robust staggered DG method for Navier-Stokes equations on polygonal meshes

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In this talk we present a novel pressure robust staggered DG method for the Navier-Stokes equations on general polygonal meshes. The method hinges on a dedicate balancing of the finite element spaces used, which enables us to achieve divergence free velocity without resorting to postprocessing. Another important ingredient lies in a carefully designed convective term. The resulting method is pressure- robust so that the pressure approximation does not influence the velocity approximation. Optimal convergence rates for all the variables can be obtained. Also, assuming that the rotational part of the forcing term is small enough, we are able to prove that the velocity error is independent of the Reynolds number and of the pressure. We will present several numerical experiments to verify the proposed theories.

References:

[1] Pressure-robust staggered DG methods for the Navier-Stokes equations on general meshes

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