Discontinuous Galerkin approximations for the Navier-Stokes equations

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We will discuss numerical schemes for the evolutionary Navier-Stokes equations. The schemes considered here, are discontinuous in time and conforming in space and of arbitrarily high-order. Fully-discrete error estimates are presented in both 2d-3d cases, and the viscosity constant is carefully tracked. The estimates are derived under low regularity assumptions. The main result states that the errors are bounded by projection errors of the exact solution which exhibit optimal rates when the solutions are smooth. The key ingredient of the proof is based on the development of "symmetric" error estimates for a parabolic analog of the classical Stokes projection, and it is motivated on the recent work on the convection-diffusion equation [1].

Joint work with Noel J. Walkington, Department of Mathematics, CMU, USA.

References:

[1] 1. K. Chrysafinos and N. J. Walkington, Lagrangian and moving mesh methods for the convection-diffusion equation, ESAIM M2AN, 42, 2008, pp 27-56.

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