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A Recovery-Assisted Discontinuous Galerkin Method for the Compressible Navier-Stokes Equations[1] ERIC JOHNSEN, PHILIP E. JOHNSON, University of Michigan — The Discontinuous Galerkin (DG) method is a promising approach for high-fidelity simulations of turbulent flows in complex geometries, given the method's capability for arbitrarily high orders of accuracy on unstructured meshes. We propose a DG approach for advection-diffusion equations (such as the Navier-Stokes equations) based on the principle of Recovery, whereby the underlying solution between two adjacent computational elements is "recovered" into a smooth, more accurate polynomial representation. By combining a biased approach to Recovery for advection with a compact gradient recovery for diffusion, we achieve $2p + 2$ order of accuracy in the cell-average error on a nearest-neighbors stencil, where p is the degree of the polynomial basis, and demonstrate higher efficiency than other state-of-the-art DG approaches. Several test cases, including compressible turbulence, are presented to support our method.

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