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An Adaptive De-Aliasing Strategy for Discontinuous Galerkin methods ANDREA BECK, DAVID FLAD, HANNES FRANK, CLAUS-DIETER MUNZ, Univ Stuttgart — Discontinuous Galerkin methods combine the accuracy of a local polynomial representation with the geometrical flexibility of an element-based discretization. In combination with their excellent parallel scalability, these methods are currently of great interest for DNS and LES. For high order schemes, the dissipation error approaches a cut-off behavior, which allows an efficient wave resolution per degree of freedom, but also reduces robustness against numerical errors. One important source of numerical error is the inconsistent discretization of the non-linear convective terms, which results in aliasing of kinetic energy and solver instability. Consistent evaluation of the inner products prevents this form of error, but is computationally very expensive. In this talk, we discuss the need for a consistent de-aliasing to achieve a neutrally stable scheme, and present a novel strategy for recovering a part of the incurred computational costs. By implementing the de-aliasing operation through a cell-local projection filter, we can perform adaptive de-aliasing in space and time, based on physically motivated indicators. We will present results for a homogeneous isotropic turbulence and the Taylor-Green vortex flow, and discuss implementation details, accuracy and efficiency.

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