

Palindromic Discontinuous Galerkin Method

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This work is devoted to a general approach for solving hyperbolic systems of conservation laws. In many applications the time scale of the interesting phenomena is very different from the time scale imposed by the explicit CFL condition.

The PDG method is a general implicit (but matrix-free) high order method for approximating systems of conservation laws. It is unconditionally stable and has the complexity of an explicit scheme.

It relies on a vectorial kinetic interpretation of the conservation laws proposed in [Aregba, Natalini, Discrete kinetic schemes for multidimensional systems of conservation laws, 2000]. The kinetic system is approximated with an asymptotic-preserving high order DG method. The method is well adapted to parallel optimizations.

We will review the task-based implementation of the method, based on the StarPU runtime library, and some applications to fluid mechanics and plasma physics. Some results of the presentation are also given in [Badwaik & *al.*, Task-based parallelization of an implicit kinetic scheme, 2017].