Badwaik, Jayesh; **Boileau, Matthieu**; **Coulette, David**; **Franck, Emmanuel**; **Helluy, Philippe**; **Klingenberg, Christian**; **Mendoza, Laura**; **Oberlin, Herbert**

Task-based parallelization of an implicit kinetic scheme. (English) Zbl 1408.35143

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Summary: In this paper, we present and implement the palindromic discontinuous Galerkin (PDG) method in dimensions higher than one. The method has already been exposed and tested in [the third author et al., in: Finite volumes for complex applications VIII – hyperbolic, elliptic and parabolic problems. Cham: Springer. 171–178 (2017; Zbl 1365.76251)] in the one-dimensional context. The PDG method is a general implicit high order method for approximating systems of conservation laws. It relies on a kinetic interpretation of the conservation laws containing stiff relaxation terms. The kinetic system is approximated with an asymptotic-preserving high order DG method. We describe the parallel implementation of the method, based on the StarPU runtime library. Then, we apply it on preliminary test cases.

MSC:

35Q35 PDEs in connection with fluid mechanics
65M60 Finite element, Rayleigh-Ritz and Galerkin methods for initial value and initial-boundary value problems involving PDEs
65Y10 Numerical algorithms for specific classes of architectures

Keywords:

parallelization; palindromic discontinuous Galerkin (PDG) method

Software:

Gmsh; KLU; StarPU

Full Text: DOI

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