Application of the approximated BGK method on a Semi-Lagrangian parallel python solver on non-conforming patches

Laura S. Mendoza[1]

[1]Inria Nancy Grand Est, TONUS team.

Abstract

The Python library SLaPPy was developed to solve transport equations on three-dimensional complex geometries. The geometries are divided into sub-domains called patches. SLaPPy is based on the backwards Semi-Lagrangian scheme. It uses local continuous Gauss-Lobatto interpolation inside the patches. The interpolation is discontinuous between patches, thus it handles overlapping and non-conforming patches. The code is written in Python for the high-level data structures and OpenCL for the low-level computations and parallelism.

The approximated BGK method allow us to split complex kinetic equations into independent transport equations, solved by the core of the SLaPPy code, and a relaxation step, which was added and parallelized in the code. Thus, we will present the results obtained with the library on linear and circular advections, isotropic diffusion and MHD models, on different geometries formed by non continuous patch.