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Tests of Maxwellian-Weighted Basis Functions in a Discontinuous Galerkin Kinetic Code[1] G.W. HAMMETT, A. HAKIM, E.L. SHI, Princeton Plasma Physics Laboratory — Discontinuous Galerkin (DG) algorithms have been very actively studied and used in the applied math and computational fluid dynamics communities in the past decade. They combine certain attractive properties of finite element methods (like high accuracy per interpolation point) and finite volume methods (like locality of calculation for parallel computers and flexibility for limiters). Higher-order methods also have more floating point operations per data point, and so can be more efficient on modern computers that are often bandwidth limited. The flexibility of DG allows one to consider various types of Maxwellian-weighted basis functions while preserving important conservation properties of the underlying system. One can think of this either as a modified inner-product norm or a Petrov-Galerkin approach. Here we explore some ways of using Maxwellian-Weighted Basis functions and test them on paradigm problems using the Gkeyll code, which is being developed for edge gyrokinetic simulations. In addition to the formal order of accuracy in the asymptotic limit as a grid is refined, we are also interested in robust reasonable solutions on coarser grids.

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