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Benchmarking a Discontinuous Galerkin Vlasov-Poisson solver in Gkeyll[1] JAMES JUNO, Rice University, AMMAR HAKIM, GREG HAMMETT, Princeton Plasma Physics Laboratory — Gkeyll is a discontinuous Galerkin (DG) code under development to solve a variety of kinetic equations in plasmas, with the aim of solving 5D gyrokinetic equations for edge turbulence. For bench-marking the code, we solved the Vlasov-Poisson system of equations, modeling the two-stream instability, as well as current research in nonlinear wave modes of plasmas, such as Bernstein, Green, and Kruskal (BGK) and kinetic electrostatic electron nonlinear (KEEN) wave modes. Results from Gkeyll compared well with linear and nonlinear analysis of the two-stream instability, and matched results of other computational techniques being used to examine BGK and KEEN wave modes. On bounded domains, we explored sheath plasma physics, and modeled the Pierce Diode connected to an external circuit. These sheath studies will contribute to an understanding of boundary conditions for gyrokinetic equations in the edge of tokamaks.

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