Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Gkeyll: High-Order Discontinuous Galerkin Solver for (Drift/Gyro) Kinetic Simulations of Edge Plasmas[1] AMMAR HAKIM, GREG HAMMETT, Princeton Plasma Physics Laboratory, ERIC SHI, Princeton University — A new high-order discontinuous Galerkin (DG) code for the solution of drift- and gyrokinetic equations in edge plasma is under development. Gkeyll implements extensions of recently developed DG schemes to general Hamiltonian systems, including to the case of discontinuous potentials. The collisionless part of the dynamics is evolved with an energy conserving DG discretization. Diffusion operators are handled with a consistent recovery-based algorithm. It is shown that traditional penalty and local DG schemes for diffusion are inconsistent, and can lead to large errors in predicting high-order moments of the solution. An energy and momentum conserving Lenard-Bernstein collision operator is implemented. The velocity space drag and diffusion operators, as well as the boundary conditions, need to be handled carefully to conserve the discrete particles, momentum and energy. Extension of Gkeyll to multiple dimension are presented, and initial tests of the code in 1D/2V and 2D/2V are shown. In addition, application of the code to computing heat-loads on divertor plates using a variety of 1D/1V kinetic models will be shown.

[1]Supported by Max-Planck/Princeton Center for Plasma Physics and DOE Contract DE-AC02-09CH11466

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Date submitted: 12 Jul 2013 Electronic form version 1.4