Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Gyrokinetics with Advanced Collision Operators[1] E.A. BELLI, J. CANDY, General Atomics — For gyrokinetic studies in the pedestal region, collisions are expected to play a more critical role than in the core and there is concern that more advanced collision operators, as well as numerical methods optimized for the strong collisionality regime, are needed. For this purpose, a new gyrokinetic solver CGYRO has been developed for precise studies of high collisionality regimes. Building on GYRO and NEO, CGYRO uses the NEO pitch angle and energy velocity-space coordinate system to optimize the accuracy of the collision dynamics, particularly for multi-species collisions and including energy diffusion. With implementation of the reduced Hirshman-Sigmar collision operator with full cross-species coupling, CGYRO recovers linear ITG growth rates and the collisional GAM test at moderate collision frequency. Methods to improve the behavior in the collisionless regime, particularly for the trapped/passing particle boundary physics for kinetic electrons, are studied. Extensions to advanced model operators with finite-$k_\perp$ corrections, e.g., the Sugama operator [1], and the impact of high collisionality on linear gyrokinetic stability in the edge are explored.

[1] H. Sugama, et al., Phys. Plasmas **16**, 112503 (2009).

[1]Work supported by the US DOE under DE-FG02-95ER54309.

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Date submitted: 11 Jul 2014 Electronic form version 1.4