

Abstract Submitted
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Collisional Ion and Electron Scale Gyrokinetic Simulations in the Tokamak Pedestal¹ E.A. BELLI, J. CANDY, P.B. SNYDER, General Atomics — A new gyrokinetic solver, CGYRO, has been developed for precise studies of high collisionality regimes, such as the H-mode pedestal and L-mode edge. Building on GYRO and NEO, CGYRO uses the same velocity-space coordinates as NEO to optimize the accuracy of the collision dynamics and allow for advanced operators beyond the standard Lorentz pitch-angle scattering model. These advanced operators include energy diffusion and finite-FLR collisional effects. The code is optimized for multiscale (coupled electron and ion turbulence scales) simulations, employing a new spatial discretization and array distribution scheme that targets scalability on next-generation (exascale) HPC systems. In this work, CGYRO is used to study the complex spectrum of modes in the pedestal region. The onset of the linear KBM with full collisional effects is assessed to develop an improved KBM/RBM model for EPED. The analysis is extended to high k to explore the role of electron-scale (ETG-range) physics. Comparisons with new analytic collisional theories are made. Inclusion of sonic toroidal rotation (including full centrifugal effects) for studies including heavy wall impurities is also reported.

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E.A. Belli
General Atomics

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