

Continuum Kinetic Modeling of the Tokamak Plasma Edge with COGENT*

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We describe recent advances in cross-separatrix and other edge-relevant plasma simulations with COGENT, a continuum gyro-kinetic code being developed by the Edge Simulation Laboratory (ESL) collaboration. Work to date has been primarily focused on a 4D (axisymmetric) divertor version that models transport properties of edge plasmas including the effects of nonlinear (Fokker-Planck) collisions, anomalous radial transport and a self-consistent radial electric field. Recent work has focused on including the effects of poloidal electric fields in cross-separatrix simulations. We have also begun development of a 5D extension (single source, compilable in either 4D or 5D) to study edge turbulence, with initial focus on kinetic effects on blob dynamics and drift-wave instability. Finally, we report on recent progress with development and implementation of implicit-explicit (IMEX) time integration schemes and integrated modeling capabilities.

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