Edge-relevant plasma simulations with the continuum code COGENT

M. DORF, M. DORR, D. GHOSH, J. HITTINGER, T. ROGNLIEN, LLNL, Livermore, CA94550, R. COHEN, CompX, Del Mar, CA 92014, W. LEE, UCSD, La Jolla, CA 92038, P. SCHWARTZ, LBNL, Berkeley, CA 94720 — 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. The distinguishing feature of the COGENT code is its high-order finite-volume discretization methods, which employ arbitrary mapped multiblock grid technology (nearly field-aligned on blocks) to handle the complexity of tokamak divertor geometry with high accuracy. This paper discusses the 4D (axisymmetric) electrostatic version of the code, and the presented topics include: (a) initial simulations with kinetic electrons and development of reduced fluid models; (b) development and application of implicit-explicit (IMEX) time integration schemes; and (c) conservative modeling of drift-waves and the universal instability.

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Mikhail Dorf
LLNL, Livermore, CA94550

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