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5D Tempest simulations of kinetic edge turbulence[1] X.Q. XU, Z. XIONG, B.I. COHEN, R.H. COHEN, M.R. DORR, J.A. HITTINGER, G.D. KERBEL, W.M. NEVINS, T.D. ROGNLIEN, M.V. UMANSKY, LLNL, H. QIN, PPPL, EDGE SIMULATION LABORATORY TEAM — Results are presented from the development and application of TEMPEST, a nonlinear five dimensional (3d2v) gyrokinetic continuum code. The simulation results and theoretical analysis include studies of H-mode edge plasma neoclassical transport and turbulence in real divertor geometry and its relationship to plasma flow generation with zero external momentum input, including the important orbit-squeezing effect due to the large electric field flow-shear in the edge. In order to extend the code to 5D, we have formulated a set of fully nonlinear electrostatic gyrokinetic equations and a fully nonlinear gyrokinetic Poisson's equation which is valid for both neoclassical and turbulence simulations. Our 5D gyrokinetic code is built on 4D version of Tempest neoclassical code with extension to a fifth dimension in binormal direction. The code is able to simulate either a full torus or a toroidal segment. Progress on performing 5D turbulence simulations will be reported.

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