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Development of SOLT3D model for tokamak edge plasma turbulence[1] M.V. UMANSKY, B.I. COHEN, A.M. DIMITS, Lawrence Livermore Natl Lab, J.R. MYRA, Lodestar Inc. — Progress is reported on development of a tokamak edge turbulence model SOLT3D, for studies of interaction of edge plasma turbulence and RF waves. The model is motivated by the 2D model SOLT [1], which, in spite of its relative simplicity, produced a number of encouraging results. SOLT3D, being developed in the BOUT++ framework [2], roughly follows the original SOLT physics model and design but includes the dimension along the magnetic field line and solves for parallel variations of plasma fields and electron dynamics along the magnetic field line. The model domain represents edge plasma region of a tokamak in a rectified geometry. The model supports basic linear instabilities relevant to SOL turbulence: drift-resistive-ballooning mode (DRBM) instability driven by the magnetic curvature and the radial gradient of plasma pressure, and the conducting-wall mode (CWM) instability driven by the end-plate sheath boundary conditions and the radial gradient of plasma temperature. Extensive testing of the model demonstrates verification of local and nonlocal linear dispersion relations and benchmarking against available nonlinear results. [1] Russell et al., Phys. Plasmas 22, 092311 (2015); [2] Dudson et al., Comput. Phys. Commun. 180, 14671480 (2009).

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