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Understanding the Impact of Parallel Boundary Conditions on Turbulence in CSDX through Nonlocal Simulations PAYAM VAEZI, CHRISTOPHER HOLLAND, SAIKAT TAKHUR, GEORGE TYNAN, Univ of California - San Diego — The Controlled Shear Decorrelation Experiment (CSDX) linear plasma device provides a unique platform for investigating the underlying physics of self-regulating drift-wave turbulence/zonal flow dynamics. A minimal model of 3D equations of drift-reduced nonlocal cold ion fluid, which evolves density, vorticity, and electron temperature fluctuations, with proper sheath boundary conditions is used to simulate dynamics of the turbulence in CSDX and its response to changes in parallel boundary conditions. These simulations carried out using BOUndary Turbulence (BOUT++) framework, and use equilibrium electron density and temperature profiles taken from experimental measurements. The simulation results show that the choice of axial insulating or conducting boundary conditions influences the turbulence structure and zonal flow formation, resulting in less broadband (more quasi-coherent) turbulence in conducting boundary condition. These initial results are qualitatively consistent with experimental observations, and progress in more quantitative validation analysis of the model using synthetic diagnostics will be presented. This work is supported by US DoE under DE-FG02-06ER54871.

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