Abstract Submitted
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Recent Progress Toward an Integrated Particle Simulation of Plasma Edge[1] C.S. CHANG, S.H. KU, Courant Institute-NYU, W.W. LEE, PPPL, S. PARKER, Univ. Colorado, Z. LIN, UC Irvine, J. CUMMINGS, Caltech, M. ADAMS, Columbia Univ., F. HINTON, General Atomic, S. ETHIER, PPPL, CPES TEAM — A SciDAC Fusion Simulation Prototype Center has recently been formed in an effort to understand the edge pedestal physics. The main activity is (a) to build a gyrokinetic particle code for the edge plasma, which spans the region from the pedestal top to the first wall and (b) to construct an integrated simulation framework for coupling of the edge kinetic code with a two-fluid MHD code for an immediate application to the physics of the pedestal-ELM cycle. The gyrokinetic particle code is for an integrated simulation of the neoclassical kinetic ion-electron physics together with the turbulence and neutral physics, in a realistic wall and flux surface geometry for the present and future tokamak devices. A two-fluid MHD code is for easier modeling of the ELM crash, in close coupling with the kinetic code. Even though the main part of the pedestal exists inside the separatrix surface, the pedestal physics is most likely coupled to the scrape-off layer plasma properties. Thus, a comprehensive understanding of the edge plasma dynamics will be necessary. We will report our recent progresses in the 5D edge neoclassical physics simulation and understandings, numerical work in the self-consistent turbulence simulation, and kinetic-MHD coupling of ELM activity.

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