Abstract Submitted
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Characterization of Neoclassical Transport in the Plasma Edge[1]

E.A. BELLI, J. CANDY, General Atomics — An extensive characterization of neoclassical transport in the plasma edge is studied numerically using the NEO code, which solves a hierarchy of drift-kinetic equations based on an expansion in ρ_{*i}. The code includes the self-consistent coupling of electrons and multiple ion species, fully general geometry, including up-down asymmetry effects, and full rapid toroidal rotation effects. The validity of standard local neoclassical transport theory in the H-mode edge is assessed for typical DIII-D plasmas via solution of the higher-order drift-kinetic equations, and the influence of finite-orbit-width effects on the non-local neoclassical energy transport and flows is explored. Preliminary results indicate that only a weak finite-orbit-width effect is found due to the steep gradients and thus the δf formulation is valid for most of the pedestal. Extended studies of the influence of impurities and orbit-squeezing effects on the edge transport are presented. Limitations of analytic theories, such as the Chang-Hinton theory and the Sauter model, are also studied for realistic experimental parameters.

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