Abstract Submitted
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Comparing kinetic and fluid simulations of scrape-off layer physics[1] R.M. CHURCHILL, Princeton Plasma Physics Laboratory, J.M. CANIK, Oak Ridge National Laboratory, C.S. CHANG, R. HAGER, Princeton Plasma Physics Laboratory, A.W. LEONARD, General Atomics, R. MAINGI, R. NAZIKIAN, D.P. STOTLER, Princeton Plasma Physics Laboratory — Simulations using the fully kinetic code XGCa were undertaken to explore the impact of kinetic effects on scrape-off layer (SOL) physics in DIII-D H-mode plasmas. XGCa is a total-f, gyrokinetic code which self-consistently calculates the axisymmetric electrostatic potential and plasma dynamics, and includes modules for neutral Monte Carlo transport. Fluid simulations are usually used to simulate the SOL, due to its high collisionality. However, a number of discrepancies have been observed between experiment and leading SOL fluid codes (e.g. SOLPS) [1], including underestimating outer target temperatures, radial electric field in the SOL, parallel ion SOL flows at the low field side, and impurity radiation. Many of these discrepancies may be linked to the fluid treatment, and could be resolved by including kinetic effects in SOL simulations. Status of benchmarking efforts to compare XGCa with the fluid code SOLPS and traditional two-point models will be presented in the sheath-limited and medium-recycling regimes, including future plans to compare results in the high-recycling and detached regimes.

[1] A.V. Chankin, D.P. Coster, the ASDEX-Upgrade Team, JNM Vol. 390–391, pg. 319-324 (2009)

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