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Comparison of Fluid and Monte Carlo Neutral Gas Models in Divertor Plasma Simulations[1] M.E. RENSINK, L.L. LODESTRO, G.D. PORTER, T.D. ROGNLIEN, Lawrence Livermore National Laboratory, D.P. COSTER, Max-Planck Institut fur Plasmaphysik — Results from divertor plasma simulations may be sensitive to the model for the neutral gas associated with recycling, recombination and gas puffing in the divertor. The gas contributes to plasma sources and sinks for particles, momentum and energy. A fluid gas model is appropriate for highly collisional regimes while a Monte Carlo model is more accurate for collisionless regimes and for complex divertor configurations. The Monte Carlo model for these comparisons is the EIRENE code; the fluid model is from the UEDGE code; and the plasma background is supplied by the UEDGE code. We follow the evolution of coupled gas-plasma models to a self-consistent steady state and compare the results. For a weakly detached plasma in DIII–D we find the divertor plate temperature from the Monte Carlo model is lower than from the fluid model ($\sim$2 eV versus $\sim$5 eV), but the coupled plasma-neutral system is still evolving slowly on a time scale of about 10 ms.

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