Abstract Submitted
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Variable Charge State Impurities in Coupled Kinetic Plasma-Kinetic Neutral Transport Simulations[1] D.P. STOTLER, R. HAGER, PPPL, K. KIM, KAIST, T. KOSKELA, Aalto Univ., G. PARK, NFRI — A previous version of the XGC0 neoclassical particle transport code with two fully stripped impurity species was used to study kinetic neoclassical transport in the DIII-D H-mode pedestal.[2] To properly simulate impurities in the scrape-off layer and divertor and to account for radiative cooling, however, the impurity charge state distributions must evolve as the particles are transported into regions of different electron temperatures and densities. To do this, the charge state of each particle in XGC0 is included as a parameter in the list that represents the particle's location in phase space. Impurity ionizations and recombinations are handled with a dedicated collision routine. The associated radiative cooling is accumulated during the process and applied to the electron population later in the time step. The density profiles of the neutral impurities are simulated with the DEGAS 2 neutral transport code and then used as a background for electron impact ionization in XGC0 via a test particle Monte Carlo method analogous to that used for deuterium.[3]

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[2]D. J. Battaglia et al., Phys. Plasmas 21, 072508 (2014).
[3]D. P. Stotler et al., Comput. Sci. Disc. 6, 015006 (2013).

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