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Simulating W Impurity Transport in Tokamaks[1] TIMOTHY R. YOUNKIN, University of Tennessee, DAVID L. GREEN, ANE LASA, JOHN M. CANIK, Oak Ridge National Lab, BRIAN D. WIRTH, University of Tennessee —
The extreme heat and charged particle flux to plasma facing materials in magnetically confined fusion devices has motivated Tungsten experiments such as the "W-Ring" experiment on the DIII-D tokamak to investigate W divertor viability. In this domain, the transport of W impurities from their tile locations to other first-wall tiles is highly relevant to material lifetimes and tokamak operation. Here we present initial results from a simulation of this W transport. Given that sputtered impurities may experience prompt redeposition near the divertor strikepoint, or migrate far from its origin to the midplane, there is a need to track the global, 3-D, impurity redistribution. This is done by directly integrating the 6-D Lorentz equation of motion (plus thermal gradient terms and relevant Monte-Carlo operators) for the impurity ions and neutrals under background plasma parameters determined by the SOLPS edge plasma code. The geometric details of the plasma facing components are represented to a fidelity sufficient to examine the global impurity migration trends with initial work also presented on advanced surface meshing capabilities targeting high fidelity simulation.

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