Abstract Submitted
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Understanding near and far-SOL impurity spatial distributions in DIII-D by reproduction of collector probe deposition patterns with DIVIMP and 3DLIM[1] S. A. ZAMPERINI, D. C. DONOVAN, J. D. DURAN, UTK, J. D. ELDER, UTIAS, J. N. NICHOLS, UTK, P. C. STANGEBY, UTIAS, E. A. UNTERBERG, ORNL — Replication of tungsten deposition patterns on a collector probe near the outboard midplane (OMP) of DIII-D in 3DLIM simulations involves W entering the far-SOL from the inner target direction in unfavorable Bt direction (grad-B drift away from divertor), despite the W source originating from the outer target. This is explicable by a long-hypothesized near-SOL impurity accumulation effect via the Ti gradient force. Mach probes on several tokamaks show main ion flow (vi) stagnation near the plasma crown in unfavorable Bt. However, stagnation between the OMP and outer target is commonly observed in favorable Bt, with fast inner-target-directed flow in the crown. In DIVIMP, the ad hoc addition of fast inner-target vi "flushes out" W ions that otherwise accumulate, implying that accumulation may only occur in unfavorable Bt. The impurity distribution along a far-SOL flux tube is input to 3DLIM, a new far-SOL Monte Carlo 3D impurity transport code. All probes inserted for unfavorable Bt had more W on their inner target facing (ITF) sides compared to their outer target facing (OTF) sides (ITF/OTF>1), which is reproduced in 3DLIM only when W enters the far-SOL from the ITF direction, as expected for near-SOL accumulation, and vice-versa for favorable Bt. These results give insight into what SOL phenomena may be setting the boundary condition on core W content.

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