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Understanding the influence of current profile and RF heating on impurity transport in advanced tokamak scenarios B.S. VICTOR, S.L. ALLEN, C.T. HOLCOMB, LLNL, D.M. THOMAS, T.W. PETRIE, General Atomics, E.A. UNTERBERG, ORNL, B.A. GRIERSON, PPPL, E.M. HOLLMANN, UCSD, K.E. THOME, ORAU — Recent DIII-D experiments show that the advanced tokamak hybrid scenario is compatible with a tungsten (W) divertor. The hybrid scenario, with on-axis electron cyclotron current drive (ECCD) and q_{min} 1, shows no degradation in β_n or energy confinement compared to an all-carbon divertor. In contrast, a high q_{min} scenario ($q_{min} \geq 1.5$) with off-axis ECCD experiences on-axis W accumulation throughout the discharge. With the application of on-axis ECCD in the hybrid scenario, the velocity to diffusion ratio (V/D) calculated with STRAHL reverses sign in the core, producing an off-axis peak in the W density profile. These results indicate that plasmas with broader current density profiles and off-axis ECCD are more susceptible to high-Z impurity accumulation. Results from the hybrid plasmas show the feasibility of a steady-state scenario with a W divertor, thus improving the physics basis of Q=5 steady-state operation on ITER.
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