Abstract Submitted
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Measurement and modeling of shattered pellet assimilation in DIII-D[1] D. SHIRAKI, J.L. HERFINDAL, L.R. BAYLOR, ORNL, E.M. HOLLMANN, R.A. MOYER, I. BYKOV, UCSD, C.J. LASNIER, LLNL, N.W. EIDIETIS, GA, R.M. SWEENEY, MIT, R. RAMAN, UW — The particle assimilation during shattered pellet injection (SPI) in DIII-D plasmas has been measured in a wide range of plasma conditions, allowing empirical scalings based on plasma parameters to be derived. The initial electron temperature is found to be the dominant quantity determining the net assimilation, while plasma density is found to have little or no impact. Later in the current quench (CQ), Ohmic dissipation of the poloidal magnetic energy becomes an important energy source for sustaining ionization. The measured densities following SPI are found to be in good agreement with predictions from reduced 0D simulations accounting for ablation shielding of pellet fragments and non-coronal radiation rates. Simulations of neon and deuterium pellets suggest that added deuterium further raises the electron density, but the dilution cooling can reduce the assimilation of the primary radiating impurity neon. The 0D model is applied to ITER plasmas, where peak densities of several 10^{21} m^{-3} are predicted, with CQ rates remaining within allowable values.

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