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Category Number and Subject: 5.6.2. DIII-D Tokamak

[ ] Theory [X] Experiment

Experiments Toward Understanding Impurity Assimilation During Massive Gas Injection for Disruption Mitigation in DIII-D,* E.M. Hollmann, J.A. Boedo, R.A. Moyer, D.L. Rudakov, J.H. Yu, *UCSD*; T.C. Jernigan, *ORNL*; T.E. Evans, D.A. Humphreys, P.B. Parks, E.J. Strait, J.C. Wesley, and W.P. West, *GA*; M. Groth and H. Scott, *LLNL*; D.G. Whyte, *MIT* – Impurity assimilation following massive gas injection (MGI) is desirable for collisional suppression of runaway electrons (RE). Experiments on the DIII-D tokamak have shown that impurity ions created at the plasma edge by MGI initially mix inward quite slowly toward the plasma core. When the associated cold front reaches the q=2 rational surface, impurity mixing is accelerated due to destabilization of low-order tearing modes, leading to the thermal quench (TQ). Average core mixing efficiencies of impurities injected into the vacuum vessel up through the TQ are of order 10%. Typically, RE suppression ratios $\gamma_{crit} = E_{crit}/E_{\parallel} \approx 0.01$ are obtained using argon. Better suppression ratios $\gamma_{crit} \approx 0.06$ are obtained with low-Z (H_2 or He) injection and firing five MGI valves simultaneously.

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