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Category Number and Subject: 5.6.2. DIII-D Tokamak

[ ] Theory [X] Experiment

Impurity Assimilation During Massive Gas Injection for Disruption Mitigation in DIII-D,* E.M. Hollmann, A.N. James, J.H. Yu, *UCSD*; T.C. Jernigan, *ORNL*; T.E. Evans, D.A. Humphreys, P.B. Parks, E.J. Strait, M.A. Van Zeeland, J.C. Wesley, W.P. West, and W. Wu, *GA*– Efficient assimilation of injected impurities into the plasma following massive gas injection (MGI) is desirable for rapid shutdown of future tokamaks. Experiments on the DIII-D tokamak with a variety of different valves and gas species have shown that MGI impurity assimilation is a dominated by magnetohydrodynamics: when the cold front associated with the impurities reaches the q=2 rational surface, transport is accelerated due to low-order tearing modes, leading rapidly to the core thermal quench (TQ). Impurity mixing efficiencies up through the TQ are of order 10%; mixing during the subsequent current quench (CQ) is slower. Extrapolation of DIII-D results suggest that MGI shutdowns in ITER would result in tolerably low wall heat loads and vessel forces, but achieving sufficient assimilation to guarantee suppression of runaway electrons appears to be difficult. Ongoing experiments on improvements and alternatives to MGI will be discussed.

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