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Category Number and Subject: 562 (DIII-D Tokamak)

[ ] Theory [X] Experiment

DIII-D Studies of Massive Gas Injection for Disruption Mitigation,* E.M. Hollmann, G. Antar, J.A. Boedo, R.A. Moyer, D.L. Rudakov, J. Yu, *UCSD*, T.C. Jernigan, S. Combs, *ORNL*, T.E. Evans, D.A. Humphreys, P.B. Parks, E.J. Strait, J.C. Wesley, *GA*, M. Groth, *LLNL*, M. Bakhtiari, D.G. Whyte, *U. Wisc.* – Experiments with massive ($\approx 3\times10^{22}$ particles) argon injection in the DIII-D tokamak for rapid, controlled discharge termination have shown that neutral delivery rate is the crucial jet parameter. Nozzle aiming is not crucial, as the neutrals are stopped at the plasma edge. This was demonstrated over a range of plasma thermal energies from $W_{th} \approx 1.0$ MJ down to $W_{th} \approx 0.02$ MJ. Calculations suggest that magnetic field pressure is contributing to the observed stopping of the neutral jet. The subsequent core radiative thermal collapse is greatly accelerated by the onset of low-order (m=1,2/n=1) MHD modes; this was demonstrated by injecting into target plasmas with different q-profiles and observing a delay in the collapse onset as the low order (q=1 and 2) rational surfaces were buried deeper in the target plasma. Experiments using a new large valve with a 10x higher flow rate will also be presented.

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