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Massive Gas Injection System for Disruption Mitigation on the DIII-D Tokamak[1] T.C. JERNIGAN, L.A. BAYLOR, S.K. COMBS, ORNL, D.A. HUMPHREYS, P.B. PARKS, J.C. WESLEY, GA — Massive injection of deuterium or noble gases ($>10^{22}$ molecules) has been very effective at mitigating disruptions in DIII-D [1]. Both the divertor heat loads and the first wall forces were reduced by more than a factor of four. Total electron densities (free and bound) of $\sim 10^{21}$ m^{-3} have been achieved, close to that required to prevent avalanche multiplication of runaways. Two tested configurations are described. Both use a fast solenoid valve with an orifice diameter of 4 mm with a flow rate in helium of 5×10^4 Pa m^3/s at 7 MPa. A new valve with a 20 mm orifice will be tested on DIII-D in 2006. This valve is actually close to that required for ITER. Calculations show that a set of four such valves can reach the no-avalanche density in ITER in $\sim 0.25\ t_{co}$ where t_{co} is the plasma current quench time. How the gas jet interacts and mixes with the plasma is under investigation.

[1] D.G. Whyte, et al., Phys. Rev. Lett. **89**, 55001 (2001).

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T.C. Jernigan

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