Hardware Advances in Disruption Mitigation by Pellet Injection on DIII–D

T.C. JERNIGAN, L.R. BAYLOR, S.K. COMBS, S.L. MILORA, Oak Ridge National Laboratory, T.E. EVANS, P.B. PARKS, General Atomics — During the past year several improvements have been made in the ORNL pellet injector hardware on DIII–D to test new approaches to disruption mitigation. Frozen methane pellets have been produced and fired into the tokamak, with encouraging results. In addition, a pellet propellant valve has been fitted with a 300 ml high pressure reservoir to inject a massive helium gas burst (2000 mbar-liter $\Delta n_e > 7 \times 10^{21}$ m$^{-3}$) in 10 ms. This will be used in experiments both with and without impurity “killer” pellets to mitigate disruptions while minimizing the generation of run-away electrons as the current ramps down. Other innovations are being explored. One is the possibility of a pellet shotgun where the combination of multiple tiny pellets of differing atomic composition in addition to the propellant gas will allow atomic tailoring of the injected material to minimize run-away production.

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