Abstract Submitted
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Comparison of Cryogenic Pellet Shatter Theory to Experiments using Disruption Mitigation Pellets[1] T. E. GEBHART, S. K. COMBS, S. J. MEITNER, L. R. BAYLOR, Oak Ridge National Laboratory, P. B. PARKS, General Atomics, T. HA, Oak Ridge National Laboratory — Mitigating disruptions is essential for high energy density tokamaks such as ITER. The technique of injecting large shattered cryogenic pellets is presently the best option. To better understand the mitigation of a disruption using shattered pellet injection (SPI), we must better understand the process behind the shattering and subsequent flight of the shattered pellet material. The main questions that are being addressed are 1) what criteria must be met for a pellet to break upon impact with an angled surface? and 2) what is the resulting particle size distribution after shattering? These questions are addressed using theoretical shattering models and comparison with experimental measurements. Solid deuterium, neon, and argon are used in the various phases of disruption mitigation (DM) and thus, an overall model must accommodate the shattering of all mixtures of these gasses. Designs of SPI disruption mitigation systems are heavily influenced by the strategic shattering of pellets just before the entering the plasma. Experimental apparatuses that include pellet shatter tubes for JET and DIII-D were tested along with a large pellet, small angle, impact test that has implications for the ITER DM system. Comparison of the shattering measurements with the theoretical models will be shown.

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