Abstract Submitted
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Simulations and Validation of Disruption Mitigation and Projections to ITER's Disruption Mitigation System[1] CHARLSON KIM, SLS2 Consulting - San Diego, BRENDAN LYONS, YUEQIANG LIU, JOSEPH MCCLENAGHAN, PAUL PARKS, LANG LAO, General Atomics - San Diego, MICHAEL LEHNEN, ALBERTO LOARTE, ITER — High fidelity 3D initial value simulations of Shattered Pellet Injection (SPI)in DIII-D show that the ablating fragment drives strong parallel flows that transport the impurities along flux tubes and govern the thermal quench evolution. This parallel flow is halted when the "head bites the tail", limiting the overall spreading of impurities, and accounting for the observed radiation asymmetry peaking near the injector. DIII-D SPI simulations show that as the thermal quench proceeds, the peak radiation lags behind the ablating fragment and peaks in the accumulated cold impurities that builds up in the wake of the fragment trajectory. Impurity scans of mixed deuterium/neon SPI pellets show a more benign thermal quench due to the enhanced transport and dilution cooling caused by the addition of deuterium suggesting optimal pellet mixtures exist. NIMROD DMS simulations of the Q=10 ITER baseline scenario show that many of the same characteristics are seen in ITER thermal quenches as those observed in DIII-D, particularly the dominance of an n=1 instability in the final thermal collapse. These simulations will be compared along side DIII-D and other tokamak SPI simulations and an initial assessment of the viability of the proposed DMS in ITER will be presented.

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