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Analysis of Major Disruptions With Extremely Rapid Current Quenches in DIII-D and C-Mod[1] S. ANGELINI, R.S. GRANETZ, Massachusetts Institute of Technology, D.A. HUMPHREYS, A.W. HYATT, J.C. WESLEY, General Atomics — Major disruptions are characterized by a prompt loss of stored energy before any loss of position, and followed by a rapid current quench (CQ). The CQ often produces an uncontrolled loss of vertical position, leading to plasma-wall contact. A rapid CQ at this time can induce large destructive eddy currents in surrounding structures. Without motion, the CQ time is proportional to the pre-disruption plasma area, among other dependencies. CQ times are often normalized by plasma area for cross-machine comparisons, but this ignores the role of vertical motion in accelerating the CQ rate. Some major disruptions in DIII-D have unusually rapid vertical motion and a normalized current decay time less than 1 ms/m2, which would present a challenge to ITER's engineering design. C-Mod provides examples of plasmas similar to DIII-D's but with different CQ dynamics. We describe comparative analyses of C-Mod and DIII-D disruptions in order to determine whether extremely rapid CQ times are likely to occur in ITER.

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