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Characterization of Mode Activity during Disruptions for Shaped and Unshaped Plasmas[1] T.G. COWAN, J.P. LEVESQUE, M.E. MAUEL, P.E. HUGHES, Columbia University — Understanding the dynamics of disruptions in the High Beta Tokamak – Extended Pulse (HBT-EP) is the first step in modeling the halo currents that occur due to plasma-wall contact. Analysis of poloidal and toroidal magnetic diagnostic arrays shows that disruptions in circular, limited plasmas typically occur in two distinct phases. These phases are characterized by progressive increases in the current quench rate and a mode transition from m = 3 to m = 2. During the second phase, the plasma moves radially inward, contacts the inner edge of the vessel, and then decreases in minor radius. In the case of single-null diverted (shaped) plasmas, only the latter phase is observed. In both cases, an n = 1 kink mode is found to persist through the entirety of the disruption, with a frequency that increases over time. These findings warrant a measurement of the halo currents during the disruption, as well as an x-ray analysis of the plasma's interior.

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