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Onset conditions for disruptions during VDEs[1] JANARDHAN MANICKAM, Princeton University, STEFAN GERHARDT, Princeton University, ALLEN BOOZER, Columbia University, NSTX TEAM — The Vertical Displacement Event, VDE, evolves on a slow timescale relative to the ideal MHD Alfvenic timescale. At some point the kink mode is strongly destabilized, leading to the final disruption. In most cases this occurs when q-edge is slightly less than two. Non-axisymmetric halo currents are often observed, well before the disruption. The evolution of the plasma during the VDE is modeled as a sequence of shrinking equilibria, where the core current profile remains constant so that the safety-factor at the axis, q-axis, remains fixed and the q-edge systematically decreases. Stability analysis shows that the plasma is indeed stable or has a small growth-rate until q- edge drops below 2, at which point the growth-rate rises rapidly, approaching $\gamma T_A = 1$. The kink mode is characterized by $m/n = 2/1$, where m and n are the poloidal and toroidal mode numbers. The surface currents associated with the MHD perturbation are computed. These may be related to the non-axisymmetric component of the halo currents and may be providing stability at modest growth-rates. This model is compared with observations on NSTX.

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