Abstract Submitted
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A Sharp Boundary Model of Nonaxisymmetric Vertical Disruption Events in Tokamaks[1] RICHARD FITZPATRICK, Institute for Fusion Studies, U. Texas at Austin — A semi-analytic sharp boundary model of a nonaxisymmetric vertical disruption event (VDE) in a vertically elongated tokamak plasma is developed. The model is used to simulate nonaxisymmetric VDEs with a wide range of different plasma equilibrium and vacuum vessel parameters. These simulations yield poloidal halo current fractions and toroidal peaking factors that are similar to those seen in experiments. The simulations also reproduce the experimentally observed inverse scaling between the current fraction and the peaking factor. The peak poloidal halo current density is found to correlate strongly with the reciprocal of the minimum edge safety-factor attained during the disruption. The peak vertical force per unit area acting on the vacuum vessel is observed to have a strong correlation with the equilibrium toroidal plasma current at the onset of the disruption, but is also seen to increase with increasing vacuum vessel conductivity relative to the SOL plasma. Finally, the peak horizontal force is found to be largely determined by the plasma beta prior to the disruption.

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