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MHD Calculation of halo currents and vessel forces in NSTX VDEs J.A. BRESLAU, Princeton Plasma Physics Laboratory, H.R. STRAUSS, HRS Fusion, R. PACCAGNELLA, Consorzio RFX — Research tokamaks such as ITER must be designed to tolerate a limited number of disruptions without sustaining significant damage. It is therefore vital to have numerical tools that can accurately predict the effects of these events. The 3D nonlinear extended MHD code M3D [1] can be used to simulate disruptions and calculate the associated wall currents and forces. It has now been validated against halo current data from NSTX experiments in which vertical displacement events (VDEs) were deliberately induced by turning off vertical feedback control. The results of high-resolution numerical simulations at realistic Lundquist numbers show reasonable agreement with the data, supporting a model in which the most dangerously asymmetric currents and heat loads, and the largest horizontal forces, arise in situations where a fast-growing ideal 2,1 external kink mode is destabilized by the scraping-off of flux surfaces with safety factor $q > 2$ during the course of the VDE.

[1] W. Park, et al., Phys. Plasmas **6** (1999) 1796.

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