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Wall touching kink mode calculations with the M3D code J.A. BRESLAU, Princeton Plasma Physics Laboratory — In recent years there have been a number of results published [1-3] concerning the transient vessel currents and forces occurring during a tokamak VDE, as predicted by simulations with the nonlinear MHD code M3D [4]. The nature of the simulations is such that these currents and forces occur at the boundary of the computational domain, making the proper choice of boundary conditions critical to the reliability of the results. The M3D boundary condition includes the prescription that the normal component of the velocity vanish at the wall. It has been argued [5] that this prescription invalidates the calculations because it would seem to rule out the possibility of advection of plasma surface currents into the wall. This claim has been tested by applying M3D to an idealized case - a kink-unstable plasma column - in order to abstract the essential physics from the complications involved in the attempt to model real devices. While comparison of the results is complicated by effects arising from the higher dimensionality and complexity of M3D, we have verified that M3D is capable of reproducing both the correct saturation behavior of the free boundary kink and the "Hiro" currents arising when the kink interacts with a conducting tile surface interior to the ideal wall. [1] H.R. Strauss, R. Paccagnella, and J. Breslau, *Phys. Plasmas* **17**, 082505 (2010). [2] H. Strauss, R. Paccagnella, J. Breslau, L. Sugiyama, and S. Jardin, *Nucl. Fus.* **53**, 073018 (2013). [3] H. Strauss, L. Sugiyama, R. Paccagnella, J. Breslau, and S. Jardin, *Nucl. Fus.* **54**, 043017 (2014). [4] W. Park, *et al*, *Phys. Plasmas* **6,** 1796 (1999). [5] L.E. Zakharov, Phys. Plasmas **17**, 124703 (2010).

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