# Investigation of Boundary Conditions for Vertical Displacement Events with NIMROD*

K. J. Bunkers and C. R. Sovinec
University of Wisconsin-Madison

Disruptions and associated vertical displacement events (VDEs) pose significant risk of damage to ITER and other large tokamak experiments. We are using the NIMROD code [Sovinec, et al., JCP 195, 335] to simulate disruptions with the aim of understanding their dynamics and improving mitigation systems. Plasma is represented with fluid-based models in the central region and is electrically connected to an external vacuum region by a thin resistive wall. Axisymmetric computations show that the evolution is sensitive to boundary conditions on temperature, but those on particle density have less influence. When tokamak plasma approaches the wall in experiments, it effectively transitions to a limited configuration, and plasma-surface effects can be important. Moreover, currents can flow through the wall and connect through open field lines in the halo region of the plasma. Appropriate boundary conditions are important for accurately modeling and assessing these phenomena. Boundary conditions based on the magnetic presheath entrance have been derived in the ion drift approximation [Loizu, Phys. Plasmas 19, 122307] and are being modified for our boundary modeling. The condition on flow is a Bohm-like condition with the parallel velocity being the sound speed, and there is flow both normal and tangential to the first wall. In addition, thermally insulating conditions with Dirichlet conditions on particle density are used. Comparisons between axisymmetric VDE results with these magnetic presheath boundary conditions and with other temperature and flow velocity boundary conditions are presented.

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