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Initial Computations of Vertical Displacement Events with
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Disruptions associated with vertical displacement events (VDEs) have potential for
causing considerable physical damage to ITER and other tokamak experiments. We
report on initial computations of generic axisymmetric VDEs using the NIMROD
code [Sovinec, et. al., JCP 195, 355 (2004)]. An implicit thin-wall computation has
been implemented to couple separate internal and external regions without numerical
stability limitations. A simple rectangular cross-section domain generated with
the NIMEQ code [Howell and Sovinec, CPC (2014)] modified to use a symmetry
condition at the midplane is used to test linear and nonlinear axisymmetric VDE
computation. As current in simulated external coils for large-$R/a$ cases is varied,
there is a clear $n = 0$ stability threshold which lies below the decay-index criterion
for the current-loop model of a tokamak to model VDEs [Mukhovatov and Shafranov,
Nucl. Fusion 11, 605 (1971)]; a scan of wall distance indicates the offset is due
to the influence of the conducting wall. Results with a vacuum region surrounding
a resistive wall will also be presented. Initial nonlinear computations show large
vertical displacement of an intact simulated tokamak.

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