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Implementation of Field Error and Resistive Wall Boundary Conditions in Finite Element Codes SCOTT KRUGER, Tech-X Corporation, DALTON SCHNACK, SAIC — Current tokamak experiments depend critically on the boundary conditions of the magnetic fields for effective operation. While non-axisymmetric boundary conditions have been considered deleterious for plasma operation because of locked modes [J.T. Scoville et.al Nuclear Fusion 31, 875 (1991)], recent experiments show they might be advantageous for ELM control [T.E. Evans et.al. PRL 92, 235003 (2004)]. Instabilities which can arise due to the finite resistivity of the wall have also emerged as a problem for advanced tokamak operation.¹ Implementation of these boundary conditions into finite element codes requires a different formulation of the boundary conditions as compared to the finite difference codes in earlier work [D.J. Ward and A. Bondeson, Phys. Plasmas 2, 1570 (1995)]. Here, we review the proper formulation with particular attention paid to numerical accuracy of the method.

¹A. Garafalo et.al. Phys. Plasmas 9, 1997 (2002)

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