Non-Ideal Plasma Equilibrium Model for RWM Simulations[1]

DOV RHODES, J. BIALEK, A.H. BOOZER, A.J. COLE, M.E. MAUEL, G.A. NAVRATIL, Q. PENG, Columbia University
— The resistive wall mode (RWM) in tokamaks has been successfully simulated with the VALEN code [1], which computes the coupling between the plasma and conducting surfaces in the device. Presently, VALEN uses an ideal plasma equilibrium computed from DCON [2], neglecting non-ideal torques which play a central role in RWM stabilization. We are developing a numerical tool to include these non-ideal magnetic torques in future VALEN simulations of the RWM. As a first step, we include the effects of resonant torques on mode-rational surfaces, as formulated in a simplified non-ideal plasma response model [3]. The next phase of this research will include additional magnetic torques from neoclassical toroidal viscosity. Preliminary simulation results will be presented and compared with resonant perturbation experiments on HBT-EP.

[1] J. Bialek, Phys. Plasmas 8, 2170 (2001)
[2] A.H. Glasser, Los Alamos Technical Report No. LA-UR-95-528, 1995
[3] R. Fitzpatrick, Phys. Plasmas 17, 112502 (2010)

Dov Rhodes
Columbia University

Date submitted: 12 Jul 2013   Electronic form version 1.4