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Magnetic-perturbation-induced plasma transport in H-mode pedestals[1] J.D. CALLEN, A.J. COLE, C.C. HEGNA, University of Wisconsin — Plasma toroidal rotation can prevent reconnection of externally applied resonant magnetic perturbation (RMP) fields on rational surfaces and hence magnetic island formation and stochasticity in the edge of tokamak H-mode plasmas. However, magnetic flutter induced by RMPs off the rational surfaces causes a radial electron heat diffusivity $\chi_e^{RMP} \sim (\delta B_r/B_0)^2 \chi_\parallel F(x)$ in which $\chi_\parallel \sim v_{Te}^2/\nu_e$ is an effective parallel electron heat diffusivity and F is a spatially varying factor [1]. The flutter also diffuses electrons radially and causes a factor of about 3 smaller increases in density diffusion. Since the electron density transport is non-ambipolar, this flutter process also modifies the radial electric field and plasma toroidal rotation. This work extends the previously developed periodic cylinder screw pinch model [1] of RMP-flutter-induced plasma transport to a full toroidal model which is axisymmetric to lowest order plus gyroradius-small magnetic field perturbations. The possible role of the RMP-flutter-induced plasma transport in reducing pressure gradients in H-mode pedestals and thereby suppressing ELMs will be discussed.

[1] J.D. Callen et al., UW-CPTC 11-13, http://www.cptc.wisc.edu (submitted to Nucl. Fusion.)

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