

CORRIGENDUM

Ripple modifications to alpha transport in tokamaks – CORRIGENDUM

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Numerical coefficients are incorrect at the end of §8 and in two places in the summary in §9 of Catto (2018). The material before (8.39) is unaffected. To evaluate the pitch angle integral in (8.39), $\chi = \eta\sqrt{2k\ell n(\sqrt{2k})}$ with $\eta = (1 - \kappa)/8$ should have been used. And on the right-hand side of (8.40) there is a 4π missing in the denominator. The overall effect is to increase the size of the coefficients of the fluxes and diffusivities by $16/\pi$ and to remove the 64 from all $\ell n(\sqrt{2k\ell n(\sqrt{2k})})$ and $\ell n(\sqrt{2k_0\ell n(\sqrt{2k_0})})$ terms. Correcting these errors (8.39), (8.40), (8.42) and (8.43) become as follows:

$$\begin{aligned} & \operatorname{Re} \left\langle \sin \vartheta e^{-i\vartheta} \int_{B_0/\widehat{B}}^{B_0/B} d\lambda \frac{\lambda}{\xi} [e^{-(1-i)\eta\sqrt{2k\ell n(\sqrt{2k})}} - 1] \right\rangle \\ & \simeq -\frac{\sqrt{2\delta}}{\pi} \operatorname{Re} \left\{ i \int_0^1 d\kappa \kappa [e^{-(1-i)\eta\sqrt{2k\ell n(\sqrt{2k})}} - 1] \ln \left(\frac{1}{\eta} \right) \right\} \\ & \simeq -\frac{8\sqrt{\delta}\ell n[\sqrt{2k\ell n(\sqrt{2k})}]}{\pi\sqrt{k\ell n(\sqrt{2k})}} \operatorname{Re} \left[i \int_0^\infty d\chi e^{-(1-i)\chi} \right] \\ & = 4\sqrt{\delta} \frac{\ell n[\sqrt{2k\ell n(\sqrt{2k})}]}{\pi\sqrt{k\ell n(\sqrt{2k})}}, \end{aligned} \tag{8.39}$$

$$\int_0^{v_0} dv v^{9/2} (Mv^2/2)^d \frac{\ell n[\sqrt{2k\ell n(\sqrt{2k})}]}{\sqrt{\ell n(\sqrt{2k})}} \frac{\partial f_s}{\partial \psi} \simeq \frac{v_0^{5/2} (Mv_0^2/2)^d \ell n[\sqrt{2k_0\ell n(\sqrt{2k_0})}]}{2\pi(5+4d)\sqrt{\ell n(\sqrt{2k_0})\ell n(v_0/v_c)}} \frac{\partial n_s}{\partial \psi}, \tag{8.40}$$

$$\Gamma_d^{\sqrt{v}} \simeq -\frac{\varepsilon^2 B_0^2 v_\lambda^{3/2} v_0^{5/2} (Mv_0^2/2)^d \ell n[\sqrt{2k_0\ell n(\sqrt{2k_0})}]}{8\pi(5+4d)q^{1/2}\Omega_0^2 \omega \sqrt{\omega\tau_s} \ell n(2k_0) \ell n(v_0/v_c)} \frac{\partial n_s}{\partial \psi}, \tag{8.42}$$

$$D_0^{\sqrt{v}} \simeq \frac{(qv_\lambda/v_0)^{3/2} (\rho_0 v_0/R)^2 \ell n[\sqrt{k_0\ell n(2k_0)}]}{40\pi\omega\sqrt{\omega\tau_s} \ell n(2k_0) \ell n(v_0/v_c)}. \tag{8.43}$$

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In addition, the erroneous τ_s has been removed from the numerator of (8.42). These errors in numerical coefficients alter (9.3) and (9.4) which become

$$\frac{\omega\tau_s}{q} \sim \left[\frac{\ln(\sqrt{k_0\ln(2k_0)})}{1.8\sqrt{\ln(2k_0)}} \right]^{2/3}, \quad (9.3)$$

and

$$\frac{\omega R}{qv_\lambda} \gg \left[\frac{\ln(\sqrt{k_0\ln(2k_0)})}{40\pi\ln(v_0/v_c)\sqrt{\ln(2k_0)}} \right]^{2/3} \left(\frac{\rho_0}{a_\alpha} \right)^{4/3} \left(\frac{v_0\tau_s}{R} \right)^{1/3}. \quad (9.4)$$

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REFERENCE

- CATTO, P. J. 2018 Ripple modifications to alpha transport in tokamaks. *J. Plasma Phys.* **84**, 905840508 (39 pp).