Corrigendum:

Theory of plasma confinement in non-axisymmetric magnetic fields

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There are two errors in this paper. The first one was kindly pointed out by Dr. Gabriel Plunk and concerns the first equation in Section 3.2,

$$\mathbf{b}\cdot\dot{\mathbf{R}} = \mathbf{b}\cdot\left(\frac{\partial\mathbf{R}}{\partial l}\dot{l} + \frac{\partial\mathbf{R}}{\partial\psi}\dot{\psi} + \frac{\partial\mathbf{R}}{\partial\alpha}\dot{\alpha}\right),$$

where the last two terms are relatively small and were therefore neglected. This approximation is however not accurate enough for calculating the drift velocity. When these terms are retained, the Lagrangian and the canonical momenta become

$$L = \frac{m}{2}\left[\dot{l} + \mathbf{b}\cdot\left(\frac{\partial\mathbf{R}}{\partial\psi}\dot{\psi} + \frac{\partial\mathbf{R}}{\partial\alpha}\dot{\alpha}\right)\right]^2 - Ze\alpha\dot{\psi} - \mu B - Ze\phi,$$

$$p_\alpha = mv_\parallel\mathbf{b}\cdot\frac{\partial\mathbf{R}}{\partial\alpha},$$

$$p_\psi = -Ze\alpha + mv_\parallel\mathbf{b}\cdot\frac{\partial\mathbf{R}}{\partial\psi},$$

and the drift equations become to leading order

$$\frac{d}{dt}\left(\psi + \frac{mv_\parallel}{Ze}\mathbf{b}\cdot\frac{\partial\mathbf{R}}{\partial\alpha}\right) = -\frac{\mu}{Ze}\frac{\partial B}{\partial\alpha} - \frac{\partial\phi}{\partial\alpha} = \frac{mv_\parallel}{Ze}\left(\frac{\partial v_\parallel}{\partial\alpha}\right)_{H,\mu,\psi,l},$$

$$\frac{d}{dt}\left(\alpha - \frac{mv_\parallel}{Ze}\mathbf{b}\cdot\frac{\partial\mathbf{R}}{\partial\alpha}\right) = \frac{\mu}{Ze}\frac{\partial B}{\partial\psi} + \frac{\partial\phi}{\partial\psi} = -\frac{mv_\parallel}{Ze}\left(\frac{\partial v_\parallel}{\partial\psi}\right)_{H,\mu,\psi,l},$$

instead of Eqs. (58) and (59). The second terms in the brackets on the left contain the curvature drift but make no difference to the result that is obtained if the equations are integrated over the time it takes for the guiding centre to travel from one bounce point to the next, since $v_\parallel = 0$ at these points. Equations (60)-(61) and the discussion that follows them are therefore unaffected.

The second error is a misprint in the last equation of Section 3.7, which should be

$$\left\langle\int_0^1 \mathbf{v}_d\cdot\nabla\alpha\, d\xi\right\rangle = \frac{v^2B}{3\Omega}\left\langle\nabla\cdot\left(\frac{\mathbf{B}\times\nabla\alpha}{B^2}\right)\right\rangle$$

$$= \frac{v^2B}{3\Omega V'}\frac{d}{d\psi}V'\left\langle\frac{\mathbf{B}\times\nabla\alpha}{B^2}\cdot\nabla\psi\right\rangle = -\frac{v^2B}{3\Omega}\frac{V''}{V'}.$$