Abstract Submitted
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Theory and Simulation of Field Error Transport.[1] D.H.E. DUBIN, UCSD — The rate at which a plasma escapes across an applied magnetic field B due to symmetry-breaking electric or magnetic "field errors" is revisited. Such field errors cause plasma loss (or compression) in stellarators, tokamaks,[2] and nonneutral plasmas.[3] We study this process using idealized simulations that follow guiding centers in given trap fields, neglecting their collective effect on the evolution, but including collisions. Also, the Fokker-Planck equation describing the particle distribution is solved, and the predicted transport agrees with simulations in every applicable regime. When a field error of the form $\delta\phi(r,\theta,z) = \varepsilon(r)e^{im\theta}\sin kz$ is applied to an infinite plasma column, the transport rates fall into the usual banana, plateau and fluid regimes. When the particles are axially confined by applied trap fields, the same three regimes occur. When an added "squeeze" potential produces a separatrix in the axial motion, the transport is enhanced, scaling roughly as $(\nu/B)^{1/2}\delta\phi^2$ when $\nu < \omega$. For $\omega < \nu < \omega_B$ (where ω, ν and ω_B are the rotation, collision and axial bounce frequencies) there is also a $1/\nu$ regime similar to that predicted for ripple-enhanced transport.[1]

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[2]H.E. Mynick, *Ph Plas* **13** 058102 (2006).
[3]Eggleston, *Ph Plas* **14** 012302 (07); Danielson et al., *Ph Plas* **13** 055706.

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