

Abstract Submitted
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Effect of a strong equilibrium electric field on the zonal flow residual in quasisymmetric stellarators MATT LANDREMAN, PETER CATTO, MIT PSFC — It was recently shown [1] that several neoclassical formulae for tokamaks can be significantly modified if the radial electric field is as large as that observed in a pedestal – specifically, if $d\Phi/dr \sim T/(e\rho_{\text{pol}})$, where ρ_{pol} is the poloidal ion gyroradius. In the present work, we consider the same modification of neoclassical quantities in quasisymmetric stellarators, beginning with the zonal flow residual [2]. The tokamak analysis in [1] exploited the conservation of canonical angular momentum. The analysis therefore requires modification in stellarators, in which canonical angular momentum is not conserved. In its place, one can use the “helical momentum” which is known to be conserved if the magnetic field is quasisymmetric [3].

[1] Kagan and Catto, *Phys. Plasmas* **16**, 056105 (2009).

[2] Rosenbluth and Hinton, *Phys. Rev. Lett.* **80**, 724 (1998).

[3] Boozer, *Phys. Fluids* **26**, 496 (1983).

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