

Abstract Submitted
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Effect of impurities on the turbulent momentum pinch in tokamaks¹ FELIX I. PARRA, MICHAEL BARNES, Plasma Science and Fusion Center, MIT, WILLIAM D. DORLAND, University of Maryland — In tokamaks, rotation shear is not the only effect that drives turbulent momentum transport. There is a pinch of momentum due to the Coriolis force that appears in the frame rotating with the plasma [1]. This Coriolis force breaks a symmetry of the nonlinear gyrokinetic equations that makes the turbulent momentum transport vanish [2]. Interestingly, the turbulent momentum pinch vanishes for adiabatic electrons even though the symmetry of the equations is broken. We prove this cancellation for the nonlinear gyrokinetic equations. The proof also provides the circumstances under which the momentum pinch is non-zero, showing that the presence of impurities with a ratio of charge over mass Z_s/m_s different from the main ion species is sufficient to drive a momentum pinch. We will confirm these results with nonlinear gyrokinetic simulations using GS2, proving that the impurities are as important for the momentum pinch as trapped electrons.

[1] A.G. Peeters, C. Angioni and D. Strintzi, *Phys. Rev. Lett.* **98**, 265003 (2007).

[2] F.I. Parra, M. Barnes and A.G. Peeters, *Phys. Plasmas* **18**, 062501 (2011).

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