

Abstract Submitted
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On pressure balance in a low collisionality tokamak scrape-off layer R.M. CHURCHILL, C.S. CHANG, R. HAGER, Princeton Plasma Physics laboratory — Understanding the physics governing the scrape-off layer is necessary in order to reliably predict machine and operation critical quantities, such as the heat flux width at the divertor, plasma-wall interaction, material migration, effect of divertor condition on the pedestal profile, detachment of the divertor plasma, etc. Recent simulation results using the axisymmetric gyrokinetic code XGCa suggest that in a lower ion collisionality near scrape-off layer, where the plasma is highly non-Maxwellian, the fluid form of the momentum equation is not conserved between the low-field side (LFS) midplane and divertor. Taking care to include neutral friction and a Chew-Goldberger-Low (CGL) form of the pressure tensor (i.e. only the dominant diagonal terms) does not resolve the imbalance. Using the full kinetic distribution function in the XGC gyrokinetic code, we explore the effect of off-diagonal pressure tensor terms, to determine their effect in the momentum balance in the scrape-off layer. We also explore other simulations with higher ion collisionality, to begin to study the effect of ion collisionality versus proximity to the separatrix (flux surfaces closer to the separatrix can be more influenced by e.g. X-point loss).

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