

Poloidal asymmetry of perpendicular velocity of the density fluctuations

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Simultaneous measurements of binormal velocity of density fluctuations using two separate Doppler backscattering systems at the low field side and at the top of the plasma show significant poloidal asymmetry [1]. The measurements are performed in the core region between the radii ($0.7 < r/a < 0.95$), over a limited number L-mode discharges covering a wide range of plasma conditions in the Tore Supra tokamak.

Ripple effect is a possible cause of this asymmetry since non-ambipolar particle flux induced by ripple losses have been shown to be the dominant mechanism that sets the radial electric field in the plasma core on Tore Supra. In this previous work, only the flux surface average of the radial electric field was derived and compared to measurements. In reality, since the magnetic ripple decreases significantly from low field side toward high field side, a possible poloidal dependence of the radial electric field induced by ripple losses is conceivable.

In addition, the generation of convective cells by underlying turbulence, as discussed in [2] has been extended to binormal velocity generation in presence of ballooned turbulence for explaining the observation of these poloidally asymmetric mean flows.

In the present contribution, these two possible origins of this unexpected poloidal asymmetry are investigated experimentally and through comparisons with numerical simulations. For this purpose, simulations are performed using a full-f, semi-Lagrangian, global gyrokinetic simulations obtained using the GYSELA code and as much as possible, the experimental radial profiles as well as a simplified synthetic Doppler backscattering diagnostic to reconstruct the perpendicular velocity of density fluctuations.

[1] L. Vermare et al, accepted to Physics of Plasmas

[2] X. Garbet et al, *Impact of flow asymmetries on transport in tokamaks*, invited talk at this conference