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Finite Plasma Beta Effect on Turbulent Particle and Energy Transport in Electron Temperature Gradient driven Turbulent Plasma of Large Volume Plasma Device

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Plasma transport across the confining magnetic field continues to bother fusion fraternity; consequently, numerous efforts are dedicated on its experimental, theoretical and computational investigations. Although, the problem concerning ion scales is greatly resolved but electron scale contribution to plasma loss still unresolved. The reason may be the inability of carrying out direct measurements in fusion devices because of the extremely small scale length of instability and violent conditions [1].

Recent success on unambiguous demonstration of excitation of Electron Temperature Gradient (ETG) turbulence in Large Volume Plasma Device (LVPD) has motivated us to investigate turbulent transport induced by ETG turbulence [2]. We investigated convective particle transport and compared it's both electrostatic and electromagnetic components with theoretical estimates and found that they are directed radially inward [3]. The EM flux is found finite and non- zero against predicted zero for slab ETG model but its magnitude is extremely small compared to ES flux [4]. We varied plasma beta between ($\beta \sim$ 0.01- 0.2) and observed that despite reduction in density fluctuations with increasing beta, the contribution to particle flux increases as shown in Figure 1, which is surprising. Thus for the details, the effect of plasma beta on particle and energy transport, a simultaneous measurement of temperature, potential and density fluctuations are carried out. Detailed results of phase angle modifications and temperature fluctuations contribution to plasma particle and energy transport will be presented in the conference with plasma beta variation.

References

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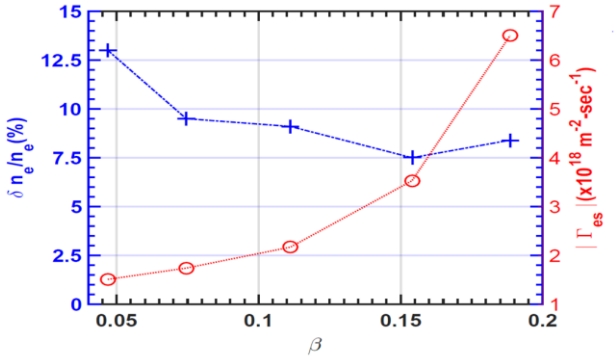

Figure 1: Variation of density fluctuation and particle flux with plasma beta (β) variation