Electron Temperature Gradient (ETG) Turbulence Induced Particle Transport in Finite Beta Laboratory Plasma

Prabhakar Srivastav[1], Rameswar Singh[1], L. M. Awasthi[1], A. K. Sanyasi[1], P. K. Srivastava[1], R. Sugandhi[1] and R. Singh[2]

[1]*Institute for Plasma Research, HBNI, Gandhinagar, India*

[2] *Advance Technology Center, NFRI, Daejeon, Rep. of Korea*

Abstract

Plasma transport across confining magnetic field continues to bother fusion fraternity, engendering numerous efforts on experimental, theoretical and computational studies. Although, over recent times, problem concerning ion scales is greatly resolved but success on containing electron scale contribution to plasma loss still eludes. The reason for this may be the inability of carrying out direct measurements in fusion devices due to extremely small scale lengths and unfavorable conditions [1].

Prompted by recent success of successful demonstration of unambiguous excitation of Electron Temperature Gradient (ETG) turbulence, by introduction of a Electron Energy Filter (EEF) in Large Volume Plasma Device (LVPD)[2]. This helped in tailoring plasma for satisfying threshold condition of ETG i.e., $\eta_e = L_{n_e} / L_{T_e}$, where L_{n_e} and L_{T_e} are plasma density and electron temperature gradient scale lengths respectively. We investigated particle transport, classified as either electrostatic or magnetic in origin, in finite beta ($\beta \sim 0.01-0.4$) plasma of LVPD and observed particle flux follow the beta scaling for ETG turbulence. Detailed Results on effect of plasma beta scaling on electrostatic and electromagnetic components of particle flux and their respective dominance towards contributing plasma loss will be presented in the conference.

References:

1. P. C. Liewer, Nucl. Fusion **25**, 543 (1985).
2. S.K. Mattoo, *et.al* Phys. Rev. Lett. **108**, *255007(2012)*