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Excitation of plasma turbulence in cross field diffused plasma of LVPD-U

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Characterization of a weakly magnetized plasma, confined at an ambient magnetic field of $B_z = 6G$ with large area multi-filamentary plasma source (LAMPS)[1] in large volume plasma device[2] – upgrade (LVPD-U) is presented. The plasma conditions in LVPD-U are controlled with a large solenoidal system called as electron energy filter (EEF)[3] producing variable magnetic fields transverse to the axial magnetic field ($B_{EEF} \perp B_z$). The EEF has been subjected to two imposed conditions for the characterization of plasma i.e. 1) to produce spatially uniform transverse magnetic field, $B_x \leq 120G$ by charging different lengths of EEF coils (1 to 19) keeping radial symmetry and 2) by changing the magnetic field of EEF from $0G$ to $140G$ thus changing B_x/B_z ratio. The EEF divides LVPD-U plasma into three distinctly different experimental regions named as source, EEF and target plasmas. The EEF presents an interesting scenario of cross field transport of magnetized plasma across uniform transverse magnetic field. The charging of physical structure of EEF forms large sheaths within the interacting plasma volume and simultaneously it imposes a barrier to transport of energetic electrons with strong transverse field, once activated. Our initial observations confirm that the EEF is still effective to restrict the plasma transport and excitation of low frequency ($\omega_{ci} < \omega \ll \omega_{ce}$) plasma turbulence with high degree correlation between density and potential fluctuations in target plasma with modified large area plasma uniform source function and thus qualifies the plasma suitability for fundamental plasma waves and instability studies.

References:

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