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Chord Average Density Measurement using Microwave Interferometry in LVPD

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Microwave interferometer diagnostic is designed and installed for carrying out chord averaged density measurements for plasma density between $\sim 5 \times 10^{10} - 6 \times 10^{11} cm^{-3}$ respectively in the Source and Target plasma regions of Large Volume Plasma Device (LVPD). These regions are developed in LVPD by the introduction of large Electron Energy Filter (EEF). This helped in making LVPD plasma suitable for investigating Electron Temperature Gradient (ETG) turbulence, a major source of plasma loss in fusion devices. In order to get hands on information about plasma density, the concept of microwave interferometry is conceived. Measurements made by this technique will be compared with density obtained using conventional Langmuir probes. Even though, Langmuir probe diagnostic is widely used in most of the low temperature plasma devices but electron temperature estimated by it suffer with certain degree of error because of measurement uncertainty of 10%, which subsequently corrupts estimate of plasma density. This has prompted us to develop a resident diagnostic based on microwave interferometry for density measurement, which can provide suitable calibration to density measurements made by Langmuir probes.

This paper will present results on design details of microwave diagnostic and its application to LVPD plasma. Plasma of different densities will be produced by varying heating current to cathode, for test and validating the diagnostics. A comparison of chord averaged density measured by microwave interferometry with Langmuir probe data will be presented.

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