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Spectroscopic Studies on GLAST-III Tokamak by Varying the Inductance and Charging Voltage of Vertical Field Coils

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Optical emission spectroscopy is applied as a diagnostic tool to investigate the plasma in GLAST-III (glass spherical tokamak) at different scenarios. It is a small limiter device having aspect ratio (R/a = 2) with major radius R = 20 cm and minor radius a = 10 cm. Spectral analysis is performed to study the plasma induced optical emission and the electron temperature for different values of charging voltage, and inductance of vertical field (VF) coils. The inductance of the VF is changed by varying number of inductors in series systematically. HR-4000 spectrometer is used to record the spectrum in the visible range (280-750 nm). The electron temperature is determined from the emission intensity of argon (Ar is used as feed gas) lines by using Boltzmann plot method. The optical emission is also recorded using photodiode BPX65. Hα line impurity is monitored using Monochromator with fixed position of grating at 656.28 nm, and intensity follows the plasma current during discharge. The results indicate that the emission intensity decrease with increase of the inductance of VF coils. Consequently, with addition of inductors the plasma current, and electron temperature both are reduced. The effect of charging voltage of VF coils on the plasma current and hence electron temperature is also calculated. It is observed that with the increase of Charging voltage of PF coils, the plasma current increases, attain a maximum value and then after a critical value of charging voltage the plasma current starts decreasing.

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