



Estimation of mutual inductances and measurement of reflected voltage for designing a power supply for shaped plasma operation in ADITYA – U tokamak

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The existing ADITYA machine, a medium sized tokamak with limiter configuration has been upgraded to a tokamak with divertor configuration [1]. This moderate field tokamak is capable of producing 250 kA of plasma current with 300 ms duration. Two new sets of divertor coils have been added to the system with an objective of producing shaped plasmas in ADITYA Upgrade. Divertor coils are made up of Continuously Transposed Conductor (CTC). The simulated plasma double null configuration demands 150 kAT of NI for the inner divertor coils and 10 – 20 kAT of NI for outer divertor coils. The inner divertor coils consists of six turns whereas the outer divertor is a single turn coil. Therefore, current ~ 25 kA is required in the inner divertor coils at 0.5 MA/Sec rise rate. The mutual inductance due to surrounding coils (Ohmic, VF and FFB) has been estimated and reflected voltages due to surrounding coils on divertor coils has been measured. The maximum measured reflected voltage across the main divertor coils during the plasma discharges operation of ADITYA- U is ~120 volt. The measured values of reflected voltages matches quite well with simulated values using the mutual inductances of the coils. Based on these calculations and measurement, the power supply for the divertor coils are designed. The complete design along with all the required controls of the divertor coils power supply will be presented in this paper.

References:

- [1] Ghosh J. et al 2016 Upgradation of ADITYA tokamak with limiter configuration to ADITYA upgrade tokamak with divertor configuration 2016 IAEA Fusion Energy Conf. (Kyoto), 17-22 October, 2016 (FIP/P4-46) Nucl. Fusion submitted. Pre-print:
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