

Understanding the effect of auxiliary transformer action on the plasma current in ADITYA-U tokamak

Abstract

The tokamak operation is based upon transformer action by changing the magnetic flux (current) through the central solenoid or ohmic transformer coil. A voltage (known as loop voltage) is induced which breaks the fuel gas and drives the plasma current. Once the plasma is initiated, maintaining the current is essential for sustaining the magnetic confinement. The time-varying current is supplied by a bipolar power supply with output current in both positive and negative direction. The auxiliary transformer plays a key role in this by providing smooth current transition from positive to negative current which helps to maintain the necessary plasma current as the tokamak continues to operate. The plasma current governs the stability and the overall behavior of the plasma. The auxiliary transformer is a critical component in ADITYA-U tokamaks for controlling the plasma current and transition to negative converter operation.

In this work, a study will be performed to analyse the effect of auxiliary transformer operation on plasma current at different operational values in ADITYA-U tokamak. Finally, a scaling will be established between the plasma current magnitude and loop voltage to estimate the future operation at high parameter operation in ADITYA-U tokamak.

Academic Project Requirements:

1) Required No. of student(s) for academic project: 2

2) Name of course with branch/discipline: B.E./B.Tech. Electrical

3) Academic Project duration:

(a) Total academic project duration: 25 Weeks

(b) Student's presence at IPR for academic project work: 3 Full working Days per week

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