

Seminar

Institute for Plasma Research

Title : Estimation of Plasma Column Position by
Mirnov Coil Measurements

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Date : 30th January 2019 (Wednesday)

Time : 03.30 PM

Venue : Committee Room 3, (New Building), IPR

Abstract :

Due to several forces acting on the plasma column in a tokamak, the plasma column tends to move horizontally and/or vertically leading to many adverse events including termination of plasma. The movement of plasma column is stabilised using equilibrium magnetic fields (vertical magnetic fields). The required magnitude of the equilibrium field depends on the plasma parameters. The dynamical variation of the plasma parameters throughout the discharge demands appropriate alterations of magnitude of equilibrium magnetic field in real time during the discharge to obtain a stable plasma column position inside the tokamak. To determine the appropriate magnitude of this equilibrium magnetic field, accurate measurement of plasma column position throughout the discharge with good temporal resolution is a necessity.

Among different estimation methods of plasma column location, the plasma position estimation using poloidal garland of magnetic probes (Mirnov coils) is extensively used in many tokamaks and is being proposed to measure the plasma position in Aditya-U tokamak. The Aditya-U has two Mirnov probes garlands, each of them has 16 magnetic probes, distributed at equal angular separation in poloidal plane. Both the garlands are installed at two different toroidal locations inside vacuum vessel at opposite positions. To estimate the plasma column position using these Mirnov coils, the first task is to calibrate these coils. For calibrating these coils, the plasma current centroid is simulated by passing current through a toroidal conductor placed at different locations inside the Aditya-U vacuum vessel. Due to the current in the conductor, the magnetic field picked-up by the coils of both the Mirnov garlands has been recorded. By analysing the recorded data the position of the conductor is determined and matched with its actual location. The detail calibration procedure, analysis of calibration data based on numerical code and the plasma position estimation based on analysis for Aditya-U will be discussed in this presentation.
