Contribution ID: **720** Type: **Poster**

Plasma Column Position Measurements using Magnetic Diagnostics in ADITYA-U Tokamak

Wednesday 24 October 2018 14:00 (20 minutes)

In a tokamak, for real-time control of plasma column movement, both horizontal and vertical, accurate measurements of plasma column location is compulsory. Magnetic pick-up coils, measuring induced voltage due to change in flux–linkage to them, are widely used of the measurement of temporal evolution of plasma column position in a tokamak. Although measurements of induced voltages are relatively easy, estimation of plasma column position from these measurements are not very straightforward and requires accurate calibration of the coils and huge amount of modeling.

In order to measure the plasma column position accurately in ADITYA-U tokamak, several types of magnetic probes are introduced. They include, Mirnov coils, external pick-up coils, Sine-Cosine coils and flux loops. To have a proper calibration factor for these probes, which is a necessity for overcoming geometrical imperfections, discrepancies introduced during installations as well as error magnetic fields from eddy currents in vacuum vessel, an in-situ calibration experiment has been carried out. A time varying current has been passed through a rigid copper conductor placed at different radial and vertical locations inside the vacuum vessel. Induced voltages in all the magnetic probes are recorded due to the different temporal profiles of driven current in the conductor. In addition to that, the magnetic pick-ups by these probes due to different poloidal magnetic field coils, which are operated during plasma operations, has also been measured by driving current through those coils in absence of plasma.

Based on these observations several numerical codes have been developed which analyse the raw data from these magnetic probes during plasma shots. After removing all the unwanted flux-linkages to the probes due to vessel eddies and other set of magnetic coils used for plasma operation, the temporal evolution of plasma column's horizontal and vertical movement has been estimated in real time. The plasma column position measured with these probes matches fairly well with other diagnostics, such as, edge Langmuir probes, fast camera images etc. Finally the real time measurements of position movement of plasma column during the plasma discharges have fed onto the plasma position control system for real time control of plasma position in ADITYA-U tokamak.

Country or International Organization

India

Paper Number

EX/P4-31

Author: Mr AICH, Suman (Scientific officer C)

Co-authors: Mr GUPTA, C N (InIPR); Mr KUMAWAT, Devilal (Institute for plasma Research Bhat Gandhinagar); Dr GHOSH, Joydeep (Institute for Plasma Research); Mr PATEL, Kaushal (Institute for Plasma Research); Mr JADEJA, Kumarpalsinh (Institute for plasma Research); Ms SHAH, Minsha (InIPR); Mr E. V, Praveenlal (InIPR); Mr KUMAR, ROHIT (Institute For Plasma Research); Dr DANIEL, Raju (InIPR); Mr TANNA, Rakesh (Institute For Plasma Research); Mr MACWAN, Tanmay (Institute for Plasma Research)

Presenter: Mr AICH, Suman (Scientific officer C)

Session Classification: P4 Posters