Contribution ID: **526** Type: **Poster**

Development of Various diagnostics for NNBI program in IPR

Friday 26 October 2018 14:00 (20 minutes)

The characteristics of a negative hydrogen ion (H-) source and its neutralization mainly determine the performance of a negative ion based neutral beam injector (NNBI) performance. Ion source possesses many technological challenges in terms of production of uniform, extracted and accelerated negative ion beam current and also its transport to the tokamak plasma or the beam dump without damaging the beamline components during its transit. Therefore, for safe operation and also to characterize the beam, it is necessary to monitor the performance of the ion source and the beam. A judicious choice of various diagnostics comprises of optical, electrical, calorimetric and thermal are required. For that a number of diagnostics are being developed for NNBI R&D program. Indian Test Facility (INTF) is an integral part of this program. Due to having versatility in nature, independent prototype experimental efforts have been carried out to establish different diagnostics. For ion source plasma characterization, optical emission spectroscopy (OES), cavity ring down spectroscopy (CRDS) and electrical probe (EP) are mainly envisaged apart from different electrical measurements in RF circuit. All are either implemented in ROBIN source in prototype setup. Regarding beam characterization, Doppler Shift Spectroscopy (DSS), Optical Emission Tomography (TOMO), Infra-red (IR) thermal imaging on carbon fiber composite (CFC) target plates in addition to thermocouple based calorimetric diagnostics on different beam line components along with electrical measurements in the accelerator power supply circuits and residual ion deflection (RID) circuits are planned. The DSS system with eight lines of sight (LOS) (blue-shifted and red-shifted) is already implemented in ROBIN ion source. An algorithm for TOMO and the corresponding code based on maximum entropy concept is developed to reconstruct the 2D emissivity profile which is obtained from the inversion of the LOS integral of brightness. The code has been tested using mathematical functions representing simulated INTF beam profile. In the paper present status of various diagnostics for ion source and beam characterization, in terms of its designs, characterization algorithms, results either on separate prototype or on associated operational ion source testbed will be presented.

Country or International Organization

India

Paper Number

FIP/P8-17

Author: Dr MAINAK, BANDYOPADHYAY (ITER-INDIA, INSTITUTE FOR PLASMA RESEARCH)

Co-authors: Mr DEKA, Arnab Jyoti (Institute for Plasma Research); CHAKRABORTY, Arun Kumar (ITER-India, Institute for Plasma Research); Dr CHATTOPADHYAY, Asim (Institute for Plasma Research); Mr MUKHOPADHYAY, Debrup (Institute for Plasma Research); Ms BORAH, Dipshikha (Institute for Plasma Research); Mr TYAGI, Himanshu (ITER-India,IPR); Mr PANDYA, Kaushal (Institute for Plasma Research); Prof. SINGH, Mahendrajit (ITER - India Institute for Plasma Research Bhat Gandhinagar Gujarat 382428 India); Mr BHUYAN, Manas (ITER-India, Institute for Plasma Research); Mrs BHARATHI, P (Institute for Plasma Research); Mr SINGH, Pranjal (Institute for Plasma Research); Mr YADAV, Ratnakar (ITER-India, Institute for Plasma Research)

Presenter: Dr MAINAK, BANDYOPADHYAY (ITER-INDIA, INSTITUTE FOR PLASMA RESEARCH)

Session Classification: P8 Posters

Track Classification: FIP - Fusion Engineering, Integration and Power Plant Design