Seminar

Institute for Plasma Research

Title : Studies of neutral particle behaviour using DEGAS2 code and analysis of edge plasma parameters with UEDGE code in Aditya tokamak plasma

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Date : 15th December 2017 (Friday)

Time : 03.30 PM

Venue : Seminar Hall, IPR

Abstract :

The neutral particle dynamic in tokamak is an important area of research since it contributes to alter the edge parameter and then influence the plasma performance. Understanding of neutral particle dynamic will give deeper insight on the formation of edge transport barrier in H-mode plasma. It will also be effective to achieve active density control via neutral particle recycling. Along with this, the tokamak edge and scrape of layer (SOL) plasma plays very important role to achieve better core plasma properties and then the studies of particle and impurity behaviour at edge are important. To Study the neutral particle behaviour in Aditya tokamak plasma neutral particle transport code, DEAGS2, is successfully implemented for Aditya limiter geometry. The penetration of neutral particle from edge to central region of plasma is investigated for different discharges of Aditya tokamak by modelling the experimental Hα spectral line profile and radial profile of Hα emissivity. For this, the code is updated by incorporating the relevant atomic and molecular data for the higher excited states of atomic hydrogen. Through this study, it has been found that dominant contribution (~ 65%) comes from molecular dissociation processes and neutral particle is generated by those processes having energy of ~ 2.0 eV. The contributions from H_2 molecule and H_2^+ molecular in Hα emission rate are become noticeable only at extreme edge region. The radial profile of the particle confinement time in typical discharges from Aditya plasma is calculated through the estimation of particle source rate using the measured Hα emissivity profile. In addition to the above, the UEDGE, which is a two-dimensional edge-plasma transport code, is implemented for Aditya limiter geometry to study the particle and impurities behaviour at plasma edge and SOL. For the present purpose, a slab geometry is considered with Cartesian coordinates. The code UEDGE will ultimately be coupled with DEGAS2 to obtain the time evolution of radial profile of neutrals. The details of geometry implementation will be discussed and preliminary results from the UEDGE code will be presented.