Seminar

Institute for Plasma Research

Title : **Novel method of estimating electron temperature using modelling of gas-puff induced H-alpha emission from the edge region of ADITYA/U tokamaks**

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Date : **30th January , 2020 (Thursday)**

Time : **03:30 PM**

Venue : **Seminar Hall, IPR**

Abstract:

It is quite well known that the tokamak edge plasma, plasma region between the hot core plasmas and solid material surfaces (e.g. wall/limiter/divertor), plays an important role in the global plasma performance. The plasma temperature and density profiles in the edge region regulate the core properties and hence the alteration of edge parameters lead to significant changes in the core plasma properties. The neutral particles also enter into the plasma edge and their dynamics changes through the interactions with edge plasma. Therefore, edge temperature and density estimations are very important. A novel approach is adopted to find the edge electron temperature through the modeling the gas puff induced H-alpha emission at the edge regions of ADITYA/ADITYA-U tokamaks. In this method, the temporal profile of H-alpha intensity is modeled by taking into account different atomic and molecular processes such as ionization, excitation, recombination etc., which depends explicitly on the electron temperature. From this dependency the edge electron temperature has been estimated and later compared with the Te value obtained from Langmuir probe measurement. Furthermore, an initiation is also taken to simulate edge electron temperature by using two dimensional edge plasma fluid transport code UEDGE.

In addition to that neutral penetration into the hot core plasma has been investigated through the exact identification of the relevant atomic and molecular processes than happen inside the discharges in ADITYA and ADITYA-U tokamak having limiter geometry. The experimentally obtained H-alpha spectrum from repetitive ADITYA and ADITYA-U discharges is modeled using neutral particle transport DEGAS2 code. It is delineated that the charge-exchange process is one of the important processes and the penetration into the core plasma explained by invoking the penetration lengths of the atoms produced via different reaction channels.