Numerical Profiling of Visible Radiation Pattern of a Typical Tokamak Plasma

Abstract

The radial profiling of density (ne(r)) and temperature (Te(r)) in a toroidal plasma is a natural consequence of edge cooling and peripheral losses from plasma edge. Eventually, several phenomena are localised at the peripheral zone only and a proper characterization of these observations gives a deep insight about a number of plasma phenomena that include ELM, ITG, ETG, drift waves, visible emission, edge transports etc. Thus, characterising the combined effect of edge profiling in ne and Te plays a crucial role for characterising plasma edge and scrape-off layer (SOL) region.
The present project work is aimed to generate and study the radial profile of visible radiation, which is strongly dependent on ne(r), from plasma column. The numerical approach will start by modelling the visible emission pattern from plasma and hence to achieve the most probable profile of visible emission. The model would address to any generalised radiation pattern for a toroidally symmetric radiating torus. As, the visible emission from the Aditya-U tokamak plasma are captured using several diagnostics, these experimentally acquired data would be used for benchmarking the numerical model.
The later part of the project will be focussed on applying the conclusions from modelling to the experimentally acquired data due to real plasma and hence to retrieve related information about the tokamak plasma.

Academic Project Requirements:

1) Required No. of student(s) for academic project: 2

2) Name of course with branch/discipline: M.Sc. Physics

3) Academic Project duration:

(a) Total academic project duration: 26 Weeks
(b) Student's presence at IPR for academic project work: 1 Full working Days per week

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