Seminar

Institute for Plasma Research

Title : Numerical studies of sheared flow effects on visco-resistive MHD instabilities and application to ADITYA-U results

Speaker: Dr. Jervis Ritesh Mendonca
Institute for Plasma Research, Gandhinagar

Date : 8th February 2021 (Monday)

Time : 03:30 PM

Venue : Online - Join the talk:
https://meet.ipr.res.in/Jervis_Mendonca_PDF_extension_talk

Abstract :

Flow and viscosity significantly modify resistive modes in a tokamak, and we have investigated these using the CUTIE code. These studies indicate that flow can be used to improve plasma duration and quality in a tokamak, and this has motivated our investigation. The tearing mode is a current driven instability, which is driven by the gradient of the radial profile of the plasma current in a tokamak. It leads to the formation of magnetic islands due to a change in the topology of the magnetic rational surfaces in a tokamak. Also present in the tokamak operations is the sawtooth oscillation, which is trigerred by kink modes. These modes develop due to a rigid shift in the m=1 rational surface when the value of the safety factor, q, drops below 1 near the centre of the plasma. Both of these instabilites are an area of great interest worldwide and have been studied in the Aditya-U tokamak. A better understanding of these could lead to improved confinement times, improves pulse durations, and a better control over disruptions, such that we can both delay disruptions and reduce the damage caused by them to the experimental setup. Experiments using biased electrodes have previously shown disruption avoidance by controlling the MHD modes effectively in the ADITYA tokamak . We have attempted to simulate the MHD activities in the ADITYA/ADITYA-U tokamak using an MHD code. Particularly, the effect of flows on MHD modes are studied using the abovementioned code and the results are compared with experimental observations. The simulation results of effect of gas-puffing and electrode biasing on MHD modes in ADITYA/ADITYA-U tokamak are presented in this talk.