Seminar

Institute for Plasma Research

Title : Status of tearing mode studies in tokamaks

Speaker: Dr. Arkaprava Bokshi
Institute for Plasma Research, Gandhinagar

Date : 01st September 2020 (Tuesday)

Time : 03:30 PM

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

Abstract :

There will be three main components to this talk.

Firstly, we shall present the basic equations that capture tearing mode physics in a single-fluid reduced MHD framework and show successful benchmarks against previous work for a slab configuration. The key extensions to the model needed to explore tearing modes in tokamaks will be discussed.

Secondly, in parallel, two important avenues are being pursued which would enable us to capture additional physics. (1) Electron terms have been added to a previously developed gyro-landau-fluid model which, without the finite larmor radius (FLR) effect, reduces to a 2-fluid model. The gyrofluid simulations show physical behavior but work is ongoing to obtain robust benchmarks against literature. The gyrofluid model will enable us to explore additional physics in the future, such as, FLR effects, impact of density and anisotropic pressure on tearing modes. (2) The CENTORI code developed at CCFE is also being tested as a tool to study, among others, the effect of plasma shaping and flows on tearing modes in tokamaks and a successor to the highly successful cylindrical CUTIE code.

Finally, I will report on an ongoing collaboration to use the BOUT++ framework to study Hall MHD physics, including successful benchmarks of the classic Kelvin-Helmholtz instability, magnetic reconnection and robust energy conservation which was previously not possible without the use of conservative Poisson bracket solver methods.