Contribution ID: **33** Type: **Poster**

Numerical investigation of energetic particle driven interchange mode in LHD

Thursday, 5 September 2019 15:15 (15 minutes)

The Energetic particle driven Interchange mode (EIC) is a mode that was observed reccently [1] in the Large Helical Device (LHD) in the presence of strong perpendicular Neutral Beam Injection (NBI). The EIC is a magnetohydrodynamic (MHD) instability with m/n=1/1 (where m and n are the poloidal and toroidal mode numbers respectively) that occurs in bursts and causes losses of energetic ions from the core plasma. It was found that the frequency was consistent with the helically trapped energetic ions precession frequency. The fast ion losses are observed through the drop in neutron emission in deuterium experiments and are deleterious for the energy confinment and plasma heating. An important feature of this mode is that it experiences a frequency down-chirping during each burst.

For the study of this mode, the code MEGA [2] is used. It is a fully nonlinear hybrid MHD-kinetic code where the bulk plasma is treated using the fluid MHD description and the energetic particles are treated using a drift kinetic description. This code uses a realistic geometry and equilibrium, and has been used successfully on both tokamak and stellarator configurations for energetic particle driven modes.

The mode is investigated using an equilibrium reconstructed from a deuterium shot where EIC was observed. The role of the energetic ion β, profile and pitch angle is investigated. Preliminary results on destabilization, nonlinear saturation, chirping, and pressure profile redistribution, are presented.

References

[1] X. D. Du *et al.*, Phys. Rev. Lett. **114**, 155003 (2015)
[2] Y. Todo, Phys. Plasmas **13**, 082503 (2006)

Country or International Organization

Japan

Primary author: IDOUAKASS, Malik (National Institute for Fusion Science)

Co-authors: TODO, Yasushi (National Institute for Fusion Science); WANG, Hao (National Institute for Fusion Science); Mr WANG, Jialei (National Institute for Fusion Science)

Presenter: IDOUAKASS, Malik (National Institute for Fusion Science)

Session Classification: Poster

Track Classification: Effects of Energetic Particles in Magnetic Confinement Fusion Devices