Gyrokinetic Global Linear Aspects of Microtearing Modes in Large Aspect Ratio Tokamaks

Aditya K Swamy, R Ganesh

Institute for Plasma Research, Bhat, Gandhinagar, India

E-mail: adithyu@gmail.com

J. Chowdhury

Dept of Physics, University of Colorado, Boulder, CO, 80309, USA

S. Brunner, J. Vaclavik, L. Villard

CRPP, EPFL, 1015 Lausanne, Switzerland

Abstract. Microtearing modes (MTMs) are low frequency, high-n electromagnetic microinstabilities envisaged to open up an important, additional electron channel of transport in tokamak plasmas. The mode draws free energy from the equilibrium electron temperature gradient and is identified by the tearing parity of fluctuations, i.e. odd parity in the electrostatic potential and even parity in the parallel magnetic vector potential. Until recently, collisionless MTMs were expected to be stable in modern hot tokamaks, but have been found to be unstable in numerical simulations for spherical as well as large aspect ratio tokamaks [1, 2]. In the absence of collisions, in spherical tokamak plasmas, the drive comes mainly from the drift resonance of trapped electrons. In the context of large aspect ratio tokamaks, the mode has been found to be driven by the magnetic drift resonance of passing electrons. Fundamental aspects of collisionless MTMs in large aspect ratio tokamaks, such as the role of trapped electron population dynamics, effect of Shafranov shift of equilibrium flux surfaces, effect of parallel magnetic field fluctuations and role of equilibrium flows will be presented.

References

[1] D. Dickinson, C. M. Roach, et.al, Plasma Phys. Control. Fusion 55, 074006 (2013).
[2] Aditya K. Swamy, R Ganesh et.al, Phys. Plasmas 21, 082513 (2014)