Contribution ID: **10** Type: **Poster**

Frequency chirping of an energetic particle driven mode in the presence of kinetic thermal ions

Thursday, 5 September 2019 14:15 (15 minutes)

In the present work, the extended hybrid MHD-gyrokinetic code (XHMGC) [1,2] with both energetic particles and thermal ions treated kinetically is used to study the frequency chirping of a single toroidal number mode. Anisotropic slowing-down distribution with single pitch angles are used to describe the energetic ion velocity space distributions, and isotropic Maxwellian distribution is used to describe the thermal ions. In our simulations, we found mode frequencies can chirp across the shear Alfvén continuum. The down-chirping is dominant. Saturation level scales differently from both resonance detuning and radial decoupling scaling for fixed mode structure and constant frequency modes [3]. During chirping, mode structure is strongly modified. Each poloidal harmonic essentially attaches to its own shear Alfvén continuum branch. As a consequence, large particle redistribution in phase space is observed. By varying thermal ion beta or energetic particle density, modes are found to chirp down to the kinetic thermal ion induced gap. When the mode chirps down, it can transfer energy to thermal ions. Down-chirping modes can transfer energy to thermal ions in an easier way, as the ion Landau damping is more effective at low frequency.

References

[1] S. Briguglio et al., Phys. Plasmas 2, 3711 (1995).
[2] X. Wang, S. Briguglio et al., Phys. Plasmas 18, 052504 (2011).
[3] X. Wang, S. Briguglio et al., Physics of Plasmas 23 (1), 012514, 2016

Acknowledgement
This work has been carried out within the framework of the EUROfusion Consortium and has received funding from the Euratom research and training programme 2014-2018 and 2019-2020 under grant agreement No 633053. The views and opinions expressed herein do not necessarily reflect those of the European Commission.

Country or International Organization

Germany

Primary author: Dr WANG, Xin (Max Planck Institute for Plasma Physics)

Co-author: Dr BRIGUGLIO, Sergio (ENEA)

Presenters: Dr WANG, Xin (Max Planck Institute for Plasma Physics); Dr BRIGUGLIO, Sergio (ENEA)

Session Classification: Poster

Track Classification: Collective Phenomena