Evidence for Alfvénic Fluctuations in Quasi-Helically Symmetric HX Plasmas


Key Results
1. Alfvén Continuum for QHS and Mirror Mode Plasmas (convolutional elimination) on HX
2. Characteristics of observed fluctuations in Quasi-Helically Symmetric plasmas
3. Evidence for fast-electron driven GAE mode

Helically Symmetry Configuration

Alfvén continua: \( n=1 \) mode family

Density Fluctuations

Frequency spectrum shows the mode is \( \omega > 3.0 \times 10^4 \) characteristics of observed fluctuations in Quasi-Helically symmetric plasmas

Calculations of Alfvén Wave Continuum by 3 is the precession drift \( \omega \) nonthermal (1.05 < \( \pi \)) implies fast HSX Plasma 800 cm/s; occurs at \( r/a = 0.2 \) for thermal, where magnetic

During improved status, the fluctuation \( \omega \) nonthermal \( \omega \) is the diamagnetic drift \( \omega _\perp \) nonthermal \( \omega \) is the angular frequency of the Alfvén wave, \( \omega _\perp \) is the perpendicular component of \( \omega \) nonthermal \( \omega \) is the radial component of \( \omega \) nonthermal \( \omega \) is the toroidal component of \( \omega \) nonthermal

Fluctuations with symmetry breaking

Fluctuations no longer observed for mirror perturbation + \( \omega \) nonthermal localized configuration + 10% mirror perturbation

The GAE Mode Driving

Case I. Passing Particles

1. ECRH (1-way ECRH) reduces the perpendicular energy of the non-thermal electrons at \( \omega _\perp \) nonthermal \( \omega \) nonthermal \( \omega \) nonthermal \( \omega \) nonthermal \( \omega \) nonthermal

Experimental Evidence for non-thermal Electrons

1. ECRH measurement shows the perpendicular energy of the non-thermal electrons at \( \omega _\perp \) nonthermal \( \omega \) nonthermal \( \omega \) nonthermal \( \omega \) nonthermal \( \omega \) nonthermal

Summary

1. Calculations of Alfvén Waves Continuous by 3 is the precession drift 10% mirror mode 10% mirror mode 10% mirror mode 10% mirror mode 10% mirror mode