APR06-2006-000401

Abstract for an Invited Paper
for the APR06 Meeting of
the American Physical Society

Nonlinear interactions between shear Alfvén waves in a laboratory plasma[1]

TROY CARTER, Dept. of Physics and Astronomy and Center for Multiscale Plasma Dynamics, UCLA

Electromagnetic turbulence is thought to play an important role in plasmas in astrophysical settings (e.g. the interstellar medium, accretion disks) and in the laboratory (e.g. transport in magnetic fusion devices). From a weak turbulence point of view, nonlinear interactions between shear Alfvén waves are fundamental to the turbulent energy cascade in magnetic turbulence. An experimental investigation of nonlinear interactions between shear Alfvén waves in the Large Plasma Device (LAPD) will be presented. Two Alfvén waves, generated by a resonant cavity, are observed to beat together, driving a low frequency perturbation at the beat frequency. The low frequency perturbation then scatters the Alfvén waves, generating a series of sidebands. The observed interaction is very strong, with the normalized amplitude of the driven low frequency mode comparable to the normalized magnetic field amplitude ($\delta B/B$) of the interacting Alfvén waves. Experimental details of this interaction will be presented along with other phenomena associated with large amplitude Alfvén waves in LAPD, including electron heating and background density modification. Initial results from counter-propagating wave interaction experiments will also be discussed.

In collaboration with Brian Brugman, Dept. of Physics and Astronomy and Center for Multiscale Plasma Dynamics, UCLA.

[1]Supported by DOE grant DE-FG02-02ER54688 and by DOE Fusion Science Center Cooperative Agreement DE-FC02-04ER54785