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Studies of nonlinear interactions between counter-propagating Alfvén waves in the LAPD[1] D.W. AUERBACH, UCLA, J.C. PEREZ, UW-Madison, T.A. CARTER, UCLA, S. BOLDYREV, UW-Madison — From a weak turbulence point of view, nonlinear interactions between shear Alfvén waves are fundamental to the energy cascade in low-frequency magnetic turbulence. We report here on an experimental study of counter-propagating Alfvén wave interactions in the Large Plasma Device (LAPD) at UCLA. Colliding, orthogonally polarized kinetic Alfvén waves are generated by two antennae, separated by 5m along the guide magnetic field. Magnetic field and langmuir probes record plasma behavior between the antennae. When each antenna is operated separately, linearly polarized Alfvén waves propagate in opposite directions along the guide field. When two antennae simultaneously excite counter propagating waves, we observe multiple side bands in the frequency domain, whose amplitude scales quadratically with wave amplitude. In the spatial domain we observe non-linear superposition in the 2D structure of the waves and spectral broadening in the perpendicular wave-number spectrum. This indicates the presence of nonlinear interaction of the counter propagating Alfvén waves, and opens the possiblity to investigate Alfvénic plasma turbulence in controlled and reproducible laboratory experiments.

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