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Nonlinear Wave-Wave Interactions in Ion Density Fluctuations Spectrum ILKER UZUN-KAYMAK, FRED SKIFF, University of Iowa — For the phase-space resolved measurements of ion density fluctuations obtained by using Laser Induced Flourescence (LIF) diagnostics, nonlinear three-wave interactions are investigated via bispectrum and higher order spectral analysis methods. Previously, it has been observed that the fluctuation spectrum has a distinctive broad peak near the drift wave frequency (ω^*) that can be dissected into two components in terms of their wavelength and ion particle velocity dependence[1]. Even though, one of these components is consistent with drift wave theory, the other has a short correlation length and ion particle velocity dependence, thereby, it is called 'kinetic component'. Opposed to what would be expected for a single broad spectrum, in higher order spectral calculations, nonlinear three wave interactions are observed for these spectral components satisfying resonance conditions. As the neutral pressure thus the ion-neutral collision frequency increase, we observe a certain threshold where the kinetic component vanishes from the cross power spectrum, in return, a new peak arises at the vicinity of second harmonic of ω^*. Meanwhile, the bispectrum analysis proves us that the bispectral signature for these components also changes accordingly. One explanation for these spectral changes can be given in terms of modulation instability. This work is supported by U.S. DOE Grant No. DEFG02-99ER54543.

[1]A.Diallo, F.Skiff, Phys. Plasmas,12(11),110701,2005

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