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Frequency spectra at large wavenumbers in two-dimensional Hasegawa-Wakatani turbulence JUHYUNG KIM, PAUL W. TERRY, Department of Physics, University of Wisconsin-Madison — The two-dimensional Hasegawa-Wakatani model is well known to show weak (strong) turbulence for $\alpha \gg 1 (\ll 1)$, where α is the adiabatic parameter. Weak turbulence has narrow frequency spectra peaked at linear wave frequecies ω_0. However, fluctuations in weak turbulence at large wavenumbers are thought to show broad frequency spectra with zero mean frequency, a feature of strong turbulence. We present the numerical results of frequency spectra showing that these spectra at large wavenumbers have finite mean frequencies at intermediate $\alpha \sim O(1)$. The potential fluctuation have finite mean frequencies ($\neq \omega_0$) and broad spectral widths while the density fluctuations reproduce linear wave frequencies despite broad spectra. These finite mean frequencies proportional to poloidal wavenumber imply the existence of nonlinear wave resonances. Since one wave in the resonance is in the energy-dominant wavenumbers, the resonance is a nonlocal three-wave interaction, which may relay the linear wave properties of the low wavenumbers up to the large wavenumbers. This richness in the spectra will be presented in terms of the parameters of α and diamagnetic drift and the three-wave coupling analysis will be applied.

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