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Energy transfer due to nonlinear wave-wave interactions in deep ocean NAOTO YOKOYAMA, YURI V. LVOV, Rensselaer Polytechnic Institute — It was believed that the Garrett-Munk spectrum was the "universal" energy spectrum of oceanic internal waves. However, it has become apparent from recent categorization of oceanic observations that the Garrett-Munk spectrum can not be as universal as been previously thought. One may use the weak turbulence theory to attempt to explain the formation of the spectral energy density of internal waves. It turns out that the large wavenumbers (small scales) interact in triads via small wavenumbers (large scales). This hypothesis provides possible explanation for the variability of the energy spectra. Namely, several families of statistically steady solutions are found in consideration of the nonlocality in wavenumber spaces of resonant interactions. The new families of power-law exponents of the energy spectra are in good agreement with the observations. To check these theory we perform direct numerical simulations based on Hamiltonian formalism. It is shown also by the numerical simulations that the nonlocal interactions in the wavenumber space are dominant in the inertial wavenumbers. The validity of the weak turbulence theory is also discussed.

Naoto Yokoyama
Rensselaer Polytechnic Institute

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