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Latitudinal Variation and Nonlinear Behavior of Internal Tides in the East China Sea

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We present four sets of concurrent ADCP data obtained from the East China Sea shelf, and it suggests that near-inertial waves induced by parametric subharmonic instability (PSI) associated with harmonic transfer beyond diurnal critical latitude ($O_1:27.6^\circ$, $K_1:30^\circ$). Two type different nonlinear behavior (harmonic transfer and subharmonic transfer) occur varying with the latitude on different location. The velocity data indicated a transfer of diurnal internal tidal energy poleward of the diurnal critical latitude. Kinetic energy and shear spectra analysis at these moorings reveals that the prominent peaks enhance and appear at not only at the even order of diurnal tide such as semidiurnal band, 4cpd, 6cpd and even 8cpd, but also some unfamiliar odd harmonics 3cpd and 5cpd. Furthermore, additional energy is converted to higher mode locally through continuum internal wave spectrum. Besides the harmonic transfer, on the critical latitude for $D_2/2$ wave(28.9°), D_1 wave is extracted from a D_2 tidal driven model output current. PSI conversion of semidiurnal internal tidal energy was confirmed by spectra analysis and bi-spectra, because of the distinguish of $M_2/2$ separated from the diurnal tidal (O_1 , K_1).

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