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An experimental study of wave coupling in gravity surface wave turbulence[1] QUENTIN AUBOURG, Univ Joseph Fourier, JOEL SOMMERIA, SAMUEL VIBOUD, CNRS, NICOLAS MORDANT, Univ Joseph Fourier — Weak turbulence is a theoretical framework aimed at describing wave turbulence (in the weakly nonlinear limit) i.e. a statistical state involving a large number of nonlinearly coupled waves. For gravity waves at the surface of water, it provides a phenomenology that may describe the formation of the spectrum of the ocean surface. Analytical predictions of the spectra are made based on the fact that energy transfer occurs through 4-wave coupling. By using an advanced stereoscopic imaging technique, we measure in time the deformation of the water surface. We obtain a state of wave turbulence by using two small wedge wavemakers in a 13-m diameter wavetank. We then use high order correlator (bi- and tri-coherence) in order to get evidence of the active wave coupling present in our system as used successfully for gravity-capillary wave turbulence [1]. At odds with the weak turbulence theory we observe 3-wave interaction involving 2 quasi linear wave and a bound wave whose frequency lies on the first harmonics of the linear dispersion relation. We do not observe 4-wave coupling within the accuracy of our measurement.
[1] Aubourg & Mordant, Phys. Rev. Fluids 1, 2016

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