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Time and space analysis of turbulence of gravity surface waves[1]
NICOLAS MORDANT, QUENTIN AUBOURG, SAMUEL VIBOUD, JOEL SOMMERIA, LEGI, Universite Grenoble Alpes CNRS — Wave turbulence is a statistical state made of a very large number of nonlinearly interacting waves. The Weak Turbulence Theory was developed to describe such a situation in the weakly nonlinear regime. Although, oceanic data tend to be compatible with the theory, laboratory data fail to fulfill the theoretical predictions. A space-time resolved measurement of the waves have proven to be especially fruitful to identify the mechanism at play in turbulence of gravity-capillary waves [1]. We developed an image processing algorithm to measure the motion of the surface of water with both space and time resolution. We first seed the surface with slightly buoyant polystyrene particles and use 3 cameras to reconstruct the surface. Our stereoscopic algorithm is coupled to PIV so that to obtain both the surface deformation and the velocity of the water surface. Such a coupling is shown to improve the sensitivity of the measurement by one order of magnitude. We use this technique to probe the existence of weakly nonlinear turbulence excited by two small wedge wavemakers in a 13-m diameter wave flume. We observe a truly weakly nonlinear regime of isotropic wave turbulence. [1] Aubourg & Mordant, *Phys. Rev. Fluids* **1**, 2016

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