



## **Surface waves phase speed modulation in the presence of long waves: modeling and measurement**

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Modulation of short surface waves in the presence of long waves is studied in this paper, which is a phenomenon that used in remote sensing of the ocean. The study focuses on the modulation of the phase velocity of short waves according to the principle of the Doppler effect.

The first part of the study is carried out by means of numerical simulation. An original algorithm is used to solve the Euler equations in Dyachenko's formulation, thus the algorithm takes into account nonlinear effects. Calculations are made for different wind speeds. A set of spectra, plotted in frequency and wave number coordinates, is obtained, and these spectra reveal the real influence of weakly nonlinear effects on wind waves with a spectrum close to the Pearson-Moskowitz function.

The second part of the study is devoted to the analysis of the experimental data in order to confirm the conclusions drawn from the numerical simulation results. Data from various types of sensors was used, including: a multi-sensor wave gauge, a video recording in daylight, and sonar, tuned for resonant scattering. The parameters of the spectra obtained by modeling and measured insitu are in agreement.