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Hilbert transform applied to experimental data tackling internal waves issues

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New insights in the physics of internal waves in two-dimensional fluid have been obtained thanks to the Hilbert Transform (HT). The internal waves were obtained experimentally using a recently developed generator [1] that creates monochromatic internal plane waves.
The analysis of dissipation, reflection and diffraction of internal waves using the HT has permited to answer fundamental questions raised by theory.

The attenuation rate along the direction of propagation of the internal waves has been quantified for a plane wave, and its dependency with the pulsation of the wave was compared to the viscous damping already considered in Thomas & Stevenson [2] or Hurley & Keady [3].
The reflection of internal waves onto a slope has also been investigated in order to identify a possible back-reflected beam, in the opposite direction to the one of the incoming wave. Such expected beam [4] had never been observed experimentally yet.
The unusual issue of sending an internal plane wave through a slit of width comparable to the wavelength was considered and the analysis of the radiated wave field has revealed a diffraction-like phenomenon.

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[2] N. H. Thomas & T. N. Stevenson, JFM (1972), **54**:495-506.

[3] D. G. Hurley & G. Keady, JFM (1997), **351**:119-138.

[4] P. G. Baines, JFM (1971), **49**:113-131.