



## Comparison of rogue waves in open ocean and wave basins

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The proposed work deals with the study of extreme events, such as freak or rogue waves in wave basins. The well known New-Year's wave, observed in North Sea, has been widely used to represent a real event for analyzing the response of structures at sea to giant waves.

Reproduction procedures allow, from the wave measurement at a given location, to perform experiments or numerical simulations with the same wave profiles than observed. Those are using frequency focusing to generate high waves, but it is recognized that a lot of different physical mechanisms may be at play in freak waves formation.

This work intends to assess that a correct reproduction of the free surface elevation imply also a correct reproduction of wave kinematics inside the fluid domain. This appears as a key point for an accurate study of the interactions of those extreme waves with structures.

A highly nonlinear model based on High-Order Spectral (HOS) approach is used to model freak waves occurrence in open ocean (and deduce the corresponding kinematics). This appears necessary due to the lack of experimental data in open ocean associated to these rogue waves (and especially induced kinematics). Then, these extreme events are reproduced in a Numerical Wave Tank (based also on HOS method). Specific attention has been paid to the accuracy of the reproduction procedure. Method adopted and validations (reproduction of New Year Wave) will be detailed in the presentation.

The comparison shows that if an accurate reproduction procedure is chosen (i.e. on the free surface elevation), velocity and pressure fields in the wave tank are also in concordance with the original freak wave.