MAPS OF PHENOMENA FOR BREAKING WAVES IN DEEP, INTERMEDIATE AND SHALLOW WATERS

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Numerous numerical simulations were performed to investigate the phenomena occurring when waves break [1]. The Notus CFD code was used to solve the Navier-Stokes equations in the finite volume framework. The breaking event was inspected on a 2D periodic first order stokes waves over a flat bottom at different depths : shallow, intermediate and deep. The wavelength of the initial wave is varying from 5 cm to 35 cm. The observation of the breaking type (Parasitic Capillary Waves, Spilling Breaker and Plunging Breaker) of each simulation has permitted to generate three mapping of the phenomena occurring during the breaking process following the wavelength and the wave steepness.

Firstly, we aim at presenting and discussing the mapping generated for the three different water depths. Then, an investigation of the vorticities created during the first steps of the breaking event will be presented. This investigation has permitted to observe three sub-categories, which has not been described in the literature, to the best of our knowledge : the spilling breaker with single vortex, with dipoles and the plunging breaker without roller. The characteristics of these sub-categories will be presented and explained thanks to the surface motion and the vorticities generated. The figure 1 is a representation of the vorticity field obtained during the spilling breaker with dipoles.

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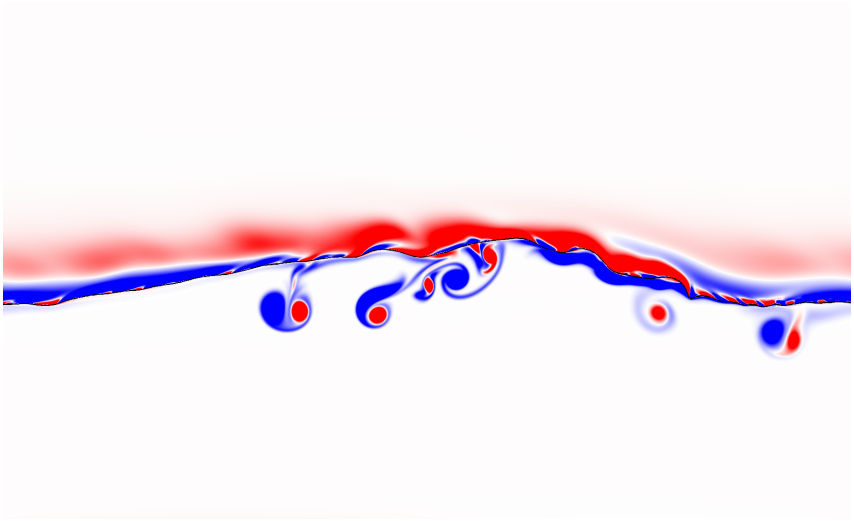

Figure 1 : Vorticity field above and under water during a spilling breaking with dipoles in deep water.

REFERENCES

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