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During the last decades various studies have been performed to understand the wave propagation over varying bathymetries. Few answers related to this non linear problem were given by the Patarapanich's studies which described the reflection coefficient of a submerged plate as a function of the wavelength. Later Le-Thi-Minh [2] demonstrated the necessity of taking into account the evanescent modes to better describe the propagation of waves over a varying bathymetry. However, all these studies stare at pseudo-stationary state that allows neither the comprehension of the transient behaviour of propagative modes nor the role of the evanescent modes in this unstationnary process. Our study deals with the wave establishment over a submerged plate or step and focuses on the evanescent modes establishment.

Rey [3] described the propagation of a normally incident surface gravity wave over a varying topography on the behaviour of the fluid using a linearized potential theory solved by a numerical model using an integral method. This model has a large field of application and has been adapted to our case. This code still solves a stationary problem but allows us to calculate the contribution of the evanescent modes in the energy layout around a submerged plate or a submerged step. The results will show the importance of the trapped energy compared to the incident wave's energy flow and lead to the definition of a characteristic time of the evanescent modes establishment.

First results show that the system is influenced by the wave frequency, and geometric parameters such as the deep in front of the obstacle, the deep of immersion and the deep under the obstacle in the case of a submerged plate. The energy trapped by the evanescent modes and under the plate is able to reach around 15% of the incident wave‘s energy flow. In further studies we will investigate the influence of each geometrical parameter to a better understanding of its contribution in energy trapping.

References :

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