

**TITLE:** CALIBRACIÓN DEL CANAL DE OLEAJE CIEM PARA UN ENSAYO DE ESTABILIDAD DE DIQUE EN TALUD

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## **ABSTRACT**

The Marine Investigation and Experimentation Flume (canal CIEM) of the UPC (Universitat Politècnica de Catalunya), has had infrastructure changes recently. In particular, modifications in the generator and in the wave control program. A study is essential to verify the good operation of the equipment due to these changes. In order to check the correct procedure of the equipment it is necessary to make several tests. These tests have to analyse the capacity of the equipment to generate the asked waves. Furthermore, these tests allow the analysis of the reliability of the used theories.

These tests are classified in two groups. The first of them tries to avoid the reflection problems of the flume. Therefore, a beach is constructed to dissipate the energy of waves and it allows the analysis of the measurement and generation equipment. The second group is made with the objective to calibrate the flume to be useful to experiment the stability of rubble-mound breakwaters. Hence a scale model of rubble-mound breakwater is constructed to carry out the future stability tests. It is in this field where the measurement of the reflection receives a special importance.

Most of formulations for the design of rubble-mound breakwaters are empirical expressions based on experimental results of laboratory measurements. Many of these formulations, still in use, are consequence of tests made some years ago, without having the knowledge if the adjustment was made using the height of incident wave or the total height. However, recent studies have verified that the use of the total height of the wave display lesser dispersion in the adjustment of breakwaters stability.

In another hand, the values of incident wave height are used to design the superficial elements of the breakwater. In these cases the total height of the wave is not used, accordingly to this fact it is possible that the weight of the elements of the armour layer of the breakwater that we obtain can be overestimated or infravalued. In order to know the relation between the height of total and incident waves it is very important the measurement of the reflection.

The reflection of a train of waves is the process in which part of the non-dissipated energy of the train generates another train of waves in the opposite direction to the incident one when it impinges on an object. The superposition of both trains composes the total wave. The formation of this total wave depends on such factors as the coefficient of reflection, their position in relation to the structure, the geometric, mechanic and hydraulic characteristics of the wave and the characteristics of the environment. There are different methods to obtain these coefficients of reflection that separate the total wave in an incident and a reflected one. Throughout the testing with the breakwater will be analyzed some of these methods to value the most suitable one for the conditions of the CIEM flume.

The necessity of study the reflection added to the necessity of evaluating the canal operability after the modifications, have been the objectives that had motivated the elaboration of this thesis.