Experimental Comparison of Catamaran and T Type Floating Breakwaters

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Abstract
In this paper, the influence of draft depth of a floating breakwater (FB) with an/two attached plate is studied experimentally and results are compared for different shapes. In addition, the influence of height of incident wave is studied and reflection, transmission and energy dissipation coefficients are calculated. For the model studies, a wave flume with a flap-type wave generator and a steep wave absorber was designed, constructed, and used to investigate the performance of floating breakwater under regular waves. With increasing in relative draft of FB, the performance of FB is enhanced remarkably, in other words, the reflection and energy dissipation coefficients increase and transmission coefficient decreases by penetration of attached plate in water column. For waves with greater heights, the reflection coefficient increases significantly. According to this study, catamaran type FB (FB with attached plates in its front and back) has a better performance rather than T type FB (FB with attached plate in the middle part of the keel structure).

Keywords: Floating Breakwater, Reflection, Transmission, Energy Dissipation

1. INTRODUCTION

Over the past two decades, interest in the study of the behavior of floating breakwater (FB) has increased owing to the requirement for the development of a large number of new marinas and recreational harbors. The lower initial investment and the mobility of the structure of FBs is attractive to the designer, where they are evaluated as a viable alternative when cost of a fixed structure exceeds the economic return to be gained at that location and specially in sites with a large water depth and worse bottom foundation conditions. Several researchers have studied interaction of FBs with waves, and developed them from various aspects. A number of studies have been focused on analytical analysis of phenomena: [Mei (1969), Drimer et al (1992), Jaw-Fang Lee (1995), and Williams et al (2000)]. Although many researchers have investigated and developed different aspects of FBs, Experimental studies are limited. An experimental study of the phenomenon for a breakwater in a floating mode was presented by Williams (1988) in which the efficiency and the response of the structure was reported. Isaacson and Bhat (1998) studied experimentally pile-restrained FBs and in particular, the influence of the heave motion on the efficiency of the structure. Koutandos et al (2005) have studied the reflection and transmission characteristics of FBs under regular and irregular wave forcing.

In this study, performance of two special type of FB under regular waves is tested experimentally. For this purpose, T Type FB with a plate with three different heights is attached to the middle part of the floating body. For Catamaran FB, two plates with three different heights are attached in front and back part. As a result of different draft depths and types of FBs, reflection; transmission and energy dissipation coefficients are calculated. Moreover, results are compared with the results of single box pontoon type FB.