The 10th International Conference on Coasts, Ports and Marine Structures (ICOPMAS 2012)
Tehran, Iran, 19-21 Nov. 2012

Investigating Fixed Floating Breakwater Response to Waves Action Using a Simplified Analytical Model

[Hussain Ali Redha. Al lawati]

Keywords: *FFBW, Analytical model, Charts, Safety factor*

Abstract

The hydrodynamic behavior of fixed floating breakwater (FFBW) is studied in the present paper, using a simplified analytical model that was developed by Drimer et al. [4]. Firstly, comparison of transmission (T) and reflection (R) coefficients values between analytical solution [4] and existing experimental data [10 and 14] was made. The comparison showed good agreement for a wide range of conditions. In addition, comparison between the analytical model [4] and the analytical formula of transmission coefficient [7] was done. After the comparison between the analytical and experimental results, design charts were developed using the analytical model [4]. The charts described the variation of the coefficients (T and R) along a wide range of water depth (h) over wave length (L) ratio for different structure width over water depth (B/h) values for a particular draft (dr) over h ratio. The main goal was to show how these charts can be used in designing of fixed floating breakwater. This was achieved through using a solved example.

Introduction

Breakwaters are structures constructed on coasts as a part of coastal defense or to protect an anchorage from the effects of weather and long shore drift. Offshore breakwaters, also called bulkheads, decrease the strength of wave action in inshore waters and thus reduce coastal erosion. They are constructed some distance away from the coast or built with one end connected to the coast. Breakwater structure is regularly parallel or perpendicular to the coast to maintain tranquility condition in the harbor. Breakwaters are subject to damage, and overtopping by large storms can lead to problems of drainage of water that gets behind them. A breakwater structure is designed to absorb the energy of the waves that hit it. This is done either by using mass (e.g. with caissons) or by using a revetment slope (e.g. with rock or concrete armor units). Breakwaters may be either fixed or floating: the selection depends on normal water depth and tidal range.

Floating breakwaters can be classified into the following groups; box type, pontoon type, scrap-tire, and tethered float breakwaters [2]. The most frequently used floating breakwater is the one that consists of rectangular pontoons linked to each other and moored to the sea bottom with cables or chains. Developing floating structures for all kinds of purposes has become more exciting in the past decade because of their significant exploitation. These structures can be built to construct floating airports, bridges, piers and docks, military services, entertainment establishments, and other structures used for habitation [5]. Through the past two decades, attention in the study of the behavior of floating breakwaters (FBWs) has increased due to the requirement for the growth of large number of small marinas and recreational harbors.