Comparative Study of Chinese and Foreign Codes for Return Period and Design Working Life in Coastal Engineering

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ABSTRACT

This paper makes a comparison of the provisions concerning the design service life of constructions and the wave recurrence criteria in China, Japan, Britain and the United States. And it also analyses the relationship among the design life, design wave recurrence period and occurrence probability of harbor buildings. Besides, it gives a pairwise relationship table to present the normal condition. According to the data, it is pointed out that the design wave recurrence period can’t be simply used as the design life limit from the safety point of view. But the recurrence period corresponding to the design life should be selected according to the importance of building. The relation chart of the three factors given in this paper can be flexibly used by for relevant workers.

KEY WORDS: port engineering; standard; return period; design working life.

INTRODUCTION

With the introduction of the national “One Belt, One Road” strategy, the internationalization of port engineering is increasing. Due to the differences in regional risks, economic levels and fortification ideas of various countries, the specific regulations for port regulations vary from country to country, which has always been a great challenge for overseas designers. An accurate understanding of the similarities and differences among national codes is beneficial to reduce the detours of foreign port engineering design, thereby reducing the unforeseen potential risks in design and construction.

In recent years, many scholars have conducted comparative studies on relevant national port codes: Zhou et al. (2016) carried out a comparative analysis of the methods for determining the water level of port engineering among different codes. Hou et al. (2017) compared the method for determining the depth of wave abundance in the design code of China, the U.S. and Japan waterway. Yang et al. (2016) summed up the classification and evolution of deep datums in countries around the world and analyzed the differences in the calculation methods of port surface elevations in various port engineering countries. An et al. (2009) made a comparative study on the value of the target reliability index in relevant norms of China and Europe. Chen and Gu (2016) comprehensively compared the design working life of the specifications in China, Europe, Britain, Japan and the United States. Liu (2017) compared the calculation problems of ship navigation in the main domestic and foreign codes. However, there is no comprehensive study on the recurrence period and its correlation with design life in domestic and foreign codes.

In the coastal port design, after the design working life of the building is determined, the return period of the hydrological element can be determined according to the requirements of relevant codes. The return period is defined as the average number of years between occurrences of hydrological element values greater than or equal to a certain magnitude. Thus, the magnitude of the return period determines the size of the hydrological element, that is, the size of the environmental load. In general, the longer the design working life is, the longer the return period of the design hydrological elements is. The larger the environmental load is used in design, the stronger the structure, and the higher the engineering investment. Therefore, it is particularly important to understand the relationship between the return period and the design working life. In this paper, a comprehensively comparative analysis is made of the design working life, return period of coastal port buildings and sea dike overtopping standards in the current norms of China, the United States, Japan and British, which provides reference for foreign

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