



Very Large steel-concrete Composite Offshore Pontoon-type Structure: Concept and Analysis

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Abstract

To overcome the shortcomings of traditional very large floating structures constructed either of steel or concrete, a new type of very large floating structure constructed of steel-concrete composite components is developed. First, the concept of very large steel-concrete composite pontoon-type floating structure is proposed and the structural characteristics of the structure is described in detail, which has significant advantages and potential compared to steel or concrete floating structures, such as anti-explosion, durability, reliability, functional flexibility and economy. Then, on the basis of three-dimensional potential theory, the computer program THhydro is developed to calculate the three-dimensional hydroelastic response of floating structures. The program is substantially verified by the experimental and numerical results of previous literature. Finally, the parameter analysis on the hydroelastic response of very large steel-concrete composite pontoon-type floating structure is conducted, which shows that the usage of steel-concrete composite components can improve the performance of very large floating structures to an extent.

Keywords: Steel-concrete composite structure; Hydroelastic analysis; Pontoon-type; Very large floating structure; VLFS.

1 Introduction

With the demand of more lands for living and industrial uses, artificial islands are designed and built to extend the scope of human activities. In the recent years, many concepts of very large floating structures (VLFS) both in design and construction have been proposed to avoid the shortcomings of traditional artificial islands built by reclamation.

The research development of very large floating structures have been greatly promoted by several projects of many coastal states such as Mega-Float [2] project held by TRAM in Japan and MOB [3] project held by NFESC in USA.

In the Mega-Float [2] project, a test airplane model was constructed in Tokyo bay, the hydroelastic response tests and aircraft landing tests of the platform were carried out successfully, and the