ABSTRACT

The Yangshan deep-water port locates in the Qiqu Archipelago with many islands and tidal channels. Taking Yangshan deep-water port sea area as an example, it was researched that distribution characteristics of suspended sediment concentration in archipelago waters, China. Based on the measured data of Oct. 1996, Jan. 1999, May 2006 and May 2007 and the measured surface suspended sediment concentration data from 1998 to 2007, the change characteristic of suspended sediment concentration is analyzed.

The suspended sediment concentration in the Yangshan sea area shows four pronounced time-scale variations, i.e. yearly variation, seasonal variation, neap-spring cycle and intra-tidal variation and two spatial scale variations (horizontal distribution and vertical distribution). Moreover, it is discussed to the causes of the variation of suspended sediment concentration. The sediments from the Yangtze Estuary have no direct effect on suspended sediment concentration of the study area, and it is also shown that the suspended sediment concentration is mainly due to local bottom sediment resuspension. There is the high suspended sediment concentration in the part area of Yangshan sea area, especially, along the Xiaoyangshan Island and Dayangshan Island chain direction. The phenomenon is mainly due to the “strait-channel effects”

KEY WORDS: Yangshan deep-water harbor; Hydrodynamic; Suspended sediment concentration (SSC); Strait-channel effects

INTRODUCTION

SSC in estuaries and coasts are determined by the combination of hydrodynamic, physical–chemical, and biological processes. Suspended sediment transport processes play an important role in the estuarine environment, because fine grained sediments are important carriers of various nutrients and pollutants (Webster and Lemckert, 2002). Studies of suspended sediment concentrations in different sea area have been carried out around the world (McManus, J., 2005; Chen et al., 2006; Shi et al., 2003; Shi and Zhou, 2004).

Yangshan deepwater harbor area lies in the Qiu Archipelago, which is a typical archipelago waters. Qiqu Archipelago is located about 32 kilometers northwest to Luchaogang harbor in Nanhui district, in the north of the Hangzhou Bay, on the south side of the Yangtze (Changjiang) Estuary, and 86 kilometers away the center of Shanghai (Fig. 1). The sea-area is composed of south and north island chains. The south island chain is from east to west based on the Dayangshan Island while the north island chain is from northwest to southeast based on the Xiaoyangshan Island. The cyclic tidal flow with strong velocity of 1.0m/s is the major dynamic force for maintaining the stability of the way and the sediment in flow is always under the combining action of waves and tidal currents. The seabed evolution is aroused by suspended sediment transport. The SSC is more 1.0kg/m³. The water depth of the main channel of Yangshan Harbor is more than 10 meters. Yangshan Harbor is the nearest deepwater harbor with natural advantages to Shanghai. Now, Yangshan Deepwater Harbor area consists of these parts: Phase 1 & Phase 2 Project (Fig.1). Phase 3 Project has been accomplished and put into operation. The West Harbor District Project is being planned.

Fig. 1 The location and measuring spots in the Yangshan area

Recently, with the construction of the Yangshan Harbor, the references