Establishing a Predictable Tide Observational System for Wharfs of Kinmen and Matsu Ports near Taiwan

Shou-Shiun Lin¹, Shiahn-Wern Shyue², Cheng-Da Li³
Harbor and Marine Technology Center, Institute of Transportation, MOTC¹, Department of Marine Environment and Engineering, National Sun Yat-sen University², Harbor and Marine Technology Center, Institute of Transportation, MOTC³ Taichung City¹, Kaohsiung City², Taichung City³, TAIWAN China

ABSTRACT

Establishing a system of tide gauge stations around ports for real-time tide observations is an important research topic and predictions are needed for estimation of water depths for vessels and cargo vessels at piers. The purpose of this research is integrating water depth information at Kinmen and Matsu ports. Observed and predicted tidal information for clearance of vessels increase efficiency of operations and will significantly improve competitiveness of ports. The major items of the this study includes: tidal data collection and analysis, establishing a tide prediction and tide observational information system, developing a GIS for ports area, and demonstrating of the system for training purposes.

KEY WORDS: GIS, Kinmen port, Matsu Port, ship parking water depth, pier water depth, tide observation, tide prediction.

INTRODUCTION

In order to analyze the tidal level of Kinmen and Matsu ports, water depth information of real-time observed and predicted tidal levels is conducted for navigational safety to increase the efficiency of harbor operations and competitiveness of the port. First, tide time series analysis of delay and variance by spatial tide station data is conducted. The harmonic analysis is typically carried out using past tidal level records, for tidal predictions in the pier areas using the amplitude and phase of the different tide gauger. Then forecasting water depth is rendered of the port area and wharf terminal areas, for the port management and related planning.

Research Methods and Steps

The tidal elevation is an important parameter in the design of coastal engineering structures, using tide station locations at different spatial distribution within Kinmen and Matsu harbors. To assess the cycle of tide time and the tide level delays and differences, calculating the datum tidal ranges of different gauger are defined in terms of tide levels. Tide level data spectral is used to convert the energy spectrum and frequency