

Motions of a Small Boat Moored in Waves Generated by a High Speed Vessel

K. Saito

Kobe University of Mercantile Marine, Kobe, Japan

S. Shiotani

Nagasaki University, Nagasaki, Japan

N. Fujitomi

Hiroshima College of Mercantile Marine, Hiroshima, Japan

ABSTRACT

The information of ship waves generated by a small vessel and the motions of a small boat subjected to these waves are very important to prevent the damage of the boat and the danger of passengers on board. This paper deals with ship waves generated by an actual small vessel and the motions of a small boat moored in the ship waves.

The purpose of this study is to investigate the characteristics of the ship waves generated by an actual small vessel at relatively high speed and the motions of an actual small boat in the ship waves, and to develop simplified estimation methods of ship waves and the ship motions.

The experiments of the ship waves generated by a high speed vessel and the motions of a small boat in the waves were carried out in real field. Comparison of the calculated results of ship waves and ship motions with the experimental ones shows reasonably good agreement.

KEY WORDS: Ship waves, Ship motion, Field experiment, Simplified estimation methods

INTRODUCTION

Many researches on ship waves generated by relatively large ships have been developed and many experiments have been made from the standpoint how to reduce wave resistance for ship hull design (Dawson, 1977). However, sufficient studies on waves generated by a relatively small vessel have not been made. Besides this, experimental studies have been restricted to model tests in towing tanks and have not been carried out in the field (Kurata and Oda, 1984).

The waves generated by a small vessel at high speed sometimes cause severe conditions to marine floating bodies such as a cage for fishing

aqua-culture and a moored small boat. Therefore, it is very important to research characteristics of the ship waves by a small vessel and the motions of a small boat in the waves. It is also important to estimate these ship waves and associated ship motion to prevent the damage of the ship hull or passengers on board.

This paper deals with the field measurements of ship waves generated by an actual small vessel at relatively high speed and ship motions of a moored small boat in the waves. The purpose of this study is to investigate and to estimate the characteristics of the ship waves by a small vessel and the ship motions of a small boat subjected to the ship waves close to the sailing line.

The experiments were carried out in two cases varying the ship speed and the distance between the boat and the sailing line. As our present interest is focused on to obtain information of ship waves and ship motions relatively simple, easily and reasonably, we used two kinds of simplified estimation methods of ship waves. The simplified estimation methods of ship motions in calculated ship waves were made by the boundary integral equation method using Green's function.

Comparison of the calculated results of ship waves and ship motions with the experimental ones shows reasonable agreement. The maximum motions of a small boat can be estimated by using the proposed simplified method.

MEASUREMENTS OF SHIP WAVES AND SHIP MOTION

Photo 1 shows two kinds of small boats used in the experiments, and Table 1 shows principal items of these boat. One small vessel generating ship waves is a training boat for students of the high speed type. The other small boat moored in the waves is a fishing pleasure boat.

The measurements of ship waves and ship motions were carried out in the real sea field. During experiments, the wind was very calm and the sea condition was very smooth and the swell from open sea was not observed