

## The Features of Towing Tests of Ship Models and Processing Results in a Small Testing Tank

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### ABSTRACT

The most reliable source of defining water resistance to the vessel's motion is testing models in a testing tank. In this case, a number of features associated with the realization of similarity streams coefficients and a small measured section are arisen in small test tanks.

The Far East testing tank in KnASTU belongs to the category of a small one. It includes two towing systems with measure complexes, wave-maker, lifting bottom which simulating shallow water, model and bench areas .

The problems associated with large-scale effect because of the limited length of the model up to 4 meters, turbulence of boundary layer and control of rate flow are under review. Methods related to exception of the instability of the test results (smoothing procedure) and the approximation of the results are proposed.

Procedures of predicting the velocity of uniform motion of high-speed models are developed in the case when section of the uniform motion is absent. The method of receiving the accompanying test results - the definition of the apparent mass of water is pointed out. All this allows extending the small testing tank facilities.

KEY WORDS: testing tank; towing tests; simulating; resistance.

### INTRODUCTION

The testing tank in Komsomolsk-na-Amure State Technical University is an educational and scientific experimental complex. Investigations in sea running abilities and seaworthiness of vessels are conducted in the tank.

The testing tank belongs to the category of a small tank because its metal basin has dimensions  $L \times B \times H = 40 \times 4 \times 3$  m and dock part has dimensions  $L \times B \times H = 4,5 \times 1,6 \times 3$  m. Towing models in the tank can be carried out by two independent drives - towing carriage and gravitational towing system (GTS). At the end of the tank plate wave maker is installed, providing a sea-way of a given intensity with opposite direction according to the motion of model. Along the tank

boards perimeter the wave absorbers are installed. General view of the testing tank with a towing carriage is shown in Figure 1.



Fig. 1. Testing tank in KnASTU.

The testing tank has the ability to simulate the motion of the vessel in shallow water. It becomes possible due to the rise of a flat unit simulating the bottom of the water basin in the section of the steady motion (Fig. 2).

The tank dimensions being limited, tests of models of up to 4 m length is possible. This ensures the minimum value of the Reynolds number:

$$Re = \frac{v_M \cdot L_M}{\nu} \approx 1,5 \cdot 10^6 \text{ if } L_M=3 \text{ m and } ( \text{where } v_M, L_M - \text{ the velocity of } \nu$$