Port of Durban: Physical model of Entrance Channel

Background

The Port of Durban is in the process of expanding its operations and its capacity. The port plans to accommodate larger container vessels in future and to improve navigational safety in the entrance channel.

The National Ports Authority (NPA) of Durban has therefore embarked on a project to widen and deepen the entrance channel to the harbour, which will allow larger vessels to visit the port.

Prestedge Retief Dresner and Wijnberg (PRDW) Consulting Engineers were appointed by NPA Durban as the consultant for the preliminary design of the structures.

As part of the design process, a physical model had to be constructed to assess the proposed future layout.

Physical model study

The purpose of the model study was to determine the effect of the widening and deepening of the present entrance channel on the wave characteristics in the inner channel and how these waves influence ships moored at two exposed quays in the harbour.

Approach

A 1:100 scale model of the entrance channel area of the Port of Durban was constructed in the Hydraulics Laboratory of the CSIR in Stellenbosch.

Two basic layouts were constructed, namely the present layout and the future layout. A set of wave scenarios was simulated in both of these model layouts.

The waves were recorded at pre-defined positions in each model layout. In addition, a digital video system, referred to as the Keoship system, was used to record the motions of a Bulk Carrier and Container type vessel. These two ships were moored at two exposed quays in the harbour, near the entrance.

By repeating the same wave conditions, the relative difference in wave penetration and ship motions, as recorded in the two model layouts, could be quantified.

Conclusions

The physical model study resulted in:

- quantifying the relative effect of the future entrance channel modification on the wave characteristics and ship motions as compared to the present layout.
- a qualitative investigation of the stability of the South and North breakwaters.
- a visual inspection of the future layout

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