

Malongo Dock Expansion, Angola: Physical Model Tests of Wave Penetration



Background

In August 2006, Civil and Coastal Construction (Pty) Ltd approached CSIR, Built Environment, with the intent of determining the wave action inside the newly planned dock layouts for the expansion of the Malongo Dock in Angola.

The capacity of Malongo dock was insufficient; therefore the dock was to be extended.

Physical model study

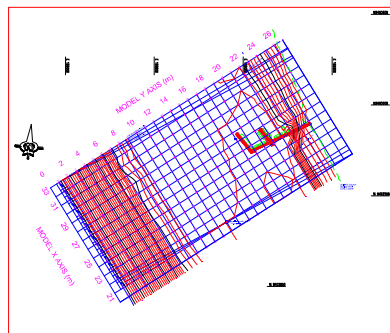
The tests involved a 1:57 scale model with wave penetration tests on the initial layout and then with several dock extension configurations, these being:

- Present lay-out,
- Extended dock with a full closed shank,
- Extended dock with 60% closed, by a row of evenly placed piles (Ø 7 mm in model),
- Extended dock with a full open shank,
- Extended dock with a full closed shank, however the first 15 m from the coastal side are left open.

Approach

The extended dock was to give at least as much sheltering to the moored ships as the current dock. This goal could be divided in the following objectives:

- Determine how much sheltering the new dock gives by comparing the significant wave height in the existing dock to the significant wave height in the future lay-outs.
- Determine whether any oscillations will occur in the new lay-outs and determine their periods and magnitude.



Conclusions

After extensive 3D model tests the following could be concluded.

- The full-closed option gives the same sheltering as the existing dock.
- The other options all give less sheltering.
- The full closed option gives also more sheltering to the present dock.
- There are small oscillations in the new dock especially in the full closed option. They are however small but may cause large horizontal movements of the ships.
- Additional ship motion tests were recommended to ascertain good mooring conditions for ships.

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