

CSIR Coastal and Hydraulics Laboratory

History

The CSIR Coastal and Hydraulics Laboratory in Stellenbosch is the site of a unique physical model hall; the only one of its size and complexity in South Africa. It was developed for coastal engineering and hydraulic model studies in the pursuit of applied research and development related to coastal engineering, harbour development, estuary hydraulics and sediment transportation in the marine environment. This was one of the primary activities of the (what was then called) National Research Institute for Oceanology (NRIO), which took over and merged with the activities of the CSIR. Currently, the hydraulics laboratory is used mainly for breakwater stability and moored ship response model studies.

Use of physical modelling

Physical modelling is used as an aid to determine:

- the optimal port layout with respect to wave penetration in the harbour basins;
- movement of moored ships due to waves;
- the stability of coastal and breakwater protection armour units;
- hydraulic action in canals and dam overflow.

Physical modelling aids in highlighting weak spots in structures, designs and systems. Therefore, potential problems may be investigated and minimised, thus reducing the risk of high costs of damages to the actual systems. A three-dimensional view of the system can be obtained, which is not possible with numerical modelling.

Activities

Models are built of harbours, breakwaters, rivers and dams. Sediment transport, scouring, water circulation, structure damage and wave action are monitored by means of electronic sensors, video monitoring and sophisticated data processing techniques.

The laboratory facilities are regularly checked and updated to keep up to date with the latest available technology.

Model basins

The CSIR Hydraulics Laboratory has two wave basins for vessel response and wave penetration tests (VR), two basins for breakwater stability tests (SB), a wind flume (WF), two concrete wave flume (CF), a glass flume (GF) and a deepwater tank (DT). The dimensions of the basins and flumes are given below as length x width x depth of the basin.

3D Wave Basins

VR1: 60 m x 30 m x 0.5 m
VR2: 55 m x 30 m x 1.0 m
SB1: 30 m x 35 m x 0.6 m
SB2: 30 m x 12 m x 0.5 m

Wind wave flume

WF1: 100 m x 3 m x 1.0 m

2D wave channels

CF1: 30 m x 4.00 m x 0.8 m
CF2: 30 m x 0.75 m x 1.0 m
GF1: 30 m x 0.75 m x 1.0 m

Deepwater tank

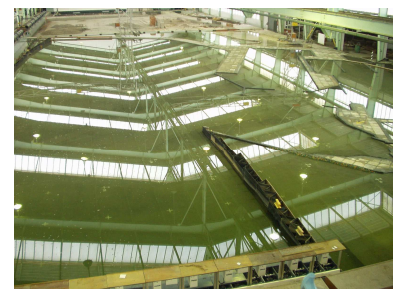
DT1: 30 m x 18 m x 2.0 m with a 1.5 m deep centre pit

24 m of multi-directional irregular shallow water generators are available for use in the 3D Basins. The wave paddles in the wave

basins and the 2D wave channels are equipped with dynamic wave absorption.

Workshops

The model facilities are supported by fully equipped metal and woodwork workshops, a scuba diving unit, and a team of trained technologists, engineers and artisans.



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