

Large Physical Wave Flume

A physical wave flume has been designed and constructed at the Department of Civil Engineering of Ghent University. Initial design started early 2002 and the flume is fully operational since March 2003. The objective of the flume is to get a better understanding of waves and wave/structure interaction on a larger scale than it was possible up till now in the small wave flume of the department. The large flume will be used for research purposes and project activities.

Dimensions

The flume measures 30.0 m long, 1.0 m wide and 1.2 m high. The overall design water depth is 80 cm. The maximum wave height in the flume is about 0.35 m. The walls of the flume are mainly made of reinforced concrete. A fifteen meter long section of one side wall is made of glass (30 mm thick), supported by a steel frame. The rear end of the flume is closed off with a steel door. Removing this door allows people to enter the wave flume for model construction. The wave flume has four compartments which can be separated from each other by bulkheads in order to dry-dock very quickly one of the compartments for model construction and/or model adjustments. Openings are present in the side walls of the wave flume for connection with pumps for tide and current simulations. The flume is equipped with the state-of-the-art model testing technology including an advanced wave generator system for both regular and irregular waves, active wave absorption, data acquisition system and wave data analysis software. All software is developed in-house at the Department of Civil Engineering.

Wave paddle

A piston type wave paddle has been installed. The paddle is fixed to a moving open framework and moves on linear bearings. All mechanical and electrical connections and devices are located above the walls of the flume. The maximum stroke length is 1.50 m. The paddle displacement is accomplished by using an electro servo motor in step mode. The step

motor is connected with the paddle using a spindle.

Wave generation using 'GENESYS'

An updated version of the Wave Generation System 'GENESYS', i.e. a PC-based application software package, is used for generation of regular and random paddle displacement signals and for simultaneous acquisition of data from multiple wave gauges. Wave generation and DAQ procedures have been implemented using LabView™ software. The paddle displacements are controlled using a network connection between the PC and the real time controller of the wave generator.



Figure 1: Wave paddle of the Large Wave Flume at Ghent University.

Active wave absorption 'AWASYS'

The AWASYS system enables the wavemaker to generate the desired incoming waves and to absorb reflected waves simultaneously.



Figure 2: Model section with glass wall of the Large Wave Flume at Ghent University.

Wave analysis software 'ANASYS'

An updated and improved version of the PC-based software package for analysis of wave signals 'ANASYS' is included in the flume software. Features include determination of wave characteristics in time and frequency domain, statistical analysis of wave heights, and options for plotting and output of detailed wave information.



Figure 3: The Large Wave Flume of Ghent University from inside the flume.