US Army Corps of Engineers®
Engineer Research and Development Center

Coastal Structures Flume Facility

Purpose

Experts at ERDC's Coastal and Hydraulics Laboratory maintain and operate a facility with two extensive laboratory flumes used for designing and testing coastal structures. The large two-dimensional wave flumes are used to test designs for rubble-mound trunk armor stability and to quantify wave runup, overtopping, and transmission. In addition, these wave flumes are used to explore the physics of water-wave propagation, wave transformation and wave-structure interaction, and are also used for experimental investigation of sediment transport in wave and steady current environments. The facility is available on a reimbursable basis for specific projects by U.S. Army Corps of Engineers District offices, other governmental agencies, and private consultants.

Specifications

Two glass-walled two-dimensional wave flumes are used to support research and site-specific studies. The flumes are both 63 m (208 ft) long and 1.5 m (5 ft) deep. One flume is 1.5 m (5 ft) wide while the other is 3 m (10 ft) wide. Both flumes are equipped with computer-controlled electro-hydraulic wave generators. The wave generators are capable of creating irregular waves with a maximum wave height of 0.46 m (1.5 ft), and wave periods of 0.75-10.0 sec. A steady flow system is also an integral part of the flumes. The facility includes an automated data acquisition and control system, extensive fluid measurement instruments, and two laser profiling systems.

10-ft and 5-ft flumes

Benefits

Outside a controlled laboratory environment, measurements of breakwater and revetment armor stability, forces on coastal structures, overtopping rates for different structural configurations during storm conditions, and sediment transport in the surf zone would be difficult and expensive. Also, structure cross section can be easily optimized in a scale model test. Other important tangible benefits of verifying designs in the laboratory are reduction of future maintenance and repair costs over the structure life as well as reduced risk of failure.

Success Stories

Recent supported studies include:

- Generalized breakwater deterioration
- Stability of breakwaters at Lajes, Azores; Kaumalapau, Hawaii; and Kodiak, Alaska
- Generalized unexploded ordnance mobility
- Reflected wave absorption

- Combined wave and current interaction
- Sand dune breaching
- Columbia River Jetty stability study

Point of Contact

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