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Engineer Research and
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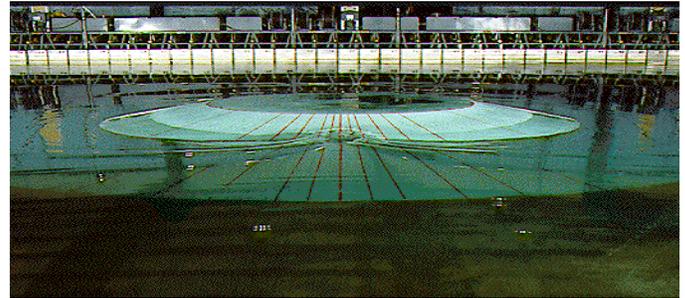
Directional Spectral Wave Generator Facility (DSWG)

Description

In FY00, the ERDC's Coastal and Hydraulics Laboratory (CHL) acquired a new state-of-the-art multidirectional wavemaker. The Directional Spectral Wave Generator (DSWG) was designed and built by MTS Systems Corporation, Minneapolis, MN. It provides realistic three-dimensional waves in a laboratory environment for coastal projects that support coastal research and development and site-specific project studies.

Specifications

The facility consists of a 400-ft long by 182-ft wide concrete basin with 2.5-ft high walls. The DSWG is 27.4-m long and consists of 60 paddles, each 46-cm wide and 1-m high. Each paddle is driven at the joints by an electrical motor in piston mode, producing very smooth and clean model waves. The stroke of ± 36 cm generates wave heights up to 30 cm in 60 cm water depths. Angles between paddles can be continuously varied using the "snake principle" to produce



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waves at angles approaching ± 85 deg. The DSWG is composed of 4 modules that enhance portability within the J.V. Hall Bldg. Passive wave absorber frames around the basin perimeter and active wave absorption on the DSWG reduce reflections from model structures and basin walls. Two hydraulic gates facilitate model construction and access. The DSWG has PC-based control, calibration, data acquisition, and analysis systems. These systems provide (a) signal simulation, generation, conditioning, command and feedback, (b) gage calibration, (c) active wave absorption, and (d) data collection and analysis. Regular, irregular, cnoidal, unidirectional, directional, episodic, and tsunami waves can be created from measured data or empirical formulas.

Benefits

The ocean and coastal engineering community is recognizing the importance of wave directionality in model studies. Over 40 hydraulic laboratories around the world now have shallow and/or deepwater multi-directional wavemakers. Typical applications are wave transformation, harbor and breakwater modeling, ship underkeel clearance, wave-current interaction, underwater explosions, submarine and aircraft carrier stability, and tsunami waves.

Application

The DSWG has been widely used by the research and academic community including Caltech, Cornell University, Naval Surface Warfare Center, Carderock Division, University of Delaware, Harvard, University of Maine, University of Miami, Scripps Institute of Oceanography, University of Southern California, University of Washington, and Washington State University.

Point of Contact

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