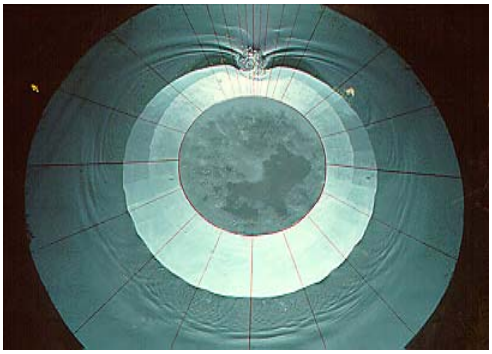
US Army Corps of Engineers®
Engineer Research and Development Center

Tsunami Runup Physical Modeling

Description

Flume and basin physical model studies were conducted to provide a better understanding of the physical phenomena and verify numerical models used in predicting tsunami wave runup on beaches, islands, and vertical walls.

Issue



Tsunami-generated edge waves wrapping around model of Babi Island in the Flores Sea

Tsunamis are long water waves of small steepness generated by impulsive geophysical events on the ocean floor or at the coastline. Since 1992 tsunamis in Nicaragua, Indonesia, Japan, and Russia have caused millions of dollars in damages and killed many thousands of people. Wave runup is the most devastating hazard associated with tsunamis, yet it is the least understood. The National Science Foundation (NSF) funded a 4-year study beginning in FY92 to identify important physical parameters involved in 3D tsunami runup. An international advisory committee met with the principal investigators once a year and included Drs. Howell Peregrine, University of Bristol, Fred Raichlen, Caltech, Nobu Shuto, Tohuku University, and Robert Street, Stanford University.

Products

CHL flumes and basins were used to conduct three physical models of a plane beach, vertical wall, and a circular island. The 7-m diameter circular island was 60-cm tall with a 1 on 4 beach slope. This model island approximated Babi Island, Indonesia, which suffered extensive damage along the southern or lee side of the island when runup heights of 5.6 to 7.1 m devastated entire villages as a result of the 1992 Flores Tsunami. Capacitance wave gages and digital runup gages were used to measure the evolution, uniformity, and runup of tsunami waves propagating around the perimeter of the island.

Supporting Technology

A bathymetric survey of Nicaragua was conducted to identify unusual bathymetric features that might have been the cause for large differences in wave runup during the 1992 Nicaraguan earthquake and tsunami.

Benefits

Two benchmark problems on a circular island and vertical wall from CHL were used to validate numerical models in the *International Workshop on Long Wave Runup Models*.

Partners

The National Science Foundation (NSF), Cornell University, Harvard University, University of Washington, University of Southern California, University of Bristol, Caltech, Tohuku University, and Stanford University.

Point of Contact

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