Fact Sheet

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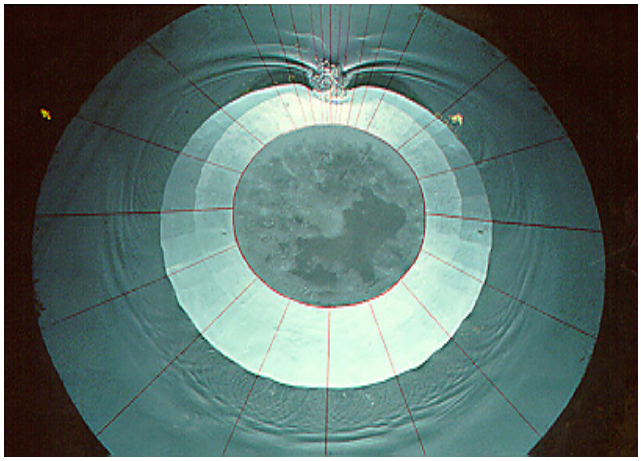
CHL web site chl.erdc.usace.army.mil

Tsunami Runup Physical Modeling

Purpose: 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.



Background: 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. This joint research study included principal investigators: Dr. Philip Liu, Cornell University, Dr. George Carrier, Harvard University, Dr. Harry Yeh, University of Washington, Dr. Costas Synolakis, University of Southern California, and Dr. Michael Briggs, CHL. 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.

Facts: 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 Okushiri Island in the Japan Sea, which suffered extensive damage along the southern portion where runup heights of 15 to 30 m were measured following the Hokkaido, Japan 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. A bathymetric survey of Nicaragua was conducted to identify unusual bathymetric features which might have been the cause for large differences in wave runup during the 1992 Nicaraguan earthquake and tsunami. Two benchmark problems on a circular island and vertical wall from CHL laboratory data were featured in the *International Workshop on Long Wave Runup Models* that was attended by 55 international scientists. A web site on tsunami research at WES was one of the first reimbursable web sites set up at WES.

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