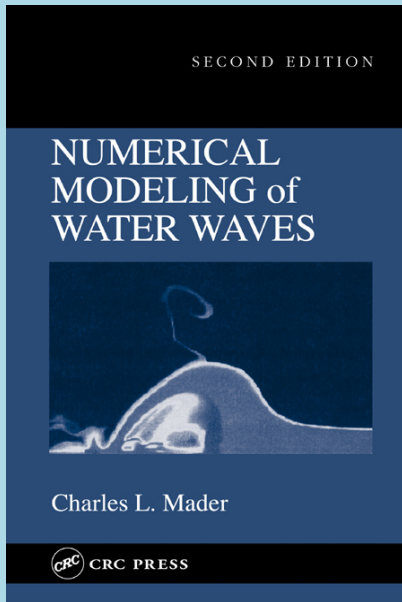


Short Course

TSUNAMIS - Science and Modeling



The course will describe the science of tsunami wave generation, propagation and destructive interaction with shorelines that has been created over the last 50 years by scientists using physical and numerical models to simulate the tsunamis that have killed hundred of thousands in the last century.

The text for the course will be a recent book and CD-ROM by the lecturer, Dr. Charles L. Mader, published in 2004 by CRC Press about the science and modeling of tsunamis entitled **NUMERICAL MODELING OF WATER WAVES - SECOND EDITION**.

The text and course describes the technological revolution that has occurred in the last four years that permits realistic numerical modeling of tsunamis generated by impact landslides, projectiles including asteroids and volcanic or nuclear explosions.

TOPICS

I. WATER WAVE THEORIES

1. Airy Waves
2. Solitary Waves
3. Laitone and Stokes Waves
4. The WAVE Code

II. INCOMPRESSIBLE SHALLOW WATER MODEL

1. Hilo, Hawaii Tsunamis of 4/1/46, 5/23/60, 3/28/64
2. Flooding Around Buildings

3. The Lisbon Tsunami of 1755 and Caribbean Wave
4. Crescent City, California Tsunami of 3/28/64
5. Skagway, Alaska Landslide Tsunami of 11/3/94
6. Indian Ocean Tsunami of 12/26/2004
7. The SWAN Code

III. INCOMPRESSIBLE NAVIER-STOKES MODEL

1. Solitary Tsunamis
2. Underwater Barriers to Mitigate Tsunamis
3. Waves from Cavities
4. Hawaii Landslide Generated Tsunami of 5/29/75
5. Skagway, Alaska Landslide Tsunami of 11/3/94
6. The ZUNI and SOLA Codes

IV. LIMITATIONS OF INCOMPRESSIBLE MODELS

1. Generation of Tsunamis
2. Propagation of Tsunamis
3. Flooding and Run-up of Tsunamis
4. "Cold Fusion" Tsunamis

V. COMPRESSIBLE NAVIER-STOKES MODEL

1. The Lituya Bay Mega-Tsunami of 7/8/58
A 1500 ft run-up Tsunami generated by an Impact Landslide
2. Fritz Wave Tank Studies of Landslide Generated Tsunamis
3. Projectile and Explosive Generated Waves
Upper Critical Depth for Generating Tsunamis
4. Asteroid Generated Tsunamis
The KT Mass Extinction Asteroid Impact and Tsunami
5. Hydro-Volcanic Explosive Generation of Tsunamis
Krakatoa Explosion in 1883.
6. The SAIC SAGE/RAGE/NOBEL Codes
Continuous Eulerian Adaptive Mesh Refinement (AMR)
Parallel Implementation Using MPI for Cluster Computers
Multiple Material Compressible Equation of State

Realistic Gravity Fields

Elastic-Plastic Strength

Chemically Reactive and Detonation Physics from

NUMERICAL MODELING OF EXPLOSIVES AND PROPELLANTS,

CRC Press

Developed by Michael Gittings (SAIC/LANL)

VI. TSUNAMI WARNING

1. PTWC and WCATWC Warning Centers - For Distant Earthquake

Generated Tsunamis

2. DART Tsunami Gauges

3. The Locally Generated Tsunami Warning Problem

4. Modeling Data Bases for Warning Centers - The WCATWC Model and

Data Base
