



Water Wave Mechanics for Engineers and Scientists: 2 (Advanced Series on Ocean Engineering)

Robert G Dean, Robert A Dalrymple

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This book is intended as an introduction to classical water wave theory for the college senior or first year graduate student. The material is self-contained; almost all mathematical and engineering concepts are presented or derived in the text, thus making the book accessible to practicing engineers as well.

The book commences with a review of fluid mechanics and basic vector concepts. The formulation and solution of the governing boundary value problem for small amplitude waves are developed and the kinematic and pressure fields for short and long waves are explored. The transformation of waves due to variations in depth and their interactions with structures are derived. Wavemaker theories and the statistics of ocean waves are reviewed. The application of the water particle motions and pressure fields are applied to the calculation of wave forces on small and large objects. Extension of the linear theory results to several nonlinear wave properties is presented. Each chapter concludes with a set of homework problems exercising and sometimes extending the material presented in the chapter. An appendix provides a description of nine experiments which can be performed, with little additional equipment, in most wave tank facilities.

Contents:

- Introduction to Wave Mechanics
- A Review of Hydrodynamics and Vector Analysis
- Small-Amplitude Water Wave Theory Formulation and Solution
- Engineering Wave Properties
- Long Waves
- Wavemaker Theory
- Wave Statistics and Spectra
- Wave Forces
- Waves Over Real Seabeds
- Nonlinear Properties Derivable from Small-Amplitude Waves
- Nonlinear Waves
- A Series of Experiments for a Laboratory Course Component in Water Waves

Readership: Coastal and ocean engineers.

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