

PREFACE TO THE REVIEW SERIES

The rapid flow of new literature has confronted scientists and engineers of all branches with a very acute dilemma: How to keep up with new knowledge without becoming too narrowly specialized. Collections of review articles covering broad sectors of science and engineering are still the best way of sifting new knowledge critically. Comprehensive review articles written by discerning scientists and engineers not only separate lasting knowledge from the ephemeral, but also serve as guides to the literature and as stimuli to thought and to future research.

The aim of this review series is to present critical commentaries of the state-of-the-art knowledge in the field of coastal and ocean engineering. Each article will review and illuminate the development of scientific understanding of a specific engineering topic. Our plans for this series include articles on sediment transport, ocean waves, coastal and offshore structures, air-sea interactions, engineering materials, and seafloor dynamics. Critical reviews on engineering designs and practices in different countries will also be included.

P. L.-F. Liu, 1994

PREFACE TO THE FIRST VOLUME

This volume of the review series is a collection of five papers reviewing a wide range of research topics in coastal engineering.

The first paper, written by Yeh, discusses one of the fundamental issues concerning many fluid flow problems, namely, free-surface boundary conditions. The free surface is defined as the sharp interface between air and water. Yeh reviewed the effects of the air flow, surface tension, as well as the viscosity on the free-surface boundary conditions. The highlights of the paper are the discussion on the vorticity condition and the vortical behavior associated with the dynamics of the free surface.

Foda presents a survey on another boundary dynamics: the seafloor dynamics. In coastal water, fluid motions under water waves mobilize sediment on the seafloor and consequently wave energy is dissipated. The process is dependent on wave characteristics and sediment properties. Foda reviews recent studies on the nonlinear wave energy transfer into the seabed and different modes of wave-induced sediment fluidization processes in cohesive as well as in noncohesive seabeds. Several issues concerning the interactions between sediment deposits and marine structures, such as pipeline and breakwater, are also briefly reviewed.

One of the active research areas in modeling wave propagation is the construction of a unified model which is valid from deep water to shallow water. Liu discusses several existing models. When the wave amplitude is small in deep water, a model based on the Boussinesq approximation seems to be performing well. However, if the nonlinearity is not negligible in deep water, none of the existing models can propagate waves from deep water to shallow water.

The sediment movement in the surf zone is a complex system. It can usually be decomposed into the longshore and the cross-shore components. Dean focuses his discussion on the cross-shore sediment transport process. In particular, the characteristics of the equilibrium profile and the dynamics of the beach profile evolution are reviewed. Several cross-shore transport models are compared and evaluated.

In the last paper, van der Meer presents a comprehensive review on the design consideration for a rubble mound breakwater. Both hydraulic and structural responses are discussed. Design formulas and graphs are presented, which can be used for a conceptual design of a rubble mound breakwater.

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