

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

PREFACE TO THE SIXTH VOLUME

This volume consists of five interesting papers covering a wide range of topics in coastal engineering. To lead off the volume, Kiyoshi Horikawa presents a comprehensive review on the “History of Coastal Engineering in Japan”. Horikawa has been a leading Japanese scholar in both coastal engineering research and education in the last half century. His article not only discusses the evolution and advancement of coastal engineering research in Japan, but also provides a chronological review of coastal development and coastal engineering activities in Japanese history.

The second paper, entitled “Wavelet Transform and New Perspective on Coastal and Ocean Engineering Data Analysis”, is prepared by Paul Liu. Although wavelets and wavelet transforms have rapidly emerged as common subjects of research and applications in many scientific and engineering investigations, coastal and ocean engineers and scientists have not focused their attention on these powerful theories and tools for data analysis. In this introductory paper, Liu has given a brief and clear introduction of the basic concept of wavelets and wavelet transforms. Using the time series data for wind waves, Liu demonstrates that the time-frequency wavelet spectrum can reveal the intermittent nature of wave groupings, which is totally hidden in the conventional frequency spectrum. Many other applications are also discussed.

Yehuda Agnon and Alexandra Sheremet present the third paper of this volume, entitled “Stochastic Evolution Models for Nonlinear Gravity Waves over Uneven Topography”. Some of the nonlinear water wave shoaling and breaking processes can be described adequately by deterministic models, which have become well established in recent years. Other aspects are best investigated through a stochastic description. In this paper, Agnon and Sheremet have discussed various aspects of the problem, deriving a stochastic model for nonlinear waves in shallow water. They have identified two distinct mechanisms for energy transfer, which is dominated by non-resonant trio interaction: Variable bathymetry and nonlinear dispersion. A brief discussion on the modeling of wave breaking is also given.

One of the primary goals for coastal engineers is to be able to calculate the sediment transport rate and the associated beach profile under a prescribed wave condition. The sheet flow becomes a dominant sediment transport mode in the entire surf zone during storm events. In the fourth paper, entitled “Sediment Transport in Oscillatory Sheet Flow”, Toshiyuki Asano has provided a thorough review of the experimental and theoretical research in sheet flow during the last two decades. Asano also identifies the needs for further research in this important topic.

The laboratory measurement techniques for fluid flows have been significantly advanced during the last thirty years. In particular, the optical technique has been developed rapidly. In the fifth paper entitled “Optical Studies of Wave Kinematics”, Clive Greated and Narumon Emarat discuss several optical techniques, including Laser Doppler Anemometry (LDA), Particle Image Velocimetry (PIV) and the technique of Laser Induced Fluorescence. They have provided specific applications such as in breaking waves, wave-current interaction, sediment motion and internal waves.

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