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Beach Processes and Sedimentation

By Paul D. Komar
Prentice-Hall, Inc., 429 p., 1976.
$29 95

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The study of coastal processes is bedeviled by the immensity of the existing literature including contributions from civil engineering, geography, geology, oceanography and applied mathematics. Within this mass of information, totally irreconcilable viewpoints are often fashionable simultaneously, each supported by equally irreconcilable observations. It is in the discussion of processes, hydrodynamic or sedimentary, that the differences between the disciplines are perhaps most obvious, the generally descriptive approach of the geologist and geographer contrasting strongly with the quantitative, predictive understanding required by the oceanographer or engineer. This difference is readily seen in the books currently available. There are several excellent volumes on coastal geomorphology which are primarily descriptive; there are a few texts on coastal engineering, all now rather dated, which provide good introductions to nearshore hydrodynamics but say very little about sedimentary processes.

This new book, based on a combination of physical oceanography and geology, fits very neatly into this gap providing an excellent introduction to the modern concepts in nearshore processes. The only existing book which makes a serious attempt to cover these topics is the 2nd edition of C. A. M. King's "Beaches and Coasts". This is very much more a survey of the subject, as it was in 1967 or so, concerned to present all the various ideas on any particular topic without very much critical comment. Komar's approach is much more personal, the development of a coherent picture of nearshore processes in the course of which alternative theories may get very short shift or be ignored entirely. Although this may annoy those whose favorite themes are neglected, the result is a very readable book, one that will be appreciated by both the professional earth scientist and the layman.

Following two short chapters, an introduction to the study of beaches and a brief review of coastal geomorphology, the bulk of the first part of the book deals with fluid motions, waves, tides, changing sea levels and nearshore currents. The second half of the book deals primarily with sedimentary processes, longshore transport, sedimentary budget, shoreline configuration and beach profiles. This is followed by a short chapter on coastal engineering structures and a rather lengthy final chapter covering a variety of sedimentological topics.

The treatment of the subjects is mathematical and, as far as possible, quantitative. The mathematics is not, however, emphasized and derivations of results are not generally included; instead the results are supported by an extensive list of references for each chapter. The book can be read 'around the mathematics' but the reader will find that some concepts which are now known to be central to our understanding of nearshore processes are most easily expressed in mathematical form. The obvious example is the concept of momentum flux due to the waves (radiation stress).

This book is essential reading for anyone interested in coastal processes. That it is written in a lively style with some very appropriate quotations and illustrations is an additional bonus. The book is basically designed for the graduate level, but for graduates from such diverse backgrounds that the general reader should have little difficulty in assimilating all but the most technical sections on wave theory.

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An Introduction to Hydrodynamics and Water Waves

By Bernard Le Mehante
Springer-Verlag New York Inc.,
324 p., 1976.
$24 80

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Standard engineering textbooks on hydraulics or fluid mechanics generally deal very briefly, if at all, with the theory of water waves; the traditional emphasis is on topics such as pipe and channel flow, hydraulic machinery and practical aerodynamics. The aim of this new book is to introduce the more mathematical aspects of hydrodynamics to students who may have some practical experience but do not necessarily have a strong, mathematical background. Consequently, mathematical concepts and notation are introduced rather slowly, the emphasis being on a careful discussion of the fundamental physics. A natural result of stressing these basic, physical ideas is that the topics covered in the book tend to be those which do not depend heavily on empirical results.

The book is divided into three sections, the first of which "Establishing the basic equations that govern flow motion" is by far the most successful. The basic principles are clearly introduced, well supported by numerous illustrations. A particularly nice feature is the arrangement of the most important equations which includes the physical meaning of each term. This deliberate approach and the inclusion of rather extensive intermediate calculations gives a very orderly development of ideas but will quickly convince the general reader that this is primarily a textbook, not a book to casually dip into.

The second part of the book covers some further developments of the mathematical concepts in much the same vein. However the sections on the application of these ideas to actual problems tend to be very superficial with little discussion of the assumptions, and limitations, implicit in the solutions.