Books

Fluvial Processes in River Engineering

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Howard H. Chang, John Wiley & Sons, New York, 432 + xiii pp., $49.95, 1988.

Reviewed by W. R. Osterkamp

Since 1971, when W. H. Graf's book, *Hydraulics of Sediment Transport,* was published, a number of other texts that also provide somewhat personal perspectives on water-sediment interactions in open-channel flows have appeared. The latest of these is *Fluvial Processes in River Engineering,* by Howard H. Chang. This text updates recent developments in the study of hydraulics and sediment transport of natural stream channels, but unlike the earlier books, it expands consideration to geomorphic processes and models of channel change. The author states that the book is intended as a text for senior and graduate-level engineering students. It appears that Chang has succeeded in tailoring the book for that audience, but it also appears that no fewer than two semesters of classroom time would be required to provide an adequate basis for understanding the considerable variety of subject matter covered.

The general organization of the book progresses from theoretical concepts of fluvial geomorphology, to engineering discussions and modeling of fluvial processes, to applications, such as canal design, channel modification and response, and use of hydraulic structures. These topics are distributed among 15 chapters that are grouped into five parts of the book. The five parts vary considerably in both length and depth of discussion, reflecting the author's technical strengths and interests.

Part I provides a brief introduction to concepts of fluvial geomorphology, including those of channel variables, channel patterns, and hydraulic geometry. This part relies principally on routinely cited references of Lane, Leopold, and Schumm, but fails to describe numerous other important contributions of the last 15 years. Many of the more recent papers contradict those cited; therefore the credibility of the section is weakened by not including alternative viewpoints. Part II, Foundations of Fluvial Processes, includes discussions of open-channel hydraulics, physical properties and movement of sediment, scour, flow resistance, bedforms, and flow in curved channels. This part, which comprises nearly one-half the book, summarizes much of the vast experience that the author has accumulated. Although the author relies primarily on pre-1973 work by colleagues with a similar background, this section is detailed and is, by far, the most informative section of the book. Part III combines the geomorphic and hydraulics theory of the first two parts to provide engineering applications to water management problems.

Mathematical and computer models are discussed in Part IV. During the last 15 years, the author has been an active participant in the development of channel-change models, and its experience provides both benefits and limitations to his discussion. The principal benefit is Chang's knowledge of the one-dimensional models that he helped put into widespread use. The deficiency of Part IV is that condsideration largely is restricted to one-dimensional, fitted-parameter models, without mention of the shortcomings of those models. The physically based, two-dimensional models of Shimizu and Itakura, Smith and McLean, deVriend and Struiksma, and others, are not cited. A final short section, Part V, describes classical techniques of bank protection, dike construction, and grade control.

Where this book is strong—Part II in particular, it is quite comprehensive, and should serve as a valuable, up-to-date text for hydraulic engineers. Where the book is weak—mostly Parts I and IV, the deficiencies largely are due to not considering alternative viewpoints; fortunately, these deficiencies do not detract from the discussion on hydraulics and sediment transport. For these topics the book is a contribution.

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AGU

AGU Letter to George Bush

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As part of AGU's continuing efforts to enhance geophysics, AGU president Don Anderson, with Council approval, wrote to George Bush on January 18 urging that the Office of Science and Technology Policy, Executive Office of the President, provide strong leadership in understanding Earth processes. The letter, below, represents the Union position on this issue.

The Honorable George Bush
President-Elect of the United States
Old Executive Office Building
Washington, DC 20501

Dear Mr. President-Elect:

The Office of Science and Technology Policy should provide strong leadership in coordinating the national effort to understand Earth processes.

There is world-wide scientific and political recognition that we can and must understand Earth processes on a global scale. This understanding will help us to assess and predict natural and man-induced global changes that may have adverse consequences on the environment and to promote the wise use of natural resources. Concern with these issues will accelerate in the next decade. It is the opinion of the American Geophysical Union that an integrated national program to understand Earth processes and to relate this understanding to man's needs demands strong and dedicated leadership from the Executive Office of the President at this time.

Changes in the Earth's environment are inevitable and are occurring; the Antarctic ozone hole, the build-up of greenhouse gases in the atmosphere, ocean pollution and deforestion are examples. The extent to which such changes can take place without serious adverse effects is uncertain. Determining what alternatives man has to mitigate adverse effects requires improved scientific and technical knowledge. Without this knowledge it will not be possible to develop sound national and international policies that will assure a continuing benevolent environment.

Understanding regional and local phenomena is also important. Droughts, hurricanes, floods, earthquakes and volcanic eruptions all take their human toll each year. We need better knowledge of how the Earth works in order to understand these phenomena. Only then will science be making the contribution it can and should to the development of sound policy that will reduce the human suffering caused by natural and man-made hazards.

The federal government, in cooperation with the scientific community, should take the lead in coordinating and strengthening the national effort to understand Earth processes. Expertise and leadership in the Executive Office of the President in this area would provide a vital force in the leadership of a truly integrated national program and in the development of appropriate policies.

The American Geophysical Union, with more than 22,000 research and academic scientists as members, is the largest U.S. scientific society devoted entirely to the study of Earth and its environment in space. We offer our expertise to advance the public welfare. Please call on us at any time.

Sincerely yours,
Don L. Anderson
President