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*Sediment Transport – A Geophysical Phenomenon*, by Albert Gyr & Klaus Hoyer 2006. Fluid Mechanics and its Applications 82. Springer-Verlag, Tiergartenstrasse 17, D-69121 Heidelberg, Germany. Hardcover, xi + 288 pp. Price EUR 94.95; USD 119.00; GBP 73.00. ISBN 978-1-4020-5015-2.



Sediment transport is a multidisciplinary science, and proper understanding of the sediment-transport phenomenon in solving real-life problems involves very active collaboration between physicists, engineers, mathematicians, statisticians and geologists. Several good books on sediment transport are available to fulfil the need of the undergraduates, graduates and practice-oriented professionals. The progress made in the last two decades in understanding the interactions between turbulent flow and sediments is, however, significant. An update of the subject based on new technical advancement and methodological development was therefore necessary. Albert Gyr and Klaus Hoyer have made an effort in this book, which forms part of Springer's series of books and monographs on "Fluid Mechanics and its Applications", to provide an update data on and insights into research related to sediment transport.

The content of the book is presented in 12 chapters. After a brief introduction on the sediment-transport phenomenon and justifications for a new book on the subject (Chapter 1), the authors discuss the classical theories of sediment transport (Chapter 2). The statistical aspects of turbulence and sediment transport are analysed in the Chapter 3. Additionally, some critical remarks highlighting the deficits of the statistical approaches of turbulence are made. In addition, the authors follow a different approach to describe sediment transport by mechanistic processes, by interpreting sediment transport as a dynamical response to an extremum principle (Chapter 4). The formulated criticisms of existing theories are elucidated in Chapter 5. Some important annotated lists of scaling of various parameters, essential for proper understanding of the sediment-transport phenomenon, are given in Chapter 6. Alluvial systems are characterised by a variety of roughness elements and they influence the flow structure considerably. Diverse types of grain roughness are discussed in Chapter 7. Chapter 8 presents a detailed account on the flow separation, topology and vortex dynamics. Chapters 9-11 present physical aspects of sediment transport and sediment/fluid interaction in fine-grained sand, heterogeneous sediment mixtures and gravel beds. A detailed account on the data and strategies to calculate sediment transport is presented in Chapter 12. This is followed by an extensive list of references and an appendix including graphs, tables and a rare document (Albert Einstein's letter of recommendation – in German with English translation – for his son Hans Albert for a position as a doctoral student at the Federal Institute of Hydraulic Structures, p. 269-270).

The book is very well written with plenty of illustrations. The physics of sediment transport is well explained and its connecting links with mathematics, statistics and engineering disciplines are properly addressed. The physics of bedform generation through sediment/fluid interaction is, however, somewhat underscored and the dynamics of bedform transitions (ripple/dune, dune/upper-stage plane beds, dune/antidune) are not discussed at all! In contrast, the authors present an excellent account on ripple formation, and mention numerous relevant references (p. 168-178), even though the pioneering work of Jim Best (1992) is not referred to!

Similarly, the discussion on sediment-transport processes and bedform generation in heterogeneous sediment mixtures and gravel beds (Chapters 10 and 11) remains incomplete, without mentioning the extensive research done by John Bridge and his colleagues during the last decade. I hope that the authors will take this into consideration, and that they will present an up-to-date account on the dynamics of bedform generation and bedform transitions in a possible next edition.

In spite of these shortcomings of relatively minor importance, I sincerely believe that this book will be extremely helpful for advanced undergraduates, graduates and researchers of sediment transport. I strongly recommend the book for the libraries of all universities/institutions. A paperback edition of the book would be most helpful for students, as the price of the hardbound volume is high.

#### Reference

Best, J.L., 1992, On the entrainment of sediment and initiation of bed defects: insight from recent developments within turbulent boundary layer research: *Sedimentology* v. 39, p. 797-811.

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