BOOK REVIEW / CRITIQUE DE LIVRE

Book review: The Hydraulics of Open Channel Flow: An Introduction[1]

By **Hubert Chanson**

This is the second and expanded edition of a successful first edition published in 1999 and reprinted in 2001 and 2002. Hubert Chanson is a Reader in Environmental Fluid Mechanics and Water Engineering at the University of Queensland, Australia. He is very active in research in the field of hydraulic engineering, including environmental hydraulics, and has published extensively. He has also authored several books in these areas. Like the first edition, this book is directed at undergraduate students in civil, environmental, and hydraulic engineering.

This book is written in four parts. Part 1 deals with basic principles of open channel flows and has five chapters, dealing with fluid properties and statics (in Chapter 1); fundamental equations of fluid mechanics (continuity, Navier–Stokes, and Bernoulli equations) in Chapter 2; and application of the Bernoulli and momentum equation to simple open channel flows like critical flow and hydraulic jumps, in Chapters 3 and 4, respectively. Chapter 5 treats uniform and gradually varied flows and presents the step method for calculating gradually varied flow profiles.

Part 2 deals with sediment transport in open channels. Chapter 6 presents an introduction to sediment transport, and Chapter 7 is on sediment properties and the different bed forms. Chapter 8 considers the initiation of bed particles and presents a modified Shields diagram. A brief Chapter 9 deals with the initiation of particle suspension. The next chapter considers bed load transport and includes some of the well-known bed-load transport equations. A similar treatment of suspended load is presented in Chapter in 11. Chapter 12 discusses total sediment transport, including grain and bedform-related shear stresses.

Part 3 deals with physical and numerical modeling of open channel flows. After a brief treatment of the basic flow equations and flow resistance in Chapter 13, the next chapter discusses the basic ideas of scale models and dimensional and similarity considerations, including geometrically similar and distorted models. Chapter 15 deals with numerical computation of backwater profiles. Chapter 16 presents integral and differential forms of the Saint-Venant equations and introduces the method of characteristics. Topics of Chapter 18 are the simple wave, the simple flood wave, and the kinematic wave; it presents a detailed discussion of the dam break wave.

Part 4 deals with the design of hydraulic structures. Chapter 18 introduces briefly the design approach. It is followed by a critical discussion of the flow over weirs and spillways and the design of hydraulic jump-type stilling basins in Chapter 19. Chapter 20 presents a similar discussion of drops and stepped cascades. Hydraulics of culverts and their design are considered in Chapter 21.

One special feature of this book is that the author provides numerous worked examples, review questions, and interesting historical notes, as well as a number of ideas that are useful to students and might also spark their interest in the subject. Towards the end of the book is an interesting presentation of several historically important projects. Reading through the book, one cannot miss the tremendous enthusiasm the author has for hydraulic engineering. I think that this book will be useful for undergraduate students, and I would recommend it to them. I also think that graduate students and practical engineers will benefit by studying this book.

In the chapter dealing with scale models, a reference to James J. Sharp's book *Hydraulic Modelling* (1981) and the *ASCE Manual 97: Hydraulic Modeling: Concepts and Practice* (2000) would have been useful for the readers. Before closing, I wonder whether the section A1.3 Mathematics is really necessary. I also wonder whether in a text book like this, one needs such a large glossary, since historical details are already provided in several sections in the book. Also, in the section dealing with fundamental equations, after Navier–Stokes equations, I think that at least a brief discussion should have been presented on Reynolds equations, since most of open channel flows are turbulent.

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