

1. Record Nr.	UNINA9910360853603321
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Titolo	Shallow Water Hydraulics // by Oscar Castro-Orgaz, Willi H. Hager
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2019
ISBN	3-030-13073-8
Edizione	[1st ed. 2019.]
Descrizione fisica	1 online resource (XVII, 563 p.)
Disciplina	519 627
Soggetti	Mathematical physics Geotechnical engineering Engineering geology Engineering—Geology Foundations Hydraulics Computer simulation Mathematical Applications in the Physical Sciences Geotechnical Engineering & Applied Earth Sciences Geoengineering, Foundations, Hydraulics Simulation and Modeling
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Chapter 1. Fundamental equations of free surface flows -- Chapter 2. Energy and momentum principles -- Chapter 3. Computation of steady gradually-varied flows -- Chapter 4. Computation of steady transcritical open channel flows -- Chapter 5. Unsteady open channel flows: basic solutions -- Chapter 6. Ideal dam break waves -- Chapter 7. Finite difference methods -- Chapter 8. The Riemann problem -- Chapter 9. Finite volume methods -- Chapter 10. Sediment transport and movable beds -- Chapter 11. Numerical modelling of non-hydrostatic free surface flows.
Sommario/riassunto	This book presents the theory and computation of open channel flows, using detailed analytical, numerical and experimental results. The

fundamental equations of open channel flows are derived by means of a rigorous vertical integration of the RANS equations for turbulent flow. In turn, the hydrostatic pressure hypothesis, which forms the core of many shallow water hydraulic models, is scrutinized by analyzing its underlying assumptions. The book's main focus is on one-dimensional models, including detailed treatments of unsteady and steady flows. The use of modern shock capturing finite difference and finite volume methods is described in detail, and the quality of solutions is carefully assessed on the basis of analytical and experimental results. The book's unique features include:

- Rigorous derivation of the hydrostatic-based shallow water hydraulic models
- Detailed treatment of steady open channel flows, including the computation of transcritical flow profiles
- General analysis of gate maneuvers as the solution of a Riemann problem
- Presents modern shock capturing finite volume methods for the computation of unsteady free surface flows
- Introduces readers to movable bed and sediment transport in shallow water models
- Includes numerical solutions of shallow water hydraulic models for non-hydrostatic steady and unsteady free surface flows

This book is suitable for both undergraduate and graduate level students, given that the theory and numerical methods are progressively introduced starting with the basics. As supporting material, a collection of source codes written in Visual Basic and inserted as macros in Microsoft Excel® is available. The theory is implemented step-by-step in the codes, and the resulting programs are used throughout the book to produce the respective solutions.
