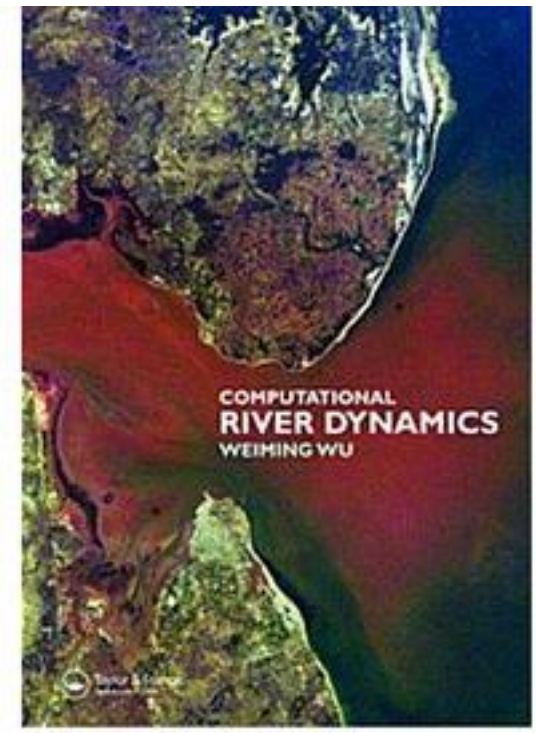
Computational River Dynamics



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This comprehensive text on the fundamentals of modeling flow and sediment transport in rivers treats both the physical principles and numerical methods for various degrees of complexity. Included are 1-D, 2-D (both depth- and width-averaged) and 3-D models, as well as the integration and coupling of these models. The volume includes a broad selection of numerical methods for open-channel flows, such as the SIMPLE[copyright] algorithms on staggered and non-staggered grids, the projection method, and the stream function and vorticity method. The state-of-the-art in

sediment transport modeling approaches is described, such as non-equilibrium transport models, non-uniform total-load transport models, and semi-coupled and coupled procedures for flow and sediment calculations. Sediment transport theory is discussed and many newly-developed, non-uniform sediment transport formulae are presented.The many worked examples illustrate various conditions, such as: reservoir sedimentation; channel erosion due to dam construction; channel widening and meandering; local scour around in-stream hydraulic structures; vegetation effects on channel morphodynamic processes; cohesive sediment transport; dam-break fluvial processes; and contaminant transport. This book is recommended as a reference guide for river and hydraulic scientists and engineers and as a course text for teaching sediment transport modeling, computational free-surface flow, and computational river dynamics to senior undergraduate and graduate students in civil engineering. It will also serve professionals in environmental, agricultural, and geological engineering.

作者介绍:

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