The Manning Equation For Open Channel Flow Calculations

The Diffusion Hydrodynamic Model (DHM), as presented in the 1987 USGS publication, was one of the first computational fluid dynamics computational programs based on the groundwater program MODFLOW, which evolved into the control volume modeling approach. Over the following decades, others developed similar computational programs that either used the methodology and approaches presented in the DHM directly or were its extensions that included additional components and capacities. Our goal is to demonstrate that the DHM, which was developed in an age preceding computer graphics/visualization tools, is as robust as any of the popular models that are currently used. We thank the USGS for their approval and permission to use the content from the earlier USGS report.
The Manning equation is a widely used empirical equation for uniform open channel flow of water. It provides a relationship among several open channel flow parameters of interest: i) flow rate and/or average velocity, ii) bottom slope of the channel, iii) cross-sectional area of flow, iv) wetted perimeter, v) and Manning roughness coefficient for the channel surface. The term "open channel flow" is used to refer to flow with a free liquid surface at atmospheric pressure, in which the driving force for flow is gravity. Pipe flow, on the other hand, is used to refer to fluid flow in a closed conduit uner pressure, in which the primary driving force for flow is typically pressure. Open channel flow occurs in natural channels, such as rivers and streams, and in manmade channels, such as those used for storm water, waste water and irrigation water flow. This book is about open channel flow, and in particular, about uniform open channel flow, in which the channel slope, water velocity, and water depth remain constant. There is emphasis on calculations with the Manning equation and the use of Excel spreadsheets for those calculations. There is also coverage of several different ways in which open channel flow is classified, including clarification of the difference between uniform and non-uniform open channel flow.
A comprehensive treatment of open channel flow, Open Channel Flow: Numerical Methods and Computer Applications starts with basic principles and gradually advances to complete problems involving systems of channels with branches, controls, and outflows/ inflows that require the simultaneous solutions of systems of nonlinear algebraic equations coupled with differential equations. The book includes a CD that contains a program that solves all types of simple open channel flow problems, the source programs described in the text, the executable elements of these programs, the TK-Solver and MathCad programs, and the equivalent MATLAB® scripts and functions. The book provides applied numerical methods in an appendix and also incorporates them as an integral component of the methodology in setting up and solving the governing equations. Packed with examples, the book includes problems at the end of each chapter that give readers experience in applying the principles and often expand upon the methodologies use in the text. The author uses Fortran as the software to supply the computer instruction but covers math software packages such as MathCad, TK-Solver, MATLAB, and spreadsheets so that readers can use the instruments with which they are the most familiar. He emphasizes the basic principles of conservation of mass, energy, and momentum, helping readers achieve true mastery of this important subject, rather than just learn routine techniques. With the enhanced understanding of the fundamental principles of fluid mechanics provided by this book, readers can then apply these principles to the solution of complex real-world problems. The book supplies the knowledge tools necessary to analyze and design economical and properly performing conveyance systems. Thus not only is the book useful for graduate students, but it also provides professional engineers the expertise and knowledge to design well performing and economical channel systems.
Open Channel Flow
Flow Model for Open-channel Reach Or Network

Environmental Hydrology, Second Edition
Environmental Fluid Mechanics
Open Channel Hydraulics is written for undergraduate and graduate civil engineering students, and practicing engineers. Written in clear and simple language, it introduces and explains all the main topics required for courses on open channel flows, using numerous worked examples to illustrate the key points. With coverage of both introduction to flows, practical guidance to the design of open channels, and more advanced topics such as bridge hydraulics and the problem of scour, Professor Akan's book offers an unparalleled user-friendly study of this important subject ·Clear and simple style suited for undergraduates and graduates alike ·Many solved problems and worked examples ·Practical and accessible guide to key aspects of open channel flow
This is the eBook of the printed book and may not include any media, website access codes, or print supplements that may come packaged with the bound book. McCuen's Hydrologic Analysis and Design, Fourth Edition is intended for a first course in hydrology. The text introduces the reader to the physical processes of the hydrologic cycle, the computational fundamentals of hydrologic analysis, and the elements of design hydrology. Although sections of the book introduce engineering design methods for engineering students, the concepts and methods pertain to students in a range of similar disciplines including geology, geography, forestry, and planning. The Fourth Edition streamlines the organization of the chapters to strengthen the focus and scope of each section. McCuen remains vigilant of the various ways hydrology is taught, making flexibility a touchstone of the book's structure. The marked flexibility in all 13 chapters provides knowledge about new design procedures, methods, and philosophies.
The Manning equation is used for a wide variety of uniform open channel flow calculations, including gravity flow in pipes, the topic of this book. Gravity flow occurs in pipes for partially full flow, up to and including full pipe flow, as long as the pipe isn't pressurized. Equations for calculating area, wetted perimeter and hydraulic radius for partially full pipe flow are included in this book along with a brief review of the Manning equation and discussion of its use to calculate a) the flow rate in a given pipe (diameter, slope, & full pipe Manning roughness) at a specified depth of flow, b) the required diameter for a specified flow rate at a target percent full in a given pipe, c) the normal depth (depth of flow) for a specified flow rate in a given pipe, d) the required pipe slope for a specified flow rate and depth of flow through a given pipe, and d) calculation of an experimentally determined value for the full pipe Manning roughness coefficient. This includes presentation and discussion of the equations for the calculations, example calculations, and spreadsheets to facilitate the calculations. Examples include calculation with both U.S. units and S.I. units.
Hydrology and Water Supply for Pond Aquaculture
Hydraulic Loss Coefficients for Culverts
Stormwater Management Manual
National Engineering Handbook
The Manning Equation for Open Channel Flow Calculations
The Stormwater Management Manual is designed for stormwater managers and those seeking certification as an APWA Certified Stormwater Manager, as well as those wishing to gain an overview of programs and practices. This manual addresses the technical knowledge stormwater managers need to make meaningful water quality improvement. It covers old and new stormwater management techniques, management of new development and redevelopment, funding and financing, and political and social factors of stormwater management programs.
Open Channel Flow, 2nd edition is written for senior-level undergraduate and graduate courses on steady and unsteady open-channel flow. The book is comprised of two parts: Part I covers steady flow and Part II describes unsteady flow. The second edition features considerable emphasis on the presentation of modern methods for computer analyses; full coverage of unsteady flow; inclusion of typical computer programs; new problem sets and a complete solution manual for instructors.
The design of a highway drainage channel to carry a given discharge is accomplished in two parts. The first part of the design involves the computation of a channel section which will carry the design discharge on the available slope. This chapter briefly discusses the principles of flow in open channels and the use of the Manning equation for computing the channel capacity. The second part of the design is the determination of the degree of protection required to prevent erosion in the drainage channel. This can be done by computing the velocity in the channel at the design discharge, using the Manning equation, and comparing the calculated velocity with that permissible for the type of channel lining used. A change in the type of channel lining will require a change in channel size unless both linings have the same roughness coefficient.
Channel Flow Resistance
Roughness Coefficients for Densely Vegetated Flood Plains
Useful Equations for HP 35s Or HP 33s Calculator for the Civil PE Exam
River Mechanics
Treatment Marshes for Runoff and Polishing
Open-Channel Hydraulics, originally published in 1959, deals with the design for flow in open channels and their related structures. Covering both theory and practice, it attempts to bridge the gap that generally exists between the two. Theory is introduced first and is then applied to design problems. In many cases the application of theory is illustrated with practical examples. Theory is frequently simplified by adopting theoretically less rigorous treatments with sound concepts, by avoiding use of advanced mathematical manipulations, or by replacing such manipulations with practical numerical procedures. To facilitate understanding of the subject matter, the treatment is mostly based on the condition of one- or two-dimensional flow. The book deals mainly with American practice but also includes related information from many countries throughout the world. Material is divided into five main sections for an orderly and logical treatment of the subject: Basic Principles. Uniform Flow, Varied Flow, Rapidly Varied Flow, and Unsteady Flow. There are 67 illustrative examples, 282 illustrations, 319 problems, and 810 references. This classic textbook was the first English-language book on the subject in two decades. Open-Channel Hydraulics is a valuable text for students of engineering mechanics. hydraulics. civil. agricultural. sanitary. and mechanical engineering, and a helpful compendium for practicing engineers. Dr. Ven Te Chow was a Professor of Hydraulic Engineering and led the hydraulic engineering research and teaching programs at the University of Illinois. Through many years of experience as a teacher, engineer, researcher, writer. lecturer, and consultant, he became an internationally recognized leader in the fields of hydraulics, hydrology and hydraulic engineering. Dr. Ven Te Chow authored two technical books and more than 60 articles and papers in scientific an engineering magazines and journals. He was a member of IAHR, ASCE, AGU, AAAS, SEE, and Sigma Xi, and had been Chairman of the American Geophysical Union's Permanent Research Committee on Runoff.
Instructors love Numerical Methods for Engineers because it makes teaching easy! Students love it because it is written for them--with clear explanations and examples throughout. The text features a broad array of applications that span all engineering disciplines. The sixth edition retains the successful instructional techniques of earlier editions. Chapra and Canale's unique approach opens each part of the text with sections called Motivation, Mathematical Background, and Orientation. This prepares the student for upcoming problems in a motivating and engaging manner. Each part closes with an Epilogue containing Trade-Offs, Important Relationships and Formulas, and Advanced Methods and Additional References. Much more than a summary, the Epilogue deepens understanding of what has been learned and provides a peek into more advanced methods. Helpful separate Appendices. "Getting Started with MATLAB" and "Getting Started with Mathcad" which make excellent references. Numerous new or revised problems drawn from actual engineering practice, many of which are based on exciting new areas such as bioengineering. The expanded breadth of engineering disciplines covered is especially evident in the problems, which now cover such areas as biotechnology and biomedical engineering. Excellent new examples and case studies span asll areas of engineering disciplines; the students using this text will be able to apply their new skills to their chosen field. Users will find use of software packages, specifically MATLAB®, Excel® with VBA and Mathcad®. This includes material on developing MATLAB® m-files and VBA macros.
Pumping Station Design, 3e is an essential reference for all professionals. From the expert city engineer to the new design officer, this book assists those who need to apply the fundamentals of various disciplines and subjects in order to produce a well-integrated pumping station that is reliable, easy to operate and maintain, and free from design mistakes. The depth of experience and expertise of the authors, contributors, and peers reviewing the content as well as the breadth of information in this book is unparalleled, making this the only book of its kind. " An award-winning reference work that has become THE standard in the field * Dispenses expert information on how to produce a well-integrated pumping station that will be reliable, easy to operate and maintain, and free from design mistakes * 60% of the material has been updated to reflect current standards and changes in practice since the book was last published in 1998 * New material added to this edition includes: the latest design information, the use of computers for pump selection, extensive references to Hydraulic Institute Standards and much more!
Centennial of Manning's Formula
A First Course in Fluid Mechanics for Civil Engineers
Design Charts for Open-channel Flow
Open-Channel Flow
An Introduction
The Hydraulics of Open Channel Flow is a major new textbook for senior undergraduates and postgraduate students. Dr Chanson first introduces the basic principles of open channel flow hydraulics, namely the continuity, Bernoulli and momentum principles. Applications include short transitions (e.g. intake), hydraulic jumps and flow resistance. The key topics of sediment transport, hydraulic modelling and the design of hydraulic structures are then developed in turn. This innovative textbook contains numerous examples, including practical applications, and is fully illustrated with line drawings and photographs in colour and black and white. Exercises - located at the end of each chapter and as revision sections at the end of each part - form an integral part of the text. The book concludes with major assignments, which assimilate all the knowledge into a fully coherent whole. Solutions to exercises, together with the shareware software Hydroculv, are available from the Web at: Key Features: Ideal for Use by Students and Lecturers in Civil and Environmental Engineering Numerous Exercises and Examples, Including a Supporting Website, to Aid the Reader□s Understanding Comprehensive Coverage of the Basic Principles and the Key Application Areas of the Hydraulics of Open Channel Flow the Reader is Taken Step by Step from the Basic Principles to the More Advanced Design Calculations
Exposes You to Current Industry-Standard Tools Open channel flow is covered in essentially all civil and environmental engineering programs, usually by final-year undergraduate or graduate students studying water resources. Fundamentals of Open Channel Flow outlines current theory along with clear and fully solved examples that illustrate the concepts and are geared to a first course in open channel flow. It highlights the practical computational tools students can use to solve problems, such as spreadsheet applications and the HEC-RAS program. It assumes a foundation in fluid mechanics, then adopts a deliberately logical sequence through energy, momentum, friction, gradually varied flow (first qualitative, then quantitative), and the basics of sediment transport. Taps into Your Innate Ability to Understand Complex Concepts Visually Open channel flow can be understood through just a few simple equations, graphs, and computational tools. For students, the book comes with downloadable animations that illustrate basic concepts visually with synchronous graphical presentation of fundamental relationships. For instructors, PowerPoint slides and solutions to end-of-chapter problems are provided. Delivers simple but powerful software animations Conveys material in three ways (analytical, graphical, computational/empirical) to aid multiple types of learners and improve overall accessibility Includes new fundamental equation for alternate depths Discusses flow transients supported by animations and calculations Emphasizes applications of common and useful computational tools Developed by an author who has been teaching open channel flow to university students for the past fifteen years, Fundamentals of Open Channel Flow provides you with a detailed explanation of the basics of open channel flow using examples and animation, and offers expert guidance on the practical application of graphical and computational tools.
Solve problems with ease. The equations in this book are relevant to the following subjects:Geotechnical* Moisture content, dry density, void ratio, degree of saturation, relative density of soil, borrow soil, flow net, laboratory permeability tests, and effective stress* Shear strength and angle of internal friction for triaxial test* Net and ultimate bearing capacities of square, continuous, and circular footings with or without water table* Active, passive, and at-rest lateral forces per unit length of wall with surcharge load and water table, and lateral force per unit length of wall for sloping backfill and vertical wall* Gross and net bearing capacity of mat foundation in saturated clay, and depth of fully compensated mat foundation * Factor of safety against overturning and sliding of retaining walls, maximum stress at the toe, and minimum stress at the heel* Settlement of normally consolidated clay with up to 4 layers of soil given surcharge load, settlement at the center and corner of mat foundation, time rate of settlement, slope stability in saturated clay, and cyclic stress ratio* 2-strut braced cut for sand, soft to medium clay, and stiff clay * Skin friction resistance, end-bearing and allowable capacities of single pile in sand or clayWater Resources and Environmental* Pitot tube, venturi meter, and orifice* Reynolds number, friction factor, head loss using Darcy-Weisbach equation or Hazen-Williams equation, Bernoulli equation with 2 different pipe sizes, pump head, and head loss due to fittings* Open channels using Manning equation for circular, rectangular, and trapezoidal channels* Flow rate and velocity of flow for circular channel when flowing full or partially full just by entering diameter of pipe, depth of water, Manning's n, constant, and slope of energy line (no need to look up tables!!!)* Flow rate and velocity of flow for trapezoidal channel just by entering depth of water, base width of channel, side slope horizontal, Manning's n, constant, and slope of energy line* Chemical feed rate* Rapid mixing* Overflow rate* Detention time* Weir loading rateTransportation* Sight distance and stopping sight distance* Radius of curve, tangent of curve, length of curve, middle ordinate, and external distance of horizontal curve* Stopping sight distance, passing sight distance, curve elevation, stationing of highest or lowest point of curve, and vertical clearance* Flexible and rigid pavement designStructural* Maximum moment of simply supported and cantilever beams, moment of inertia for I-beam, T-beam, and inverted T-beam using parallel axis theorem, maximum bending stresses, and deflection of beamThis book contains 200 equations with keystrokes included for HP 35s and HP 33s calculators plus 96 sample problems with step-by-step solutions.Visit www.usefulequations.com to purchase book and HP 35s pre-programmed calculator package, HP 35s pre-programmed calculator, and book.
Hydrologic Analysis and Design
A Direct Solution to Manning's Equation for the Normal Depth in Open-channel Flow
Practices of Irrigation & On-farm Water Management: Volume 2
Determination of Roughness Coefficients for Streams in Colorado
Pumping Station Design
Water, water everywhere - with this in mind, the perennial question in water works remains: can the earth's finite supply of water resources be increased to meet the constantly growing demand? Hailed on its first publication as a masterful account of the state of water science, this second edition of the bestselling The Science of Water: Concepts and Applications puts the spotlight on the critical importance of water's role in future sustainability. Clearly written and user-friendly, this timely revision builds on the remarkable success of the first edition by updating, reorganizing, and revising the original to include the latest information and research results. The common thread woven through the fabric of this presentation is water resource utilization and its protection. It covers topics such as water sources, water hydraulics, chemistry, biology/microbiology, ecology, water quality, pollution, biomonitoring, sampling, testing, reuse, and treatment. The author examines the impact of human use, misuse, and reuse of freshwater and wastewater on the overall water supply. Authoritative, informative, and up-to-date, the book blends real-world experience with theoretical models. This work provides the valuable insight all water/wastewater practitioners need and includes important information for policymakers and anyone else tasked with making decisions concerning water resource utilization.
"Culverts are designed and constructed to be hydraulically efficient, such that they are able to pass flood flows without overtopping the road embankment. Flow passing through a culvert typically experiences an increase in velocity, relative to the approach channel flow, due to reductions in cross-sectional flow area. Increased flow velocity can cause additional outlet erosion as well as be a problem for many types of migratory species. In addition to migratory species, resident fish such as juvenile salmon can also be affected by culverts. Juvenile salmon move up and down streams as population pressures and food sources change. If high velocities in culverts provide barriers to this movement, food sources and population may be limited. Other fish species may have requirements similar to those of juvenile salmon or may require upstream movement for spawning. Research in the area of culvert hydraulics has centered on concrete box culverts and circular corrugated metal pipe culverts. The hydraulic analyses of these culvert types have been well defined for conventional installations, but not for environmentally sensitive and nontraditional culverts. It is desirable to design and construct some culvert crossings to minimize their impact on the natural environment. Culverts are now being designed to maintain natural velocities and minimize turbulence to allow migratory species to pass through the culvert barrel. Such designs may add baffles on the invert, bury the culvert invert, or use bottomless culverts to provide for a natural stream invert. Other designs use larger and wider culverts to reduce the amount of contraction and acceleration. In order to design these culverts that minimize impacts to the natural stream environment, designers need the associated hydraulic equations and loss coefficients to be evaluated and made more accurate. In NCHRP Project 15-24, Utah State University conducted physical, numerical, and computer modeling to refine existing hydraulic relationships and develop new ones for analysis and design of culverts for conventional and nontraditional, environmentally sensitive installations"--Foreword.
ntroduction to Highway Hydraulics provides an introduction to highway hydraulics. Hydrologic techniques presented concentrate on methods suitable to small areas, since many components of highway drainage (culverts, storm drains, ditches, etc) service primarily small areas. A brief review of fundamental hydraulic concepts is provided, including continuity, energy, momentum, hydrostatics, weir flow and orifice flow. The book then presents open channel flow principles and design applications, followed by a parallel discussion of closed conduit principles and design applications. Open channel applications include discussion of stable channel design and pavement drainage. Closed conduit applications include culvert and storm drain design. Examples are provided to help illustrate important concepts. An overview of energy dissipators is provided and the document concludes with a brief discussion of construction, maintenance and economic issues. As the title suggests, Introduction to Highway Hydraulics provides only an introduction to the design of highway drainage facilities and should be particularly useful for designers and engineers without extensive drainage training or experience.
An Overview of Programs and Practices
Fluid Mechanics for Civil and Environmental Engineers
Numerical Methods for Engineers
Revised 3rd Edition
Fundamentals of Open Channel Flow
The comprehensive and compact presentation in this book is the perfect format for a resource/textbook for undergraduate students in the areas of Agricultural Engineering, Biological Systems Engineering, Bio-Science Engineering, Water Resource Engineering, and Civil & Environmental Engineering. This book will also serve as a reference manual for researchers and extension workers in such diverse fields as agricultural engineering, agronomy, ecology, hydrology, and meteorology.
Covering all elements of the storm water runoff process, Urban Storm Water Management includes numerous examples and case studies to guide practitioners in the design, maintenance, and understanding of runoff systems, erosion control systems, and common design methods and misconceptions. It covers storm water management in practice and in regulation, and reviews shortcomings and suggestions for improvements. It also covers alternative methods such as porous pavements, rain gardens, green roofs and other systems which are becoming increasingly popular and are forming the future of storm water management. Appropriate storm water management and compliance is a necessary, yet costly and involved process. This book provides information, guidelines, and case studies to guide practitioners through all phases of effective structural storm water management. This book covers: All aspects of storm water management—including its impacts on the environment Numerous design procedures and problems with a separate solutions manual Hydrologic and hydraulic calculations involved in the field of storm water management Design and calculation methods required for efficient storm water management Pipe and open channel flow equations, supplemented with charts and tables Various types of nonstructural, source reduction measures Installation methods of drainage and storm water management facilities Urbanization has had a drastic impact on the natural process of storm water runoff, increasing both the peak and the volume of runoff, reducing infiltration, while also degrading water quality. Urban Storm Water Management is a compendium of all matters necessary for the design of efficient drainage and storm water management systems. It includes numerous examples of hydrologic and hydraulic calculations involved in this field. It also contains ample case studies that exemplify the methods and procedures for the design of extended detention basins, infiltration basins, and underground retention/infiltration basins such as chambers and dry wells. Furthermore, the book demonstrates how storm water runoff can be an effective and cost-efficient conservable and reusable resource.
The technological advances of recent years include the emergence of new remote sensing and geographic information systems that are invaluable for the study of wetlands, agricultural land, and land use change. Students, hydrologists, and environmental engineers are searching for a comprehensive hydrogeologic overview that supplements information on hydrologic processes with data on these new information technology tools. Environmental Hydrology, Second Edition builds upon the foundation of the bestselling first edition by providing a qualitative understanding of hydrologic processes while introducing new methods for quantifying hydrologic parameters and processes. Written by authors with extensive multidisciplinary experience, the text first discusses the components of the hydrologic cycle, then follows with chapters on precipitation, stream processes, human impacts, new information system applications, and numerous other methods and strategies. By updating this thorough text with the newest analytical tools and measurement methodologies in the field, the authors provide an ideal reference for students and professionals in environmental science, hydrology, soil science, geology, ecological engineering, and countless other environmental fields.
hydrology
Selected Water Resources Abstracts
Partially Full Pipe Flow Calculation Spreadsheets
Effect of Detritus Transportation Upon Flow in Open Channels
Management of Mountain Watersheds
The Manning Equation for Open Channel Flow Calculations
Treatment Marshes for Runoff and Polishing represents the most comprehensive and up-date-date resource for the design, construction, and operation of marsh treatment systems. This new edition represents a complete rewrite of the surface flow sections of previous editions of Treatment Wetlands. It is based on the performance hundreds of treatment marshes over the past 40 years. Treatment Marshes focuses on urban and agricultural runoff, river and lake water improvement, and highly treated municipal effluents. New information from the past dozen years is used to improve data interpretation and design concepts. Topics included in this book are Diversity of marsh vegetation Analyses of the human use of treatment marshes New concepts of underground processes and functions Spectrum of marsh values spanning mitigation, restoration, enhancement, and water quality improvement Improved methods for calculation of evapotranspiration and wetland water temperatures Hydraulics of surface and subsurface flows in marshes Analysis of long track records for deterministic and probabilistic behavior Consideration of integrated microbial and vegetative contaminant removals via mass balances Uptake and emission of gases Performance of urban and agricultural wetlands Design procedures for urban and agricultural wetlands Reduction of trace metals, pesticides, pharmaceuticals, endocrine disruptors, and trace organics Updated capital and O&M economics, and valuation of ancillary benefits An updated list of over 1900 references
An ideal textbook for civil and environmental, mechanical, and chemical engineers taking the required Introduction to Fluid Mechanics course, Fluid Mechanics for Civil and Environmental Engineers offers clear guidance and builds a firm real-world foundation using practical examples and problem sets. Each chapter begins with a statement of objectives, and includes practical examples to relate the theory to real-world engineering design challenges. The author places special emphasis on topics that are included in the Fundamentals of Engineering exam, and make the book more accessible by highlighting keywords and important concepts, including Mathcad algorithms, and providing chapter summaries of important concepts and equations.
Open-channel Hydraulics
Urban Storm Water Management
A Diffusion Hydrodynamic Model
Hydraulics of Bridge Waterways
The Hydraulics of Open Channel Flow
Environmental Fluid Mechanics provides comprehensive coverage of a combination of basic fluid principles and their application in a number of different situations-exploring fluid motions on the earth's surface, underground, and in oceans-detailing the use of physical and numerical models and modern computational approaches for the analysis of environmental processes. Environmental Fluid Mechanics covers novel scaling methods for a variety of environmental issues; equations of motion for boundary layers; hydraulic characteristics of open channel flow; surface and internal wave theory; the advection diffusion equation; sediment and associated contaminant transport in lakes and streams; mixed layer modeling in lakes; remediation; transport processes at the air/water interface; and more.
See journals under US Geological survey. Prof. paper 1384.
In 1979, several graduate students in the Department of Fisheries and Allied Aquacultures at Auburn University met with one of the authors (CEB) and asked him to teach a new course on water supply for aqua culture. They felt that information on climatology, hydrology, water distribution systems, pumps, and wells would be valuable to them. Most of these students were planning to work in commercial aquaculture in the United States or abroad, and they thought that such a cdurse would better prepare them to plan aquaculture projects and to communicate with engineers, contractors, and other specialists who often become involved in the planning and construction phases of aquaculture en deavors. The course was developed, and after a few years it was decided that more effective presentation of some of the material could be made by an engineer. The other author (KHY) accepted the challenge, and three courses on the water supply aspects of aquaculture are now offered at Auburn University. A course providing background in hydrology is followed by courses on selected topics from water supply engineering. Most graduate programs in aquaculture at other universities will even tually include similar coursework, because students need a formal intro duction to this important, yet somewhat neglected, part of aquaculture. We have written this book to serve as a text for a course in water supply for aquaculture or for individual study. The book is divided into is concerned two parts.
Water Measurement Manual
Numerical Methods and Computer Applications
Design of Roadside Drainage Channels
The Science of Water
Open Channel Hydraulics
Completely updated and with three new chapters, this analysis of river dynamics is invaluable for advanced students, researchers and practitioners.
The book aims to address the interdisciplinary targets of watershed management in mountain regions based on the current knowledge of the subject. The focus of the book is particularly on monitoring, research, and modelling the interactions between the climate, water cycle, and aquatic ecosystem. The issues of watershed management in mountain regions in different parts of Europe, Africa, America and Asia have been the central theme of the book, which is basically divided into five sections: Institutional aspects in control of mountain regions; Stream-flow processes in mountain catchments; Water chemistry and biota in mountain streams and lakes; Effects of forest practices and climate change on hydrological phenomena; and Soil conservation and control of floods and landslides. The contributions have been peer-reviewed and the interdisciplinary team of authors includes experts from the specialised areas of geography, hydrology, chemistry, biology, forestry, ecology, economy and sociology. The practical applications and management strategies mentioned in the book, deal with the integrated resource management approach, based on the compromise between the development, conservation/ protection of the nature. Finally, the socio-economic and cultural aspects, and ecosystem prevalent in a mountain catchment are discussed in detail.
Introduction to Highway Hydraulics
Concepts and Applications, Second Edition