

Open Channel Flow and Hydraulic Structures

QUESTION 1

A rectangular 5 m wide channel has a sluice gate placed in a stilling (see figure below). The channel has bed slope of $S_o=0.1\%$, the Manning roughness coefficient of $n=0.015$ and no controls downstream from the stilling basin. The flow rate is $Q=20 \text{ m}^3/\text{s}$, the gate opening is $h_g=0.7\text{m}$, the gate coefficient of contraction is $C_c=0.6$, the slope of the stilling basin bed is $S_s=0\%$, and the energy loss coefficient at the end of the stilling basin (at the step p) is $\xi=0.3$, while the hydraulic jump forms immediately after the gate. Calculate the following:

- (i) the depth of the water downstream from the stilling basin, h
- (ii) the depth of the stilling basin, p
- (ii) the depth upstream from the gate, h_u



Open Channel Hydraulics Solved Problems

R Pring

A decorative graphic element consisting of a horizontal light blue bar with a rounded right end, and a semi-circular red gradient shape extending from the right side of the bar.

Open Channel Hydraulics Solved Problems:

Open Channel Hydraulics A. Osman Akan,2011-02-24 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 Open Channel Flow Roland Jeppson,2010-11-09 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 *A Text Book of Fluid Mechanics and Hydraulic Machines* Bansal,2005-12-30

Open-Channel Flow M Hanif Chaudhry,2007-12-04 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 **Numerical Modeling in Open Channel Hydraulics**

Romuald Szymkiewicz,2010-03-10 Open channel hydraulics has always been a very interesting domain of scientific and engineering activity because of the great importance of water for human living The free surface flow which takes place in the oceans seas and rivers can be still regarded as one of the most complex physical processes in the environment The first source of difficulties is the proper recognition of physical flow processes and their mathematical description The second one is related to the solution of the derived equations The equations arising in hydrodynamics are rather complicated and except some much idealized cases their solution requires application of the numerical methods For this reason the great progress in open channel flow modeling that took place during last 40 years paralleled the progress in computer technique informatics and numerical methods It is well known that even typical hydraulic engineering problems need applications of computer codes Thus we witness a rapid development of ready made packages which are widely disseminated and offered for engineers However it seems necessary for their users to be familiar with some fundamentals of numerical methods and computational techniques applied for solving the problems of interest This is helpful for many reasons The ready made packages can be effectively and safely applied on condition that the users know their possibilities and limitations For instance such knowledge is indispensable to distinguish in the obtained solutions the effects coming from the considered physical processes and those caused by numerical artifacts *Handbook of Hydraulics for the Solution of Hydrostatic and Fluid-flow Problems* ,1918

Handbook of Hydraulics for the Solution of Hydraulic Problems Horace Williams King,1929 2,500 Solved Problems In Fluid Mechanics and Hydraulics Jack Evett,Cheng Liu,1989-01-01 This powerful problem solver gives you 2 500 problems in fluid mechanics and hydraulics fully solved step by step From Schaum's the originator of the solved problem guide and students favorite with over 30 million study guides sold this timesaver helps you master every type of fluid mechanics and hydraulics problem that you will face in your homework and on your tests from properties of fluids to drag and lift Work the problems yourself then check the answers or go directly to the answers you need using the complete index Compatible with any classroom text Schaum's 2500 Solved Problems in Fluid Mechanics and Hydraulics is so complete it is the perfect tool for graduate or professional exam review **Open-channel Hydraulics** Richard H. French,1985 Open Channel Hydraulics Terry W. Sturm,2001 A comprehensive overview of stormwater and wastewater collection methods from around the world written by leading experts in the field Includes detailed analysis of system designs operation maintenance and rehabilitation Includes recent research advances and personal computer applications Fundamentals of Open Channel Flow Glenn E. Moglen,2022-12-30 This second edition of Fundamentals of Open Channel Flow focuses on theory followed by clear fully solved examples and practical computational tools such as spreadsheets and industry standard software It builds on a foundation in fluid mechanics and offers the basics of a first course in open channel flow for senior undergraduates or graduate students energy momentum friction and gradually varied flow both qualitative and quantitative This edition provides more coverage of design applications including culvert design a wider range of channel shapes and an update of the

US Corps of Engineers HEC RAS program It shows how a few simple equations can solve a range of basic problems The energy depth and momentum depth relationships are examined graphically and the book s website offers unique animations showing actual flow dynamics of some transient flow problems as well as solutions to end of chapter problems and PowerPoint slides for instructors

Open Channel Hydraulics, Third Edition Terry W. Sturm,2021-07-28 A definitive guide to open channel hydraulics fully updated for the latest tools and methods This thoroughly revised resource offers focused coverage of some of the most common problems encountered by practicing hydraulic engineers and includes the latest research and computing advances Based on a course taught by the author for nearly 40 years Open Channel Hydraulics Third Edition features clear explanations of floodplain mapping flood routing bridge hydraulics culvert design stormwater system design stream restoration and much more Throughout special emphasis is placed on the application of basic fluid mechanics principles to the formulation of open channel flow problems Coverage includes Basic principles Specific energy Momentum Uniform flow Gradually varied flow Hydraulic structures Governing unsteady flow equations and numerical solutions Simplified methods of flow routing Flow in alluvial channels Three dimensional CFD modeling for open channel flows

Practical Hydraulics Melvyn Kay,2007-12-17 Hydraulics has a reputation for being a complex even intimidating discipline Put simply hydraulics is the study of how water and similar fluids behave and can be harnessed for practical use It is one of the fundamental scientific and engineering subjects and many professions demand a working knowledge of its basic concepts yet most hydraulics textbooks are aimed at readers with a strong engineering or mathematical background Practical Hydraulics approaches the subject from basic principles and demonstrates how these are applied in practice It is clearly written and includes many illustrations and examples It will appeal to a wide range of professionals and students needing an introduction to the subject from farmers irrigating crops to fire crews putting out fires with high pressure water hoses However hydraulics is not just about water Many other fluids behave in the same way and so affect a wide range of people from doctors needing to know how blood flows in veins to car designers wanting to save fuel by reducing drag

Hydraulics of Open Channel Flow Sergio Montes,1998 This book emphasizes the dynamics of the open channel flow by attempting to provide a complete framework of the basic equation of fluid motion which is used as a building block for the treatment of many practical problems It provides up to date coverage of modern techniques while providing a more rigorous analytical foundation for those who require it The structure follows a logical progression from a description and classification of open channel flows through a development of the basic equations of motion for steady and unsteady flow to an analysis of varied cases of flow

Transactions of the American Society of Civil Engineers American Society of Civil Engineers,1928 Vols 29 30 contain papers of the International Engineering Congress Chicago 1893 v 54 pts A F papers of the International Engineering Congress St Louis 1904

Text Book on Hydraulics George Edmond Russell,1925

Hydraulics and Numerical Solutions of Steady-state But Spatially Varied Debris Flow Alfredo A. De Leon,Roland W.

Jeppson,1982 *Design and Construction of Urban Stormwater Management Systems* American Society of Civil Engineers,1993-01-01 Prepared by the Task Committee of the Urban Water Resources Research Council of ASCE Copublished by ASCE and the Water Environment Federation Design and Construction of Urban Stormwater Management Systems presents a comprehensive examination of the issues involved in engineering urban stormwater systems This Manual which updates relevant portions of Design and Construction of Sanitary and Storm Sewers MOP 37 reflects the many changes taking place in the field such as the use of microcomputers and the need to control the quality of runoff as well as the quantity Chapters are prepared by authors with experience and expertise in the particular subject area The Manual aids the practicing engineer by presenting a brief summary of currently accepted procedures relating to the following areas financial services regulations surveys and investigations design concepts and master planning hydrology and water quality storm drainage hydraulics and computer modeling

Reservoir Sedimentation G.W. Annandale,1987-01-01 Research on reservoir sedimentation in recent years has been aimed mainly at water resources projects in developing countries These countries especially in Africa often have to cope with long droughts flash floods and severe erosion problems Large reservoir capacities are required to capture water provided by flash floods so as to ensure the supply of water in periods of drought The problem arising however is that these floods due to their tremendous stream power carry enormous volumes of sediment which due to the size of reservoirs are virtually deposited in toto in the reservoir basin leading to fast deterioration of a costly investment Accurate forecasting of reservoir behaviour is therefore of the utmost importance This book fills a gap in current literature by providing in one volume comprehensive coverage of techniques required to practically investigate the effects sediment deposition in reservoirs has on the viability of water resources projects Current techniques for practically estimating sediment yield from catchments estimating the volume of sediment expected to deposit in reservoirs predicting sediment distribution and calculating scour downstream of reservoirs are evaluated and presented The liberal use of diagrams and graphs to explain the various techniques enhances understanding and makes practical application simple A major feature of the book is the application of stream power theory to explain the process of reservoir sedimentation and to develop four new methods for predicting sediment distribution in reservoirs The book is primarily directed at practising engineers involved in the planning and design of water resources projects and at post graduate students interested in this field of study

Hydraulics for Engineers and Engineering Students Frederick Charles Lea,1923

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