



Chandigarh College of Engineering & Technology

Government Institute under UT Administration, Affiliated to Panjab University

CHANDIGARH COLLEGE OF ENGINEERING AND TECHNOLOGY, SECTOR 26, CHANDIGARH		
Experiment No-6		Rev = 1
Subject: Fluid Mechanics Lab.	Subject Code: MEC-456	Semester: 4

Experiment: To determine the friction coefficients for pipes of different diameters.

Equipment required: Darcy's apparatus

Description of equipment's to be used:

1. Darcy's apparatus consists of two pipes with different pipes
2. One common inlet valve is provided in the main supply line for the whole apparatus.
3. A measuring tank.

Theory:

While the nature of flow depends upon the Reynolds Number, the frictional resistance offered to the flow of fluids depends essentially on the roughness of the surface of the conduit carrying the flow. In laminar flow this frictional resistance is mostly due to viscous resistance of fluid to flow. In turbulent flow it is due to resistance offered by viscosity of fluid and surface roughness of the conduct this frictional resistance causes loss of head which is given by Darcy and Weisbach equation:

$$h_f = \frac{4fLV^2}{2gD}$$

Where f is called Darcy's friction factor and given by $f = 64/Re$ for laminar flow and depends upon relative roughness of pipe in case of turbulent flow.

L = Pipe length

V = Velocity

D = Diameter of pipe

Mechanical Fm Lab Manual

J Rink



Mechanical Fm Lab Manual:

Fluid Mechanics Experiments Robabeh Jazaei, 2022-05-31 Fluid mechanics is one of the most challenging undergraduate courses for engineering students. The fluid mechanics lab facilitates students learning in a hands-on environment. The primary objective of this book is to provide a graphical lab manual for the fluid mechanics laboratory. The manual is divided into six chapters to cover the main topics of undergraduate level fluid mechanics. Chapter 1 begins with an overview of laboratory objectives and the introduction of technical laboratory report content. In Chapter 1, error analysis is discussed by providing examples. In Chapter 2, fluid properties including viscosity, density, temperature, specific weight, and specific gravity are discussed. Chapter 3 revolves around the fluid statics, including pressure measurement using piezometers and manometers. Additionally, hydrostatic pressure on the submerged plane and curved surfaces as well as buoyancy and Archimedes' Principle are examined in Chapter 3. In Chapter 4, several core concepts of fluid dynamics are discussed. This chapter begins with defining a control system based on which momentum analysis of the flow system is explained. The rest of the chapter is allotted to the force acting on a control system, the linear momentum equation, and the energy equation. Chapter 4 also covers the hydraulic grade line and energy grade line experiment. The effect of orifice and changing cross-sectional area by using Bernoulli's equation is presented in Chapter 4. The application of the siphon is extended from Chapter 4 by applying Bernoulli's equation. The last two chapters cover various topics in both internal and external flows, which are of great importance in engineering design. Chapter 5 deals with internal flow, including Reynolds number, flow classification, flow rate measurement, and velocity profile. The last experiment in Chapter 5 is devoted to a deep understanding of internal flow concepts in a piping system. In this experiment, students learn how to measure minor and major head losses as well as the impact of piping materials on the hydrodynamics behavior of the flow. Finally, open channels, weirs, specific energy, and flow classification, hydraulic jump, and sluice gate experiments are covered in Chapter 6.

Fluid Mechanics with Laboratory Manual Bireswar Majumdar, 2010-10 Primarily intended for the undergraduate students of mechanical engineering, civil engineering, chemical engineering, and other branches of applied science, this book presents a comprehensive coverage of the basic laws of fluid mechanics. The text also discusses the solutions of fluid flow problems that are modelled by differential equations. Emphasis is placed on formulating and solving typical problems of engineering practice. The text introduces the principle of fluid mechanics in a well-organized manner, beginning with the simple and proceeding to the complex. The aim of the laboratory manual at the end of chapters is to teach the students how to conduct experiments in fluid mechanics. It provides the step-wise details of experiments, which include objective theory of the experiment, apparatus used in the experiment, procedure, observations, and graphs to be plotted. Chapter-end exercises enable the students to recapture the topics discussed and drill them in the theory. Finally, the worked-out examples with solutions are useful to readers in comprehending the problems discussed. The book would also prove to be a useful ready reference for the first-level postgraduate student.

Fluid Mechanics and Fluid Power T. Prabu, P. Viswanathan, Amit Agrawal, Jyotirmay Banerjee, 2021-08-03 This book comprises select proceedings of the 46th National Conference on Fluid Mechanics and Fluid Power FMFP 2019 The contents of this book focus on aerodynamics and flow control computational fluid dynamics fluid structure interaction noise and aero acoustics unsteady and pulsating flows vortex dynamics nuclear thermal hydraulics heat transfer in nanofluids etc This book serves as a useful reference beneficial to researchers academicians and students interested in the broad field of mechanics

Fluid Mechanics Experiments Robabeh Jazaei, 2020-09-16 Fluid mechanics is one of the most challenging undergraduate courses for engineering students The fluid mechanics lab facilitates students learning in a hands on environment The primary objective of this book is to provide a graphical lab manual for the fluid mechanics laboratory The manual is divided into six chapters to cover the main topics of undergraduate level fluid mechanics Chapter 1 begins with an overview of laboratory objectives and the introduction of technical laboratory report content In Chapter 1 error analysis is discussed by providing examples In Chapter 2 fluid properties including viscosity density temperature specific weight and specific gravity are discussed Chapter 3 revolves around the fluid statics include pressure measurement using piezometers and manometers Additionally hydrostatic pressure on the submerged plane and curved surfaces as well as buoyancy and Archimedes Principle are examined in Chapter 3 In Chapter 4 several core concepts of fluid dynamics are discussed This chapter begins with defining a control system based on which momentum analysis of the flow system is explained The rest of the chapter is allotted to the force acting on a control system the linear momentum equation and the energy equation Chapter 4 also covers the hydraulic grade line and energy grade line experiment The effect of orifice and changing cross sectional area by using Bernoulli's equation is presented in Chapter 4 The application of the siphon is extended from Chapter 4 by applying Bernoulli's equation The last two chapters cover various topics in both internal and external flows which are of great importance in engineering design Chapter 5 deals with internal flow including Reynolds number flow classification flow rate measurement and velocity profile The last experiment in Chapter 5 is devoted to a deep understanding of internal flow concepts in a piping system In this experiment students learn how to measure minor and major head losses as well as the impact of piping materials on the hydrodynamics behavior of the flow Finally open channels weirs specific energy and flow classification hydraulic jump and sluice gate experiments are covered in Chapter 6

Fluid Mechanics and Hydraulic Machines Lab Manual Annapureddy Damodara Reddy, 2012 Engineering is applying scientific knowledge to find solutions for problems of practical importance A basic knowledge of Fluid mechanics and machinery is essential for all the scientists and engineers because they frequently come across a variety of problems involving flow of fluids such as in aerodynamics Force of fluid on structural surfaces fluid transport The experiments described in this lab are part of the curriculum of Fluid Mechanics and Hydraulic Machines Laboratory for the degree course in Mechanical Chemical and Electrical and Electronics Engineering

Introduction to Experimental Methods Terry W. Armstrong, 2023-07-31 Introduction to Experimental

Methods succinctly explains fundamental engineering concepts in mechanics dynamics heat transfer and fluid dynamics From conceptualizing an engineering experiment to conducting a comprehensive lab this book enables students to work through the entire experimental design process Offering a complete overview of instruction for engineering lab methodology the book includes practical lab manuals for student use directly complementing the instruction Numerous worked examples and problems are presented along with several hands on experiments in individual lab manuals This book discusses how to write lab reports how to configure a variety of instruments and equipment and how to work through failures in experimentation Introduction to Experimental Methods is intended for senior undergraduate engineering students taking courses in Experimental Methods Instructors will be able to utilize a Solutions Manual for their course Features Provides an overview of experimental methods in mechanics dynamics heat transfer and fluid dynamics Covers design of experiments instruments and statistics Discusses SolidWorks and PASCO Capstone software Includes numerous end of chapter problems and worked problems Features a Solutions Manual for instructor use *Wave Reflection and Transmission for Cylindrical Pile Arrays* Brian van Weele,1965 **EIT Industrial Review** Donovan Young,2003-09-18 This guide is written for the afternoon FE EIT Industrial Exam and reviews each topic with numerous example problems and complete step by step solutions End of chapter problems with solutions and a complete sample exam with solutions are provided Topics covered Production Planning and Scheduling Engineering Economics Engineering Statistics Statistical Quality Control Manufacturing Processes Mathematical Optimization and Modeling Simulation Facility Design and Location Work Performance and Methods Manufacturing Systems Design Industrial Ergonomics Industrial Cost Analysis Material Handling System Design Total Quality Management Computer Computations and Modeling Queuing Theory and Modeling Design of Industrial Experiments Industrial Management Information System Design Productivity Measurement and Management 101 problems with complete solutions SI Units **Proceedings** American Society for Engineering Education. Conference,1994 *Course and Curriculum Improvement Projects: Mathematics, Science, Social Sciences* National Science Foundation (U.S.),1966

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