DEPARTMENT OF CHEMICAL ENGINEERING

University of Engineering & Technology, Lahore

Fluid Mechanics Lab

Introduction

Fluid Mechanics laboratory provides a “hands on” environment that is crucial for developing students understanding of theoretical concepts. Fluid mechanics laboratory is of fluids and their flows are studied and observed. Pressure variations of compressible fluids when they allowed flowing through convergent divergent nozzles .Calibration of pressure gauges and theoretical demonstration of different laws of fluid mechanics etc.

List of Equipment

1. Basic hydraulic bench
2. Osborne Reynolds' Demonstration Apparatus
3. Hydrostatic pressure apparatus
4. Bernoulli's Demonstration apparatus
5. Dead weight calibrator
6. Orifice and free jet flow apparatus
7. Orifice discharge apparatus
8. Free and Forced vortices apparatus
9. Compressible flow bench

Details of Equipment

Basic Hydraulics Bench

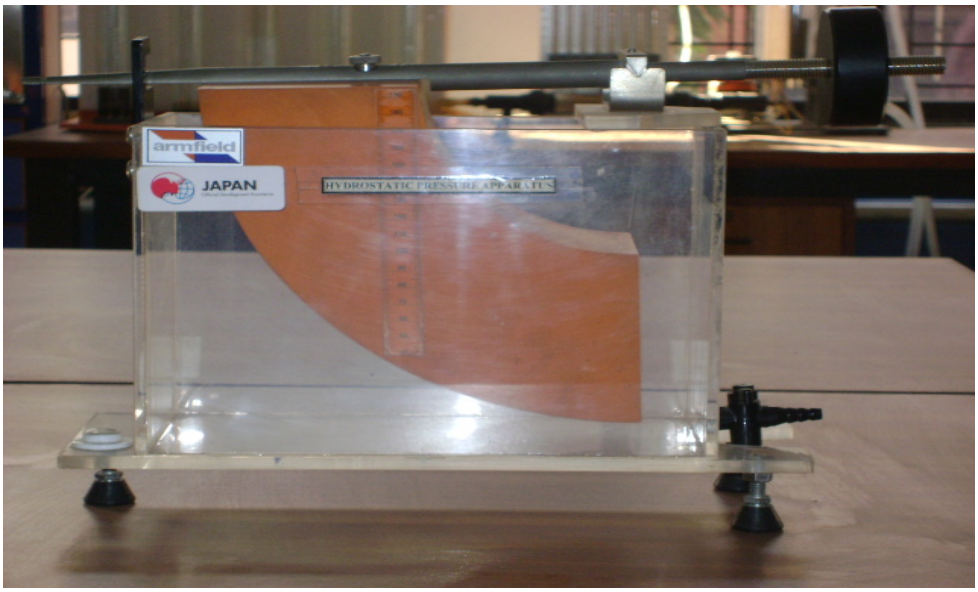
This unit is designed as portable and self-contained service module. The bench top incorporates an open channel with side channels to support accessories on test.

Osborne Reynolds Demonstration Apparatus

Osborne Reynolds apparatus uses a dye injection technique which enables the observation of flow conditions. It helps in visual observation of nature of laminar and turbulent flow. Also observing the laminar, transitional, turbulent flow and velocity profile.

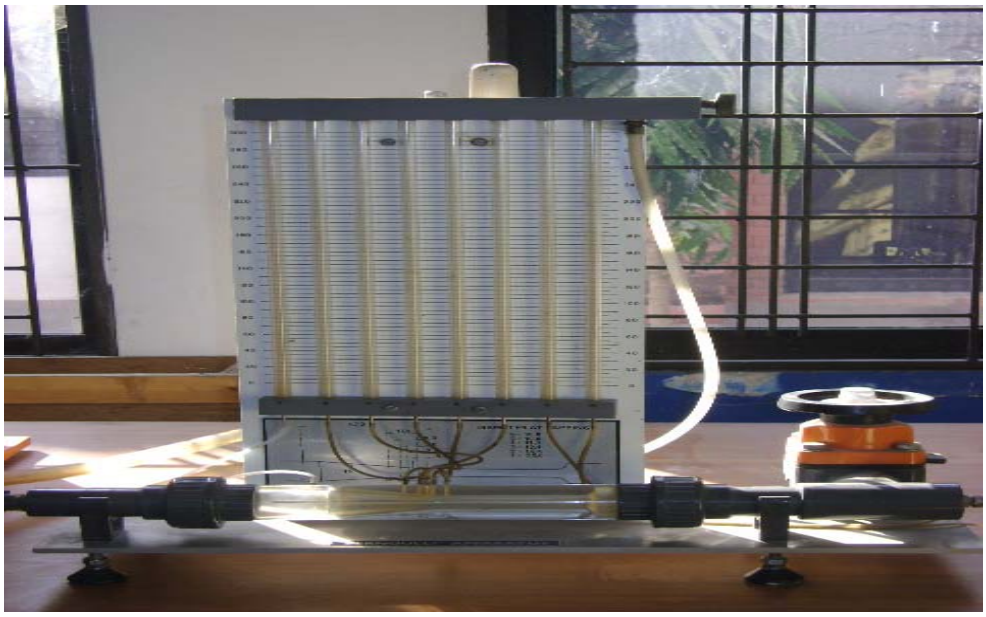
Hydrostatic Pressure Apparatus

The Hydrostatic Pressure accessory has been designed to determine the static thrust exerted by a fluid on a submerged surface and allow comparison of the measured magnitude and position of this force with simple theory. Determining the centre of pressure on both a submerged or partially submerged plane surface and comparison with the theoretical position.



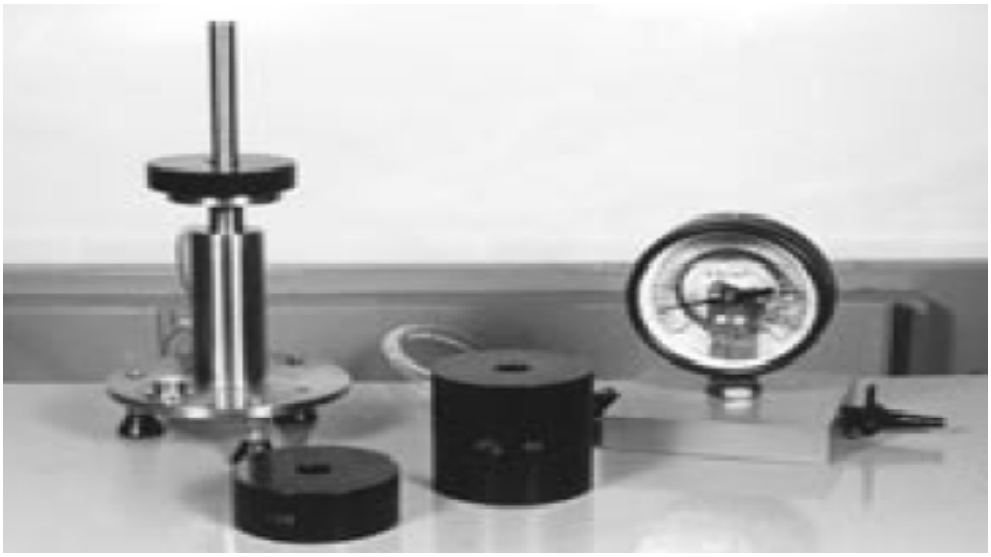
Bernoulli’s Theorem Demonstration Apparatus

The Bernoulli's Theorem Demonstration accessory illustrates those circumstances to which Bernoulli's Theorem may be applied. Also other circumstances the theorem gives an inadequate description of the fluid behaviour. The test section is arranged so that the characteristics of flow through both a converging and diverging section can be studied.



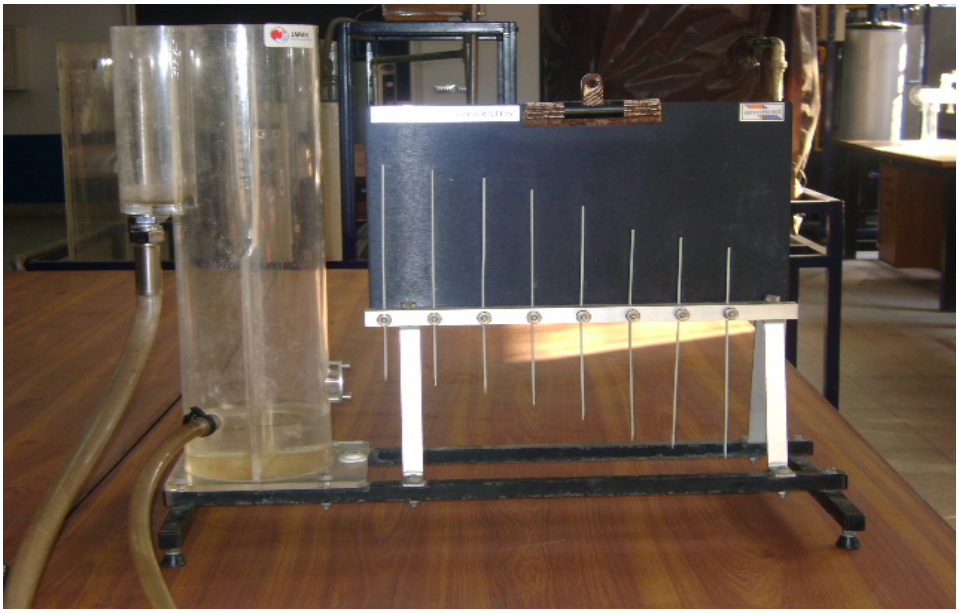
Dead Weight Pressure Gauge Calibrator

This calibrator functions on the same principle adopted in calibrating industrial pressure gauges. A Bourdon gauge is supplied for calibration.



Orifice and Free Jet Flow

This equipment permits calibration of two orifices of differing diameter. In the Orifice & Free Jet Flow accessory a constant head tank is fed with water from the Hydraulics Bench. The head is maintained at a constant value by an adjustable overflow. A jet trajectory tracing device allows the path followed by the jet to be ascertained. Establishing the coefficient of velocity for a small orifice, Finding experimentally the coefficient of discharge for a small orifice with flow under constant head and flow under varying head, Comparing the measured trajectory of a jet with that predicted by simple theory of mechanics.

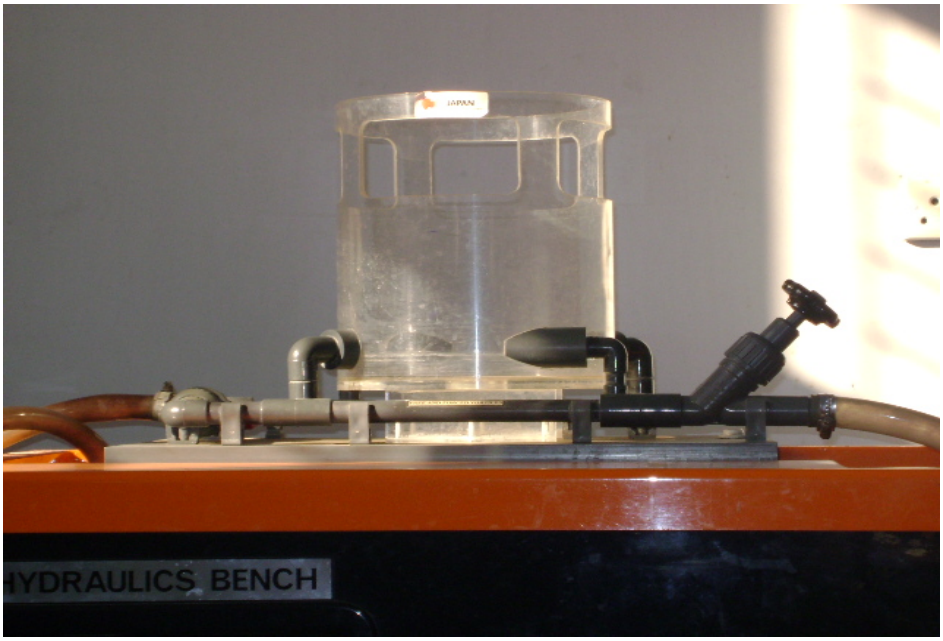


Orifice Discharge Apparatus

The Orifice Discharge accessory enables full analysis of the flow through five different orifices over a range of flow rates. Determining the contraction and velocity coefficients and calculating the discharge coefficient.

Free and Forced Vortex Apparatus

This equipment is designed to produce and measure the characteristics of free and forced vortices.



Compressible Flow Bench

List of Experiments

1. To observe laminar, transitional and turbulent pipe flow.
2. To determine the hydrostatic thrust acting on a plane surface immersed in water
3. To determine the position of the line of action of the thrust and to compare the position determined by experiment with the theoretical position.
4. To calibrate a bourdon type pressure gauge and to determine the gauge error.
5. To determine the measurement errors in the reference pressure source use for calibration.
6. To determine the co-efficient of velocity of two small orifices.
7. Determine the orifice of discharge with outflow under constant head.
8. Determine the co-efficient of discharge with outflow under varying head.
9. To determine the co-efficient of discharge, velocity and contraction of a small orifice.
10. To determine the surface profile of a forced vortex.
11. To investigate the physical phenomena associated with a free vortex.