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Fluid Mechanics

PRESSURE AND FLUID STATICS

by

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Chapter Description

- Expected Outcomes
 - Define relationship between Absolute Pressure and Gauge Pressure .
 - Calculate pressure by different measurement devices: mercuric Barometer, Piezometer, Manometer and etc.
 - Compute Hydrostatic Force on Submerged Plane.

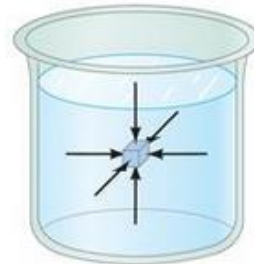
TOPICS

WEEK	CHAPTER	TOPIC	
3 19 – 21 Sept	2	Pressure and Fluid Statics	
		2.1	Pressure
		2.1.1	Absolute Pressure and Gauge Pressure
		2.1.2	Pressure and Force
		2.2	Pressure Measurement Devices
		2.2.1	The Barometer
4 26 – 28 Sept		2.2.2	The Manometer
		2.3	Fluid Statics
		2.3.1	Introduction to Fluid Static
5 3 – 5 Oct		2.3.2	Hydrostatic Forces on Plane Surface
		2.3.3	Hydrostatic Forces on Curved Surface
		2.3.4	Buoyancy and Stability
		2.3.5	Fluid Flow Concept

INTRODUCTION

- **Fluid at rest** (fluid statics or hydrostatics):-
 - No shear stresses are present
 - Normal forces due to pressure & gravity are present
- Normal pressure forces will occur in a moving fluid if the fluid is moving in bulk without deformation.
 - The sum of the component forces acting in any direction must be zero.
 - The sum of the moments of the forces about any point must be zero.
 - Normal Forces/normal stresses are referred to as pressure, P

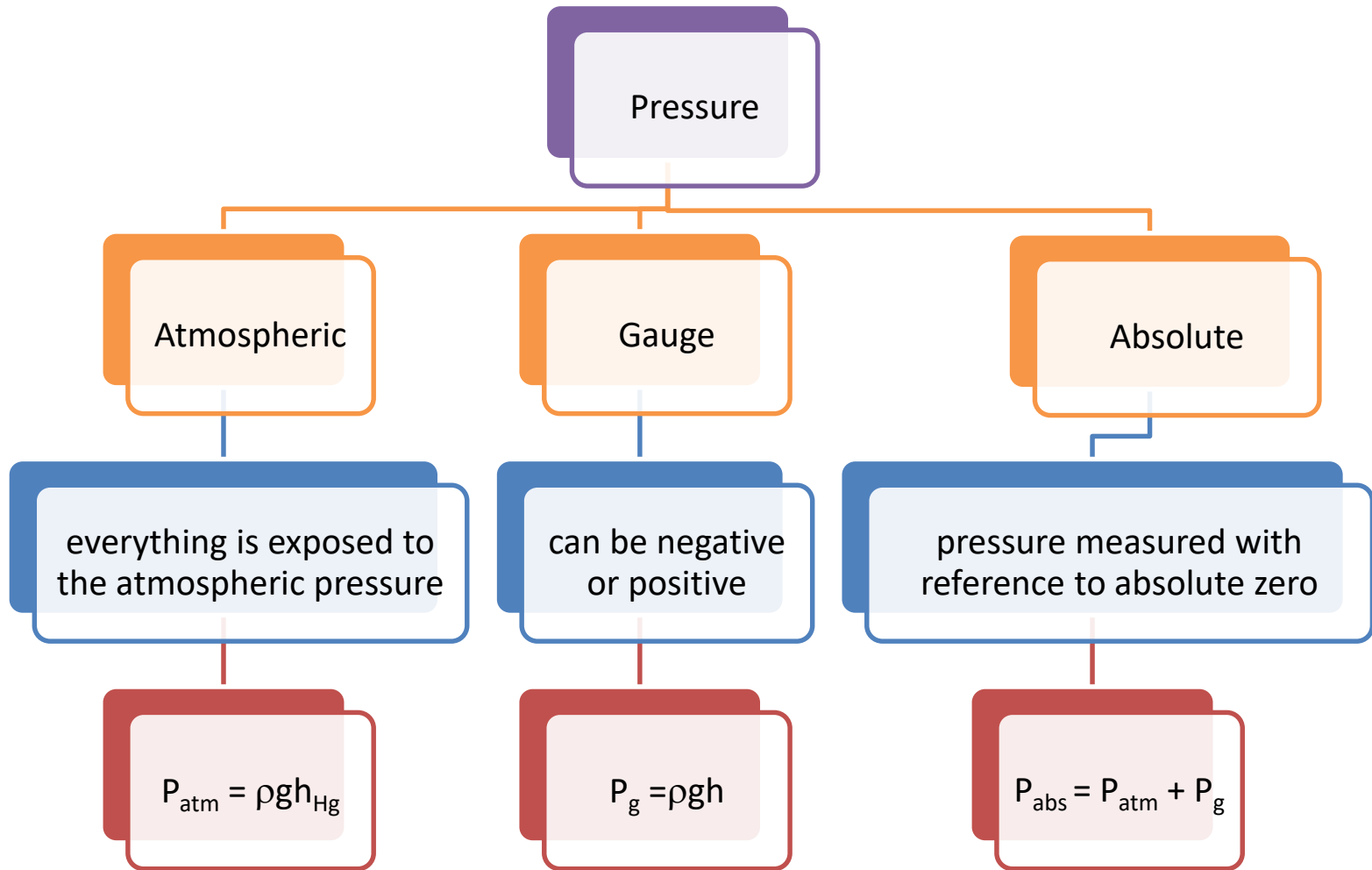
At any points, the pressure is same in all directions



Force due to fluid pressure is always perpendicular to contact surfaces

- If the force exerted on each unit area of a boundary is the same, the pressure is said to be uniform.

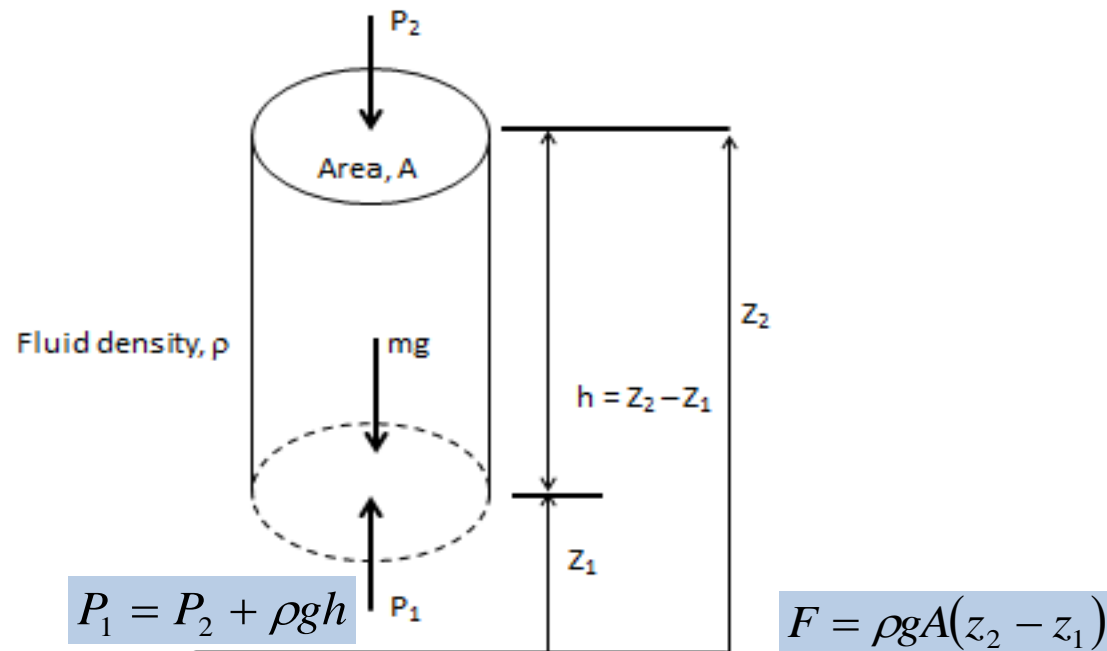
2.1.1 Absolute Pressure and Gauge Pressure



2.1.2 Pressure and Force

- Pressure variation with **elevation**

For static fluid, pressure varies only with the elevation within the fluid. Figure below explains the variation of pressure due to elevation.



2.1.2 Pressure and Force

- Pressure at the **same level**
- Pressure at any points at the same level in a body of fluid
- The fluid is at equilibrium so the sum of the forces acting in the x direction is zero. at rest will be the same.

