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FLUID MECHANICS

By: Varun Pathak Sir

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Introduction

* A fluid is a substance that is having the ability to flow or deform continuosly under the action of shear force [Tangential force], No matter how much small the force is.

*

* No slip condition or Maxwellian condition [Experimental]

* Free surface :

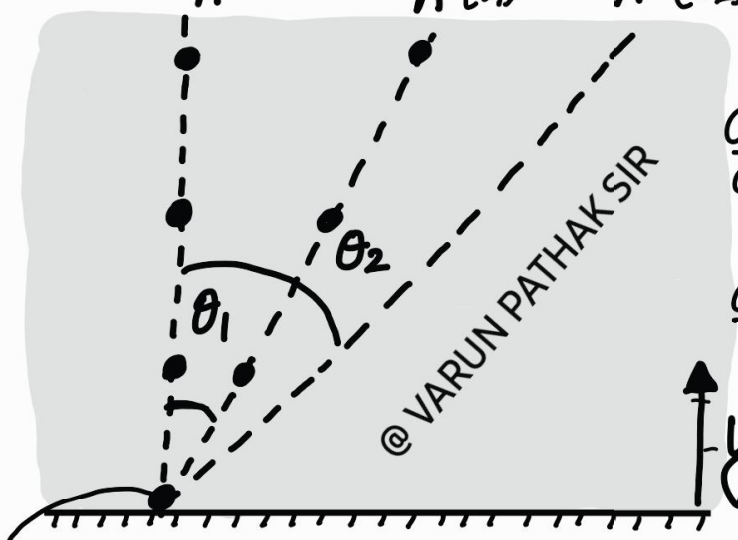
Difference between Solids & Fluids

① In case of solids the deformation is constant with respect to time whereas in case of fluids

deformation is continuos with respect to time i.e. In case of fluids Rate of Deformation $\left(\frac{d\theta}{dt}\right)$ is more important than deformation.

(2.) In case of solids on removal of load, solids will try to Regain their Original Shape where as fluids will never try to Regain original Shape.

Fluids



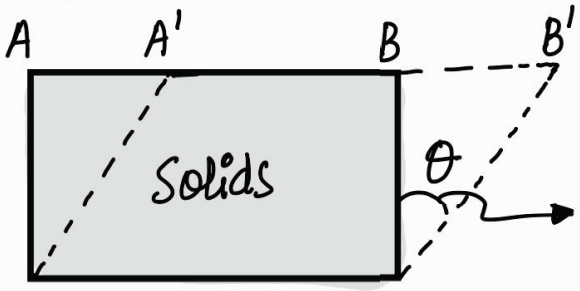
$\frac{d\theta}{dt}$ → Rate of Angular Deformation

$\frac{du}{dy}$ → Velocity Gradient

No slip condition (or) Maxwellian condition

[Relative velocity between the Molecule and the Boundary is zero $V_R = 0$]

Solids



Angular Deformation

Note:

The Intermolecular force of attraction between molecules of same nature is known as cohesion whereas intermolecular force of attraction between molecules of different Nature is known as adhesion.

*

Eg. Water in contact with Glass →
Mercury in contact with Glass →
Water in contact with Plastic Sheet →

Mechanics :