Announcements

- CBTF Quiz 7 next week
- 3D rigid body practice: PL HW10

❑ Upcoming deadlines:

- Friday (12/1)
  - WA #4
- Saturday (12/2)
  - ME HW25

Chapter 9 Part II – Fluid Pressure

Mechanics is a branch of the physical sciences that is concerned with the **state of rest or motion of bodies that are subjected to the action of forces**

SOLIDS

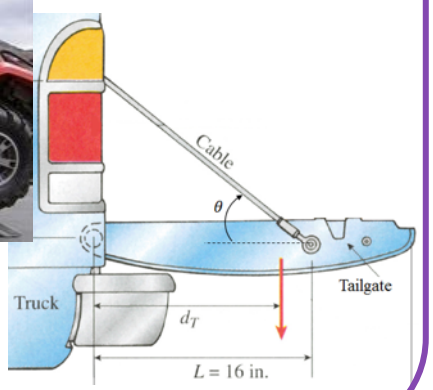
Rigid Bodies

TAM 210/211: Statics

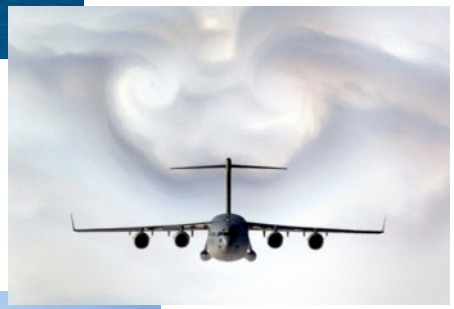
TAM212: Dynamics

Deformable Bodies

TAM 251: Solid Mechanics



FLUIDS



What Makes a Fluid or Solid?

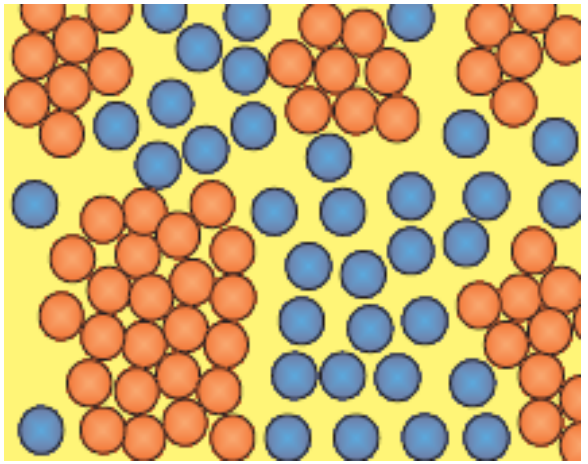
Honey

Rock

They look like a fluid...

Cornstarch + water =

(small, hard particles)



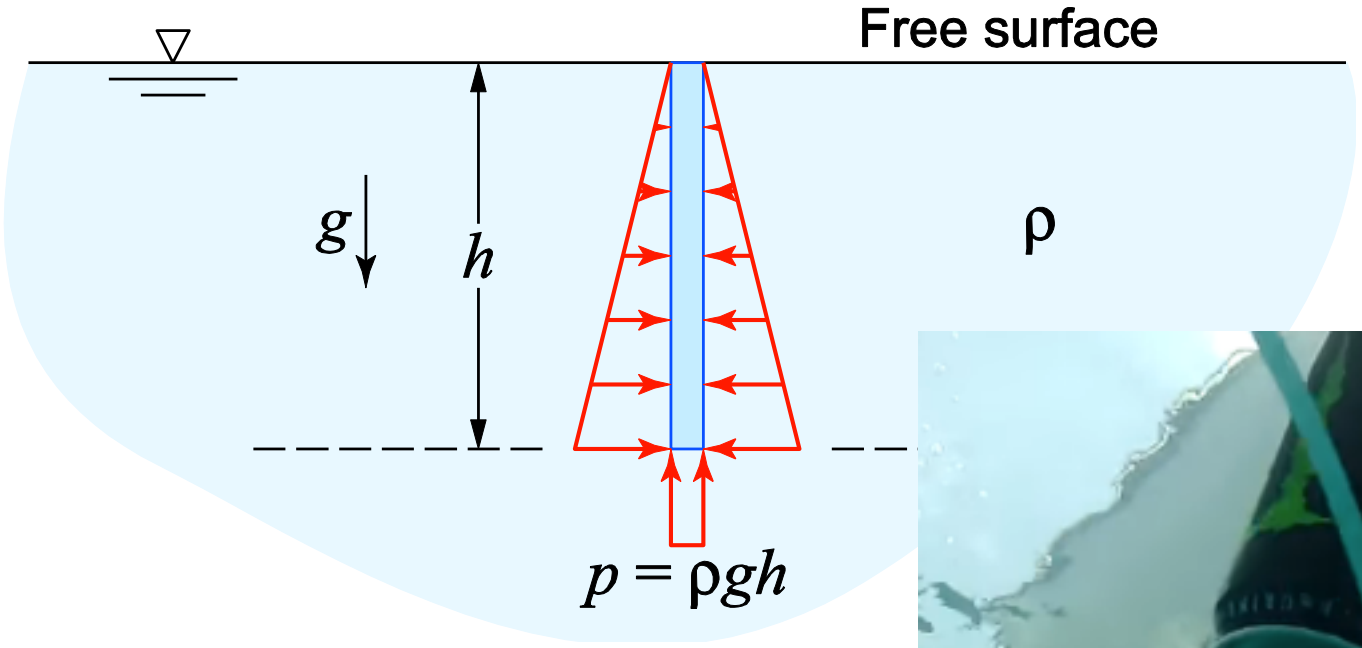
(Mythbusters)

Fluids

Pascal's law: A fluid at rest creates a pressure p at a point that is the ***same*** in ***all*** directions

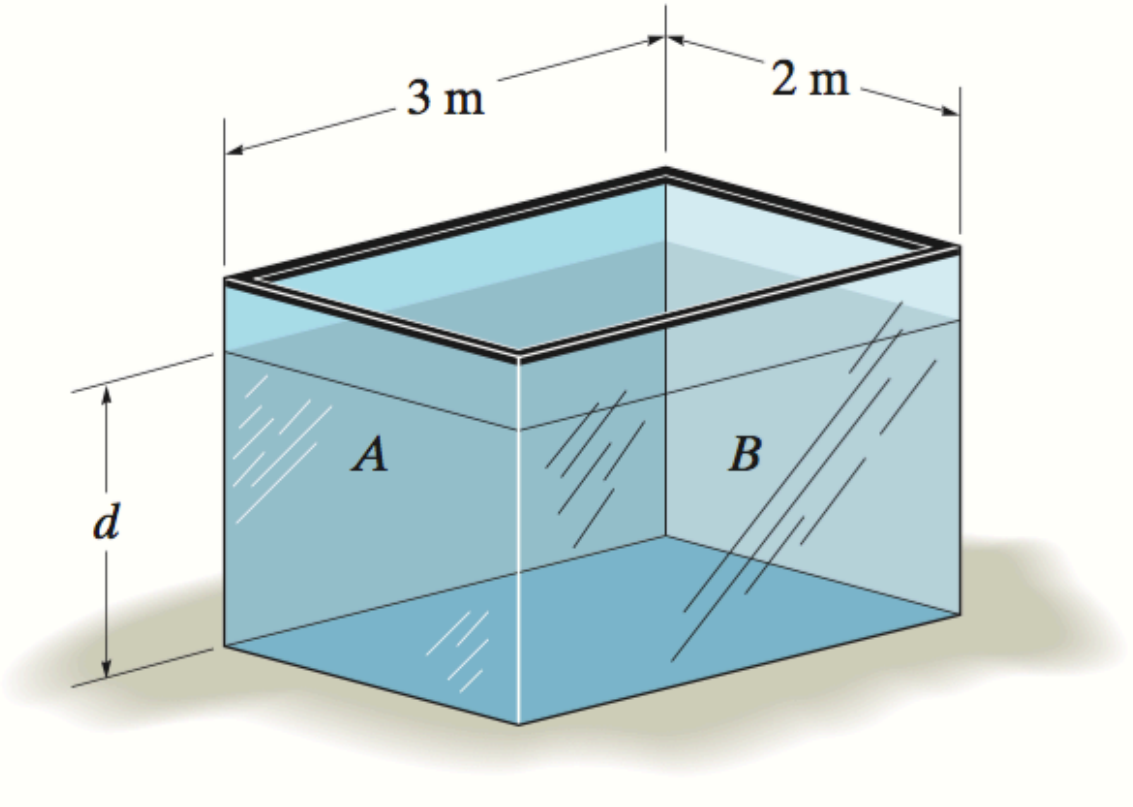
Incompressible: An incompressible fluid is one for which the mass density is independent of the pressure p. Liquids are generally considered incompressible. Gases are compressible, but may be approximated as incompressible if the pressure variations are relatively small.

Observe that the pressure varies *linearly* from the free surface, and is *constant* along any horizontal plane (since h is constant):

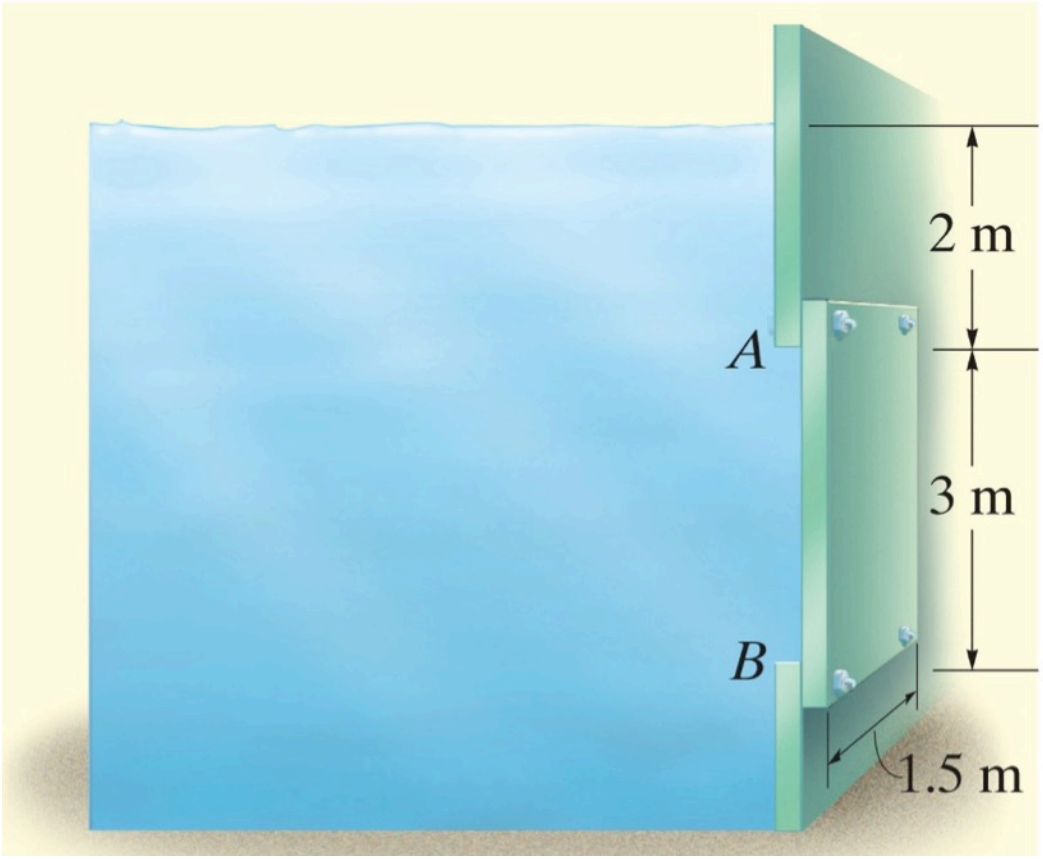


(Can crushing clip)

The tank is filled with water to a depth of $d = 4$ m. Determine the resultant force the water exerts on side A of the tank. ($\rho = 1000$ kg/m^3)



Determine the magnitude and location of the resultant hydrostatic force acting on the submerged rectangular plate AB. The plate has width 1.5m. ($\rho_{\text{water}} = 1000\ \text{kg/m}^3$)



The factor of safety for tipping of the concrete dam is defined as the ratio of the stabilizing moment due to the dam's weight divided by the overturning moment about *O* due to the water pressure. Determine this factor if the concrete has a density of $\rho_{conc} = 2.5\ Mg/m^3$ and for water $\rho_{water} = 1\ Mg/m^3$.