ADVANCED PHYSICS CLUB

OCTOBER 14, 2018

TODAY'S MEETING

Today we continued the discussion of hydrostatics. We reviewed

- A trick for calculating the force on a vessel due to the liquid inside by consider imaginary liquid outside (Problem 1 below).
- The hydraulic press and its application
- Communicating vessels (Problem 2 below)

You might find the following web page useful:

A fun demonstation of the power of the hydrostatic pressure due to gravity:
https://www.youtube.com/watch?v=EJHrr21UvY8

DISCUSSED PROBLEMS

1. A funnel is placed upside down on a table, as shown in the figure, and 1000 cm^3 of water is poured into it. The area covered by the funnel on the table- top is 200 cm^2, and the height of the water is 18 cm. What is the minimum mass of the funnel if it is not to be lifted away from the supporting surface?
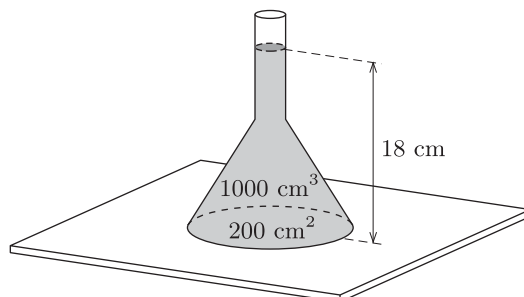
Hint: Consider notionally covering the funnel with a cylinder that has a base that coincides with the rim of the funnel, and then pouring water into it up to the level of that in the funnel. In this situation, how much force does the water exert on the funnel?

2. There is water in a container that stands on a table. A rubber hose connects the bottom of the container with a cupboard-sized black box standing next to the table. If additional water is added to the container, then the water level in it sinks, and if some is taken out, the level rises. Whatever could the black box contain?

HOMEWORK

1. A large tank is filled with water. A very long rubber hose has one end connected to the bottom of the tank, and the other end is sealed and free to move. The inside of the hose is completely filled with water. We gradually lift the free end of the hose. What is the pressure of water in the hose at the top end? Can we reach negative pressure in this way?