ADVANCED PHYSICS CLUB

MARCH 26, 2023

The updates, homework assignments, and useful links for APC can be found on SchoolNova's web page:
`http://schoolnova.org/nova/classinfo?class_id=adv_phy_club&sem_id=ay2022`
The practical information about the club and contacts can be found on the same web page.

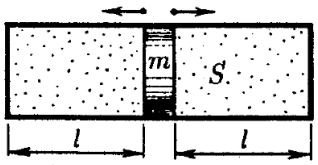
Today's meeting

Today we finished the assignment on Bernoulli law and started solving problems about ideal gas. The next assignment contains unfinished problems as well as some new ones.

Homework

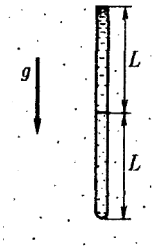
1. Atmosphere of Venus consists almost exclusively of carbon dioxide. Its' temperature near the planet surface is about 500°C and pressure is about 100 atm (10^7 Pa). What should be the volume of a space probe of mass 1000 kg for it to float in the bottom layer of Venus atmosphere?

2. Find the period of small oscillations of a piston of mass m dividing a smooth cylindrical vessel of cross section S into two parts, each of length l. In both parts of the vessel there is air which has temperature T_0 and pressure p_0 when piston is in equilibrium. Assume that temperature is constant during the piston oscillations.



3. Estimate the number of molecules in the Earth's atmosphere.

***4.** The bottom end of a vertical narrow tube of length $2L$ is sealed and the upper end is open into the atmosphere. The lower half of the tube contains gas at temperature T_0 while the upper half is filled with mercury. Gas is slowly heated. At what temperature gas is going to displace all mercury? Atmospheric pressure in the units of mercury column is L.



***5.** A sealed container is filled with water in such a way that there is an air bubble on its bottom. Pressure at the bottom level is p_0. What will the pressure become if the bubble floats all the way up? Height of the container is H, water density is ρ.

For the next meeting

IMPORTANT: The next club's meeting is at 3:30pm, via Zoom, on Sunday, **April 2**.