

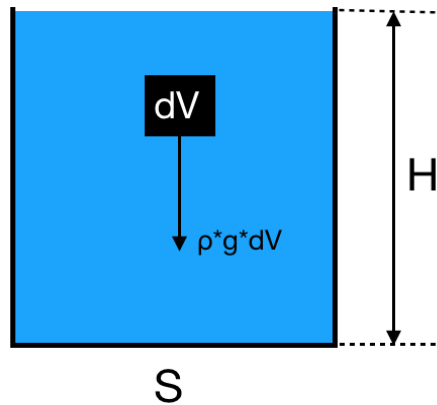
Answer on Question #79507 , Physics / Mechanics | Relativity

Problem

Explain why pressure in liquid varies with increasing depth?

Answer

Let's consider liquid in the vessel (H – height of the vessel, S – cross-section) . Every infinitesimal volume of liquid dV is affected by the Earth's gravity force dF .

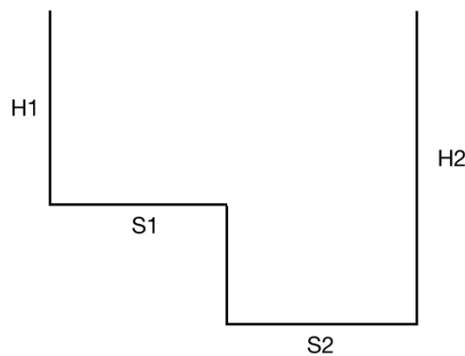


The absolute value of this force is $\rho * g * dV = \rho * g * dS * dh$, where $\rho = \text{const}$ is density of the liquid. The pressure on the bottom of the vessel. Pressure is by definition $p = dF/dS$. So:

$$p = \frac{dS * \int_0^H \rho * g * dh}{dS} = \rho * g * H,$$

Constant of integration is chosen to be 0, so that pressure of a water layer of $H=0$ is 0. That's why the pressure of liquid increases with increasing depth.

So if we consider a vessel with a variable depth:



pressure on the bottom $S1$ will be less the pressure on $S2$ because $H1 < H2$.

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