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Hydrostatics, Forces Acting on Liquids

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Annotation: Mass forces act on every particle of the fluid khajmi being looked at and are proportional to its mass. They include the force of gravity and the forces of inertia. Liquid pressure measuring instruments.

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Hydrostatics is the branch of hydraulics that studies the laws of equilibrium of liquids. In addition, hydrostatics also studies the laws of equilibrium of solids completely or partially immersed in liquids. The study of these laws is important in solving examples related to the transfer of forces through fluids.

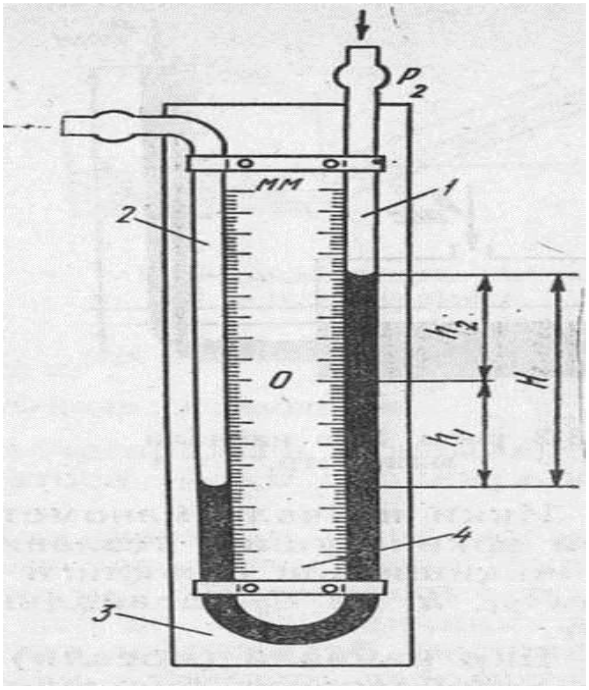
The forces acting on liquids are divided into internal and external forces depending on the method of laying:

Internal forces-arise as a result of the interaction of liquid particles:

External forces-represent the effect of other bodies on the liquid (for example, the effect of the walls of the container in which the liquid is inserted, the pressure of the air acting on the open surface, and x.).

Internal forces appear as resistance to sliding forces and are called internal friction forces. external forces can be seen as acting on the surface and according to the hajm. Therefore, the forces acting on the liquid can be divided into surface forces and mass forces, depending on the effect on the surface and hajm.

Surface forces act on the surface of the fluid being seen. They include the force of pressure, the force of Surface Tension, The Force of reaction of the vessel wall and the forces of internal friction.



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Mass forces act on every particle of the fluid khajmi being looked at and are proportional to its mass. They include the force of gravity and the forces of inertia. Liquid pressure measuring instruments. The principle of operation of these instruments is based on the fact that the measured pressure is balanced by the hydrostatic pressure of the fluid column. The tools are filled with various working fluids, most often Mercury, transformer oil, water and alcohol. The principle of adjacent dishes is used in the tools. In them, the working fluid levels match when the pressure above them is equal, while when the pressure is not equal, the liquid level takes such a state that the excess pressure in one vessel is balanced by the hydrostatic pressure of the excess column of the liquid in another vessel. Most liquid monometers have a visible level of working fluid. Instructions for that level can be recorded directly. There is such a liquid instrument Gruppa in which the level of the working fluid is not directly visible. A change in level leads to a displacement of the cork or a change in the characteristics of another device. These characteristics provide either a direct indication of the magnitude being measured using digital devices, or a change in its value and transfer to a distance.

Let's take a look at some of the different types of liquid tools. Two-tube manometers. To measure the pressure and pressure exchange (difference), two-tube simon manometers and diphmanometers are used, the level of which is visible. Two vertically adjacent tubes are fixed to 1, 2 metal or wooden bases 3, to which scale 4 is fixed.

If the hydrostatic pressure of the fluid column in the open part of the tube coincides with the pressure in the second part, the system is in equilibrium. Thus, the following expression can be written:

$$P_{абс} \cdot s = P_{атм} \cdot s + H \cdot s \cdot g(\rho - \rho_1),$$

where Rabs is the measured pressure, Pa; Ratm is the atmospheric pressure, Pa; s is the face of the tube section, m3; N is the difference in the Liquid Level (column length), m; ρ is the density of the liquid, kg/m3; ρ1 is the density of the medium above the liquid in the manometer, kg/m3; g is the acceleration force, m/s2.

Meaning

$$P_{абс} = P_{атм} + H \cdot g \cdot (\rho - \rho_1),$$

$$P_{орт} = P_{абс} - P_{атм} = H \cdot g \cdot (\rho - \rho_1),$$

If there is gas above the liquid in the manometer, then:

$$P_{орт} = P_{абс} - P_{атм} = Hg\rho.$$

In order to find the height of the fluid column, it is necessary to count the column Heights twice (in one elbow it is necessary to add a decrease, in the other-an increase and their value. When measuring the pressure difference (change), a liquid differential is given a large (positive) pressure on one side of the two-tube manometer and a small (negative) pressure on the other. The difference in the liquid level on the positive and negative sides is proportional to the difference in pressures being measured

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