

Answer on Question #53006 - Physics - Mechanics - Kinematics - Dynamics

Due to an increase in pressure of $\Delta P = 10 \text{ Pa}$ in a liquid, the density ρ increases by $\frac{\Delta\rho}{\rho} = 0.02\%$. What is its bulk modulus of elasticity K ? In this case, use the formula for the bulk modulus of elasticity in terms of density change.

Solution:

The bulk modulus of K of the liquid is given by

$$K = \rho \frac{\Delta P}{\Delta\rho},$$

where $\Delta\rho$ – is the increase in the density of the fluid. Since $\Delta P = 10 \text{ Pa}$, and $\frac{\Delta\rho}{\rho} = 0.02\%$, we obtain

$$K = \rho \frac{\Delta P}{\Delta\rho} = \frac{\Delta P}{\left(\frac{\Delta\rho}{\rho}\right)} = \frac{10 \text{ Pa}}{2 \times 10^{-4}} = 5 \times 10^4 \text{ Pa}$$

Answer: $5 \times 10^4 \text{ Pa}$.