## Answer on Question #53002, Physics / Mechanics | Kinematics | Dynamics

Determine the pressure increase required to reduce the volume of water by 1.5%, if its bulk modulus of elasticity is  $2.2 \times 10^9$ Pa.

## Solution:

In given task we let the V as the volume of water. We know that the change in volume is equal to

$$\mathrm{d}V = -\frac{1.5V}{100}V = -0.015V$$

Now, we can note that that

$$-\frac{\mathrm{d}V}{V} = 0.015$$

Then, we have to mark the increase in pressure, which is equal to

$$\Delta P = \left(-\frac{\mathrm{d}V}{V}\right)K$$

Bulk modulus of elasticity of water (K) =  $2.2 \times 10^9$ Pa = 2.2 Gpa

Thus, we can substitute the values into the noted above formula.

$$\Delta P = 2.2 \cdot 10^9 \cdot 0.015 = 33\ 000\ 000 = 33000\ kPa = 3.3 \times 10^4\ kPa$$

Finally, we can note that the pressure increase required to reduce the volume of water by 1.5% is equal to  $3.3 \times 10^4$  kPa.