## 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 $2.2 \times 10^{9} \mathrm{~Pa}$.

## Solution:

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

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

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 $(\mathrm{K})=2.2 \times 10^{9} \mathrm{~Pa}=2.2 \mathrm{Gpa}$
Thus, we can substitute the values into the noted above formula.

$$
\Delta \mathrm{P}=2.2 \cdot 10^{9} \cdot 0.015=33000000=33000 \mathrm{kPa}=3.3 \times 10^{4} \mathrm{kPa}
$$

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

