A square prism of wood 50*50 mm in cross section and 300 mm long is subjected to a tensile stress of 4 t/cm2 along it's longitudinal axis and lateral compressive to a tensile stress of 2 t/cm2 along one pair of sides and a lateral tensile stress of 1-0 t/cm2 acting along the other pair of sides.If the value of E of the material is 1.5*10 to the power 5 kg/cm2,calculate it's changed dimensions.poisson's ratio for wood=.4

Let

$$\begin{cases} l_x = l_y = 50 \, mm, l_z = 300 \, mm \\ \sigma_x = 2000\frac{kg}{cm^2}, \sigma_y = 1000\frac{kg}{cm^2}, \sigma_z = 4000\frac{kg}{cm^2} \\ E = 1.5 \cdot 10^5 \frac{kg}{cm^2} \end{cases}$$

$$\sigma = E\frac{\Delta l}{l} \rightarrow \Delta l = \frac{\sigma l}{E}$$

$$\begin{cases} \rightarrow \Delta l_x = \frac{\sigma_x l}{E} = 2000 \cdot \frac{0.5}{1.5 \cdot 10^5} = 666 \cdot 10^{-5} cm \\ \rightarrow \Delta l_y = \frac{\sigma_y l}{E} = 1000 \cdot \frac{0.5}{1.5 \cdot 10^5} = 333 \cdot 10^{-5} cm \\ \rightarrow \Delta l_z = \frac{\sigma_z l}{E} = 4000 \cdot \frac{30}{1.5 \cdot 10^5} = 666 \cdot 10^{-5} = 0.8 \, cm \end{cases}$$

$$\begin{cases} \rightarrow L_x = l_x + \Delta l_x = 0.5 + 666 \cdot 10^{-5} cm \\ \rightarrow L_y = l_y + \Delta l_y = 0.5 + 333 \cdot 10^{-5} cm \\ \rightarrow L_z = l_z + \Delta l_z = 3.8 \, cm \end{cases}$$