A prismatic block is inserted into a hollow whose front and back faces are open. If a uniform load $P$ is applied to the top surface of the block, calculate (a) the changes in the lengths of the edges $b$ and $c$, (b) the pressure on the block caused by the rigid side surfaces of the hollow.

**Boundary conditions**

\[
\begin{align*}
\sigma_z &= -\frac{P}{A} = -\frac{P}{a \times b} \\
\sigma_{xy} &= 0 \\
\varepsilon_{xx} &= 0 \\
\varepsilon_{xy} &= 0 \left( \frac{1}{E} \sigma_{xx} - \nu (\sigma_{yy} + \sigma_{zz}) \right), \quad (\sigma_{yy} = 0) \\
\sigma_{xx} &= \nu \sigma_{zz} \\
\sigma_{xx} &= -\frac{P}{a \times b} \nu \\
\varepsilon_{yz} &= \frac{1}{E} (\sigma_{yy} - \nu (\sigma_{xx} + \sigma_{zz})), \quad (\sigma_{yy} = 0) \\
\varepsilon_{yy} &= -\frac{\nu}{E} (\nu \sigma_{zz} + \sigma_{zz}) \\
\varepsilon_{zz} &= -\frac{\nu (\nu + 1)}{E} \sigma_{zz}
\end{align*}
\]

The change in the length of the prismatic block in the $y$ - direction

\[
\varepsilon_{yy} = \frac{\Delta b}{b} = \frac{\nu (\nu + 1)}{E} \left( -\frac{P}{a \times b} \right)
\]

The change in the length of the prismatic block in the $z$ - direction

\[
\varepsilon_{zz} = \frac{\Delta c}{c} = \frac{1-\nu^2}{E} \left( -\frac{P}{a \times b} \right)
\]