Answer on Question #50975, Physics, Solid State Physics

If the length of a wire of steel is increased 6%, than will the diameter get reduced 4%? explain with Poisson ratio?

Solution

The resulting Poisson's ratio

$$v = -\frac{\varepsilon_{trans}}{\varepsilon_{axial}} = -\frac{(-0.04)}{0.06} = 0.67 \tag{1}$$

where $\varepsilon_{trans} = -0.04$ is transverse strain (negative for axial tension (stretching), positive for axial compression); $\varepsilon_{axial} = 0.06$ is axial strain (positive for axial tension, negative for axial compression).
For steel $v \approx 0.28$ but not 0.67. Than $\varepsilon_{trans} = -v\varepsilon_{axial} = -0.28(-0.06) = 0.0168$

So, if the length of a wire of steel is increased 6%, than will not the diameter get reduced 4%, just 1.7%.