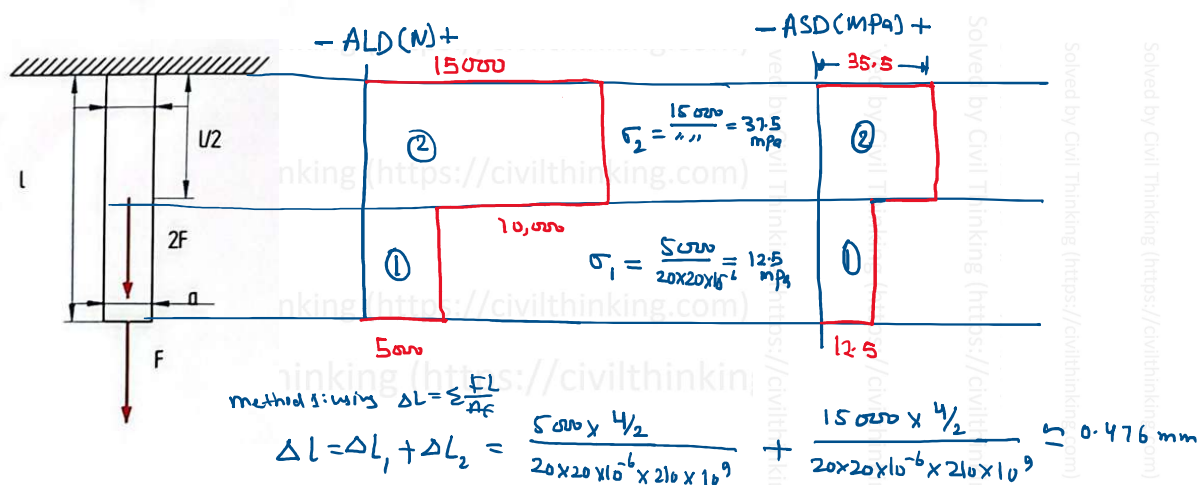
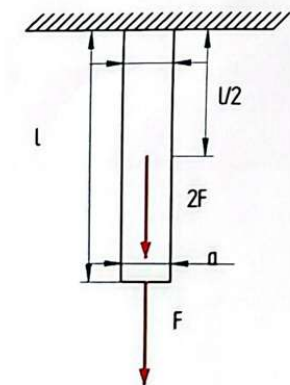


Solid Mechanics: Axial Load Diagram, Axial Stress Diagram: Problem 1

solution

Draw a graph of tensile or compressive forces and stresses and calculate the total deformation of a square steel bar with the given data $l=4\text{m}$ $b=20\text{mm}$ $F=5000\text{N}$ and $E=210\text{ GPa}$ for the following cases:



Method 2: using $\Delta L = \sum \frac{\sigma L}{E}$

$$\Delta L = \sum \frac{PL}{AE} = \sum \frac{\sigma L}{E} = \frac{\sigma_1 \times \frac{l}{2}}{E} + \frac{\sigma_2 \times \frac{l}{2}}{E} = \frac{l}{2E} (\sigma_1 + \sigma_2) = \frac{4}{2 \times 210 \times 10^9} \times (12.5 + 37.5) \times 10^6 = 0.476 \text{ mm}$$

This problem was solved by Civil Thinking (<https://civilthinking.com>)

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