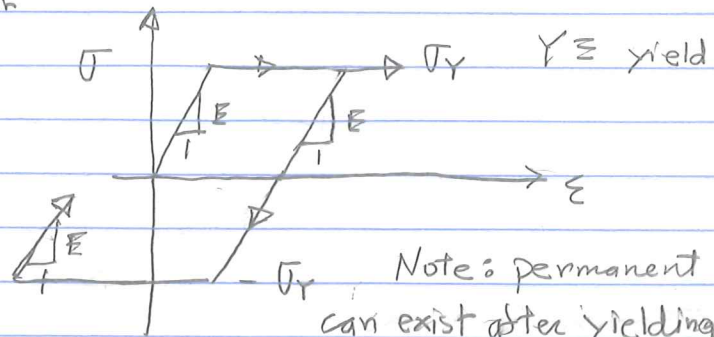


8. Elastic-plastic behavior

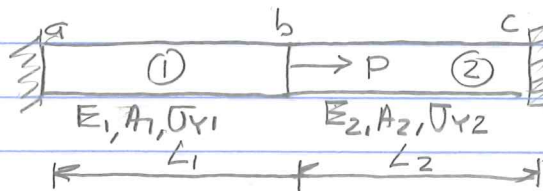
←  → σ, ϵ

Same yield stress in both directions.



Note: permanent strains can exist after yielding and unloading.

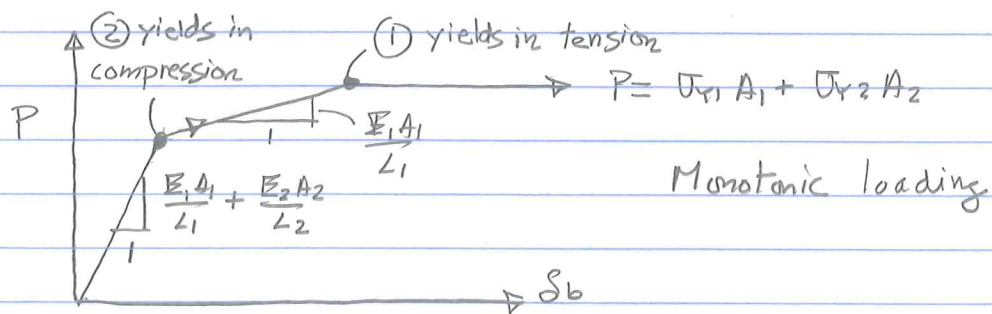
Example:



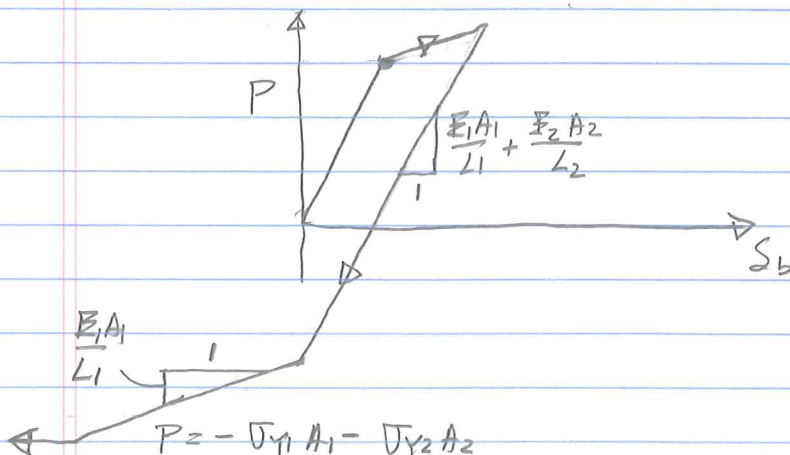
Assume stress is uniform across the cross-section

Plot P vs. δ_b for various load histories. Use a stiffness approach since superposition will not hold if yielding occurs.

(1) yields when $\epsilon_1 = \epsilon_{Y1} = \frac{\sigma_{Y1}}{E_1}$ and (2) yields when $\epsilon_2 = \epsilon_{Y2} = \frac{\sigma_{Y2}}{E_2}$. Since $\epsilon_1 = \delta_b / L_1$ and $\epsilon_2 = \delta_b / L_2$, we can figure out which piece yields first. Suppose (2) yields first.



Monotonic loading



Loading with a reversal