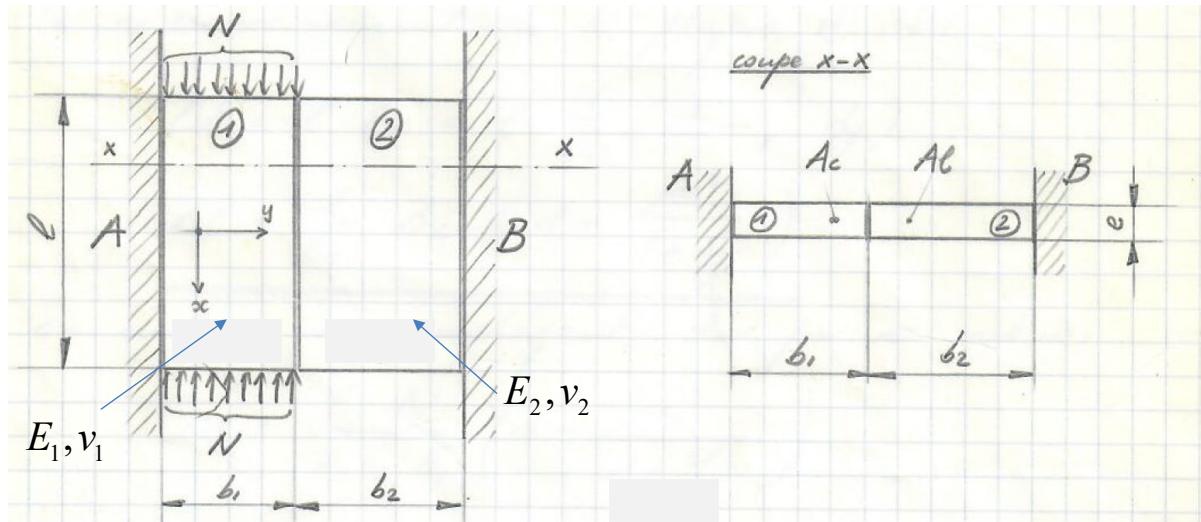


Exercise 1: A plate of steel and a plate of aluminum of the same length l are placed between two vertical rigid supports A and B . Assuming that the friction between them is negligible, calculate the decrease in length Δl of the steel plate.



Exercise 2: A steel tank with an internal diameter of $2r_i = 1.4$ m is subjected to an internal pressure $p_i = 8$ MPa. The tensile and compressive elastic limits are equal and given by $\sigma_{yp} = 240$ MPa. What is the wall thickness with a safety factor of 2?

Exercise 3: Demonstrate that for an annular rotating disk the ratio of the maximum tangential stress to the maximum radial stress is (ν is the Poisson ratio),

$$\frac{\sigma_{\theta\theta,\max}}{\sigma_{rr,\max}} = \frac{2}{(r_e - r_i)^2} \left(r_e^2 + \frac{1-\nu}{3+\nu} r_i^2 \right)$$

Exercise 4: Calculate the allowable angular rotation in rpm of a flat solid disk with radius $r_e = 125$ mm. The disk is made of an aluminum alloy with $\sigma_{yp} = 280$ MPa, Poisson ratio $1/3$ and density $\rho = 2.7 \text{ kNs}^2/\text{m}^4$. Use the maximum distortion energy criterion.