

Homework 4

Problem 1:

Figure 3 is a front elevation view of a simple beam structure carrying two external loads P . The beam has section properties EI near the supports and $2EI$ in the centre section. (10 points)

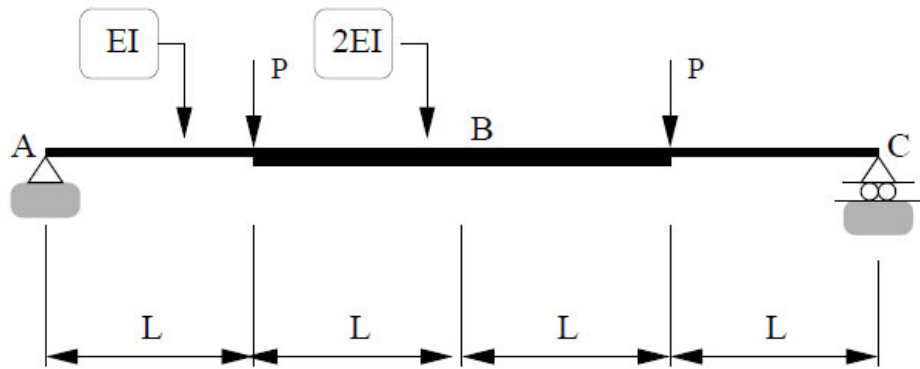


Figure 3: Simple beam structure (symmetric loads P).

Use the method of moment area to show that the end rotation at A (measured clockwise) is:

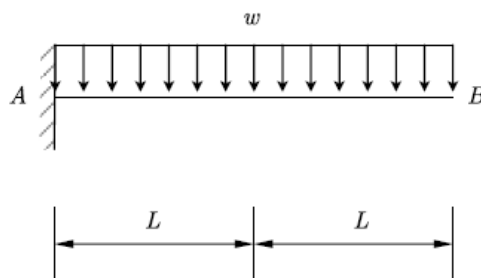
$$\theta_A = \frac{PL^2}{EI}. \quad (3)$$

Use the method of moment area to show that the vertical beam deflection at B is:

$$\Delta_B = \frac{13 PL^3}{12 EI}. \quad (4)$$

Problem 2:

For the cantilever beam shown below: (5 points)



Use the *method of moment-area* to calculate the vertical displacement at point B, assuming the EI is constant along the beam.

Question 3: (5 points)

For a cantilever beam shown below:

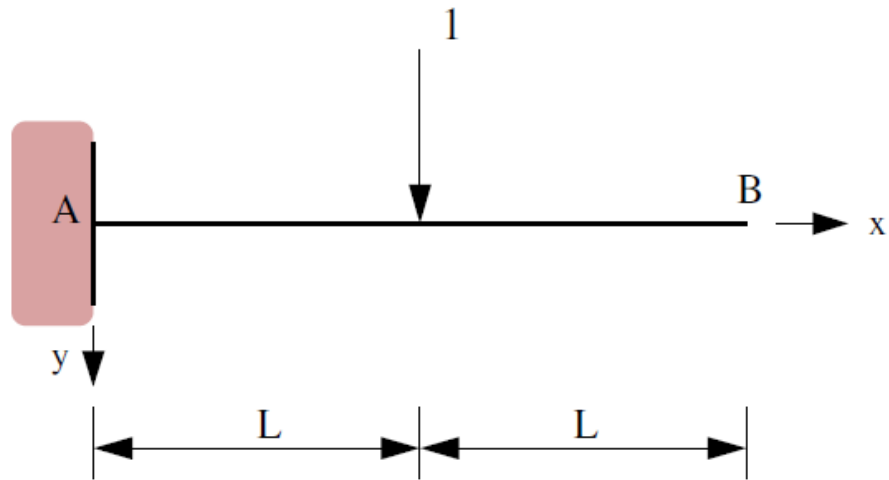


Figure 2: Problem 2 (A)

- a). Use the *method of moment-area* to calculate the **vertical displacement** at point B, assuming the EI is constant along the beam.
- b). Based on the results of (a), calculate the **reaction force** at point B for the following propped-cantilever beam, assuming the EI is constant along the beam:

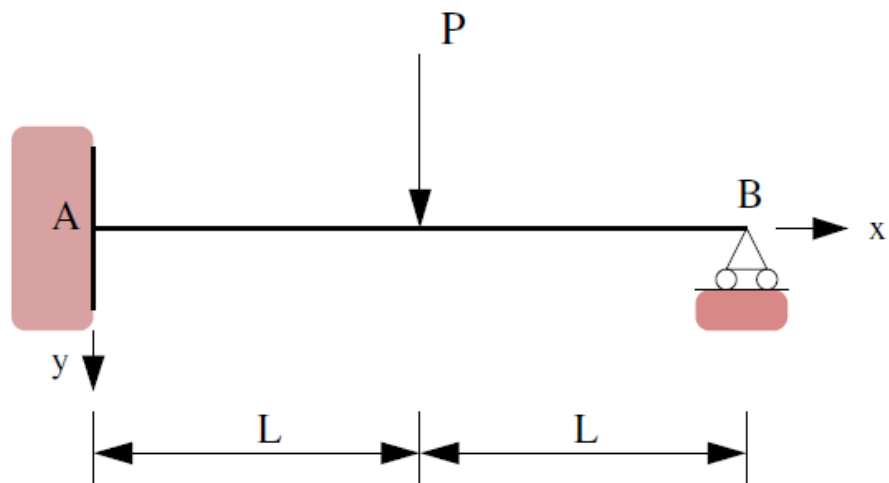


Figure 3: Problem 2 (B)