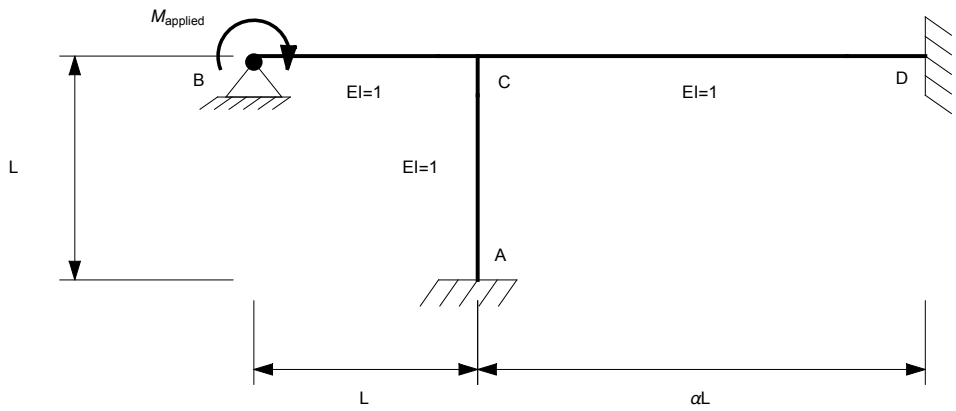
Problem 1

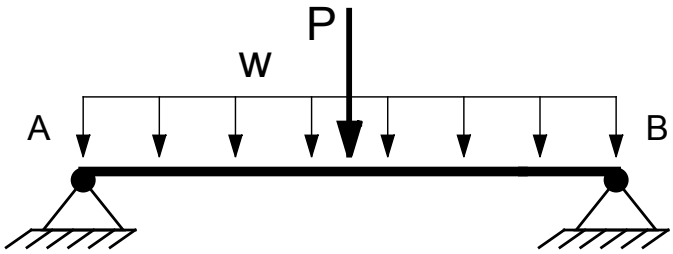


a) For $\alpha = 1$, sketch the approximate deflected shape.

b) Given $M_{applied} = 20$ and $\alpha = 1$, sketch the (exact) moment diagram.

c) For any value of $M_{applied}$ and any value of α, determine $M_{CA}/M_{applied}$ in terms of α and plot it.

Problem 2



For a simple bridge with self-weight and a central force P applied, estimate the minimum total weight of the bridge in terms of:

- σ_Y yield stress of the beam material
- h height of the beam (or truss)
- L length of the beam
- γ specific gravity of the beam material
- P applied central load

Estimate the minimum weight of the simple bridge for the following parameters:
$\sigma_Y = 200$ MPa, h = 1 m, L = 30 m, $\gamma = 7.8$, P = $2 \times 10^3 \times g$ N ($g \approx 9.8\ m/s^2$; so P is due to 2000 kg)