

Exercise #8: Buckling analysis of wall-frame structures

Problem 1

Figure 1 shows the plan view of a 8-storey tube-in-tube structure. The inner and outer tube represent the wall system and the frame system, respectively. The storey height is 3.20m . The inner tube wall thickness is 0.20m with a modulus of elasticity $E_w = 2.5 \times 10^7 \text{ kN/m}^2$. The outer tube consists of $0.30 \times 0.50\text{m}^2$ column cross-sections and $0.30 \times 0.70\text{m}^2$ girder cross-sections and a modulus of elasticity $E = 3.0 \times 10^7 \text{ kN/m}^2$.

Determine the buckling loads of the first storey of the structure and verify if the structure is safe against P-Delta gravity effects. The structure's dead and live load together is 12 kN/m^2 .

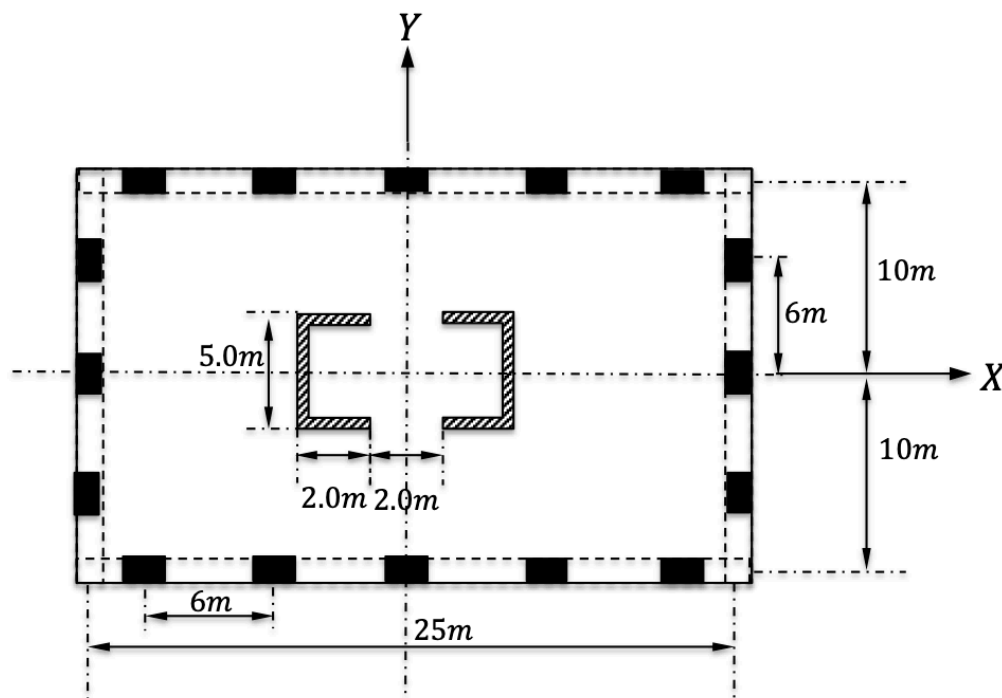


Figure 1. Tube-in-tube structure