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In-class Exercise Week #4: Geometric stiffness matrix

Exercise #1:

Both members in the frame below are axial force members with the following properties:

$$A_{ab} = 2\text{mm}^2, A_{bc} = 5 \times 10^3\text{mm}^2, E = 200,000\text{MPa}$$

Calculate the critical load of the system for the following two cases:

1. $a = 0$
2. $a = 0.05$

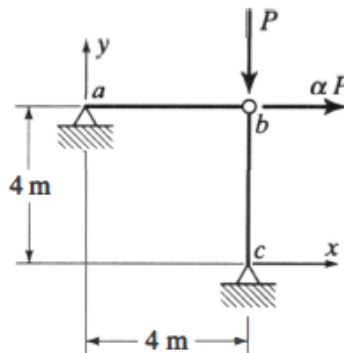


Figure 1. Planar frame under axial loading

Exercise #2:

Member ab is a straight elastic bar with the following properties:

$$A = 1.27 \times 10^4 \text{ mm}^2, I = 3.66 \times 10^7 \text{ mm}^4, E = 200,000 \text{ MPa}$$

Calculate the critical load of the system for the following two cases:

1. $a = 0$
2. $a = 1.25 \times 10^{-4}$

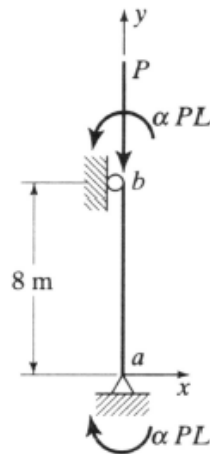


Figure 1. Member under axial and flexural loading