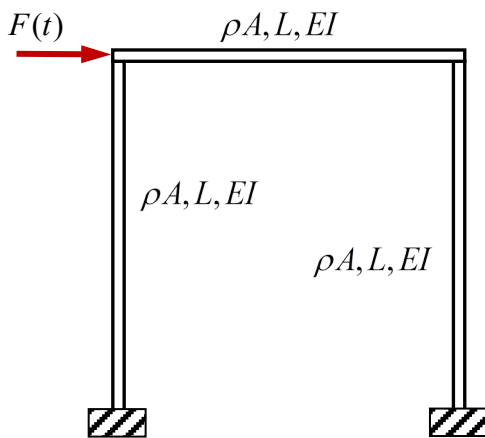EI, ρA, L

x

v

1. Determinate the stiffness matrix using two beam elements. Condense statically the rotational DOF. Determinate the lowest eigenpair by the inverse vector iteration. Use the lumped mass approximation. By Sturm's sequence rule find out whether the second eigenfrequency is higher than

$$\omega = 35\sqrt{EI/\rho AL^4} \ .$$

$F(t)$

$\rho A, L, EI$

$\rho A, L, EI$

$\rho A, L, EI$

2. Use the eigenpair in Exercise 1 and determinate the steady state response when

$$\rho A = 6{,}0 \ \text{kg/m}, \frac{EI}{L^3} = 1{,}346 \ \text{kN/m},$$

$$L = 3 \ \text{m (IPE 80)}$$

with the harmonic excitation

$$F(t) = 200\sin(25 \cdot t) \ \text{N} \ .$$