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Exercise #9: Eigenvalue analysis

Problem 1

For the two-storey shear building shown in Figure 1.1, determine the following:

1. The mass and stiffness matrices of the building.
2. Determine the natural vibration frequencies and modes. Express the frequencies in terms of m , EI , and h .
3. Verify that the modes satisfy the orthogonality properties.
4. Normalize each mode so that the roof displacement is unity. Sketch the modes and identify the associated natural frequencies.
5. Normalize each mode so that the modal mass M_n has unit value. Compare these modes with those obtained in part (4) and comment on the differences.

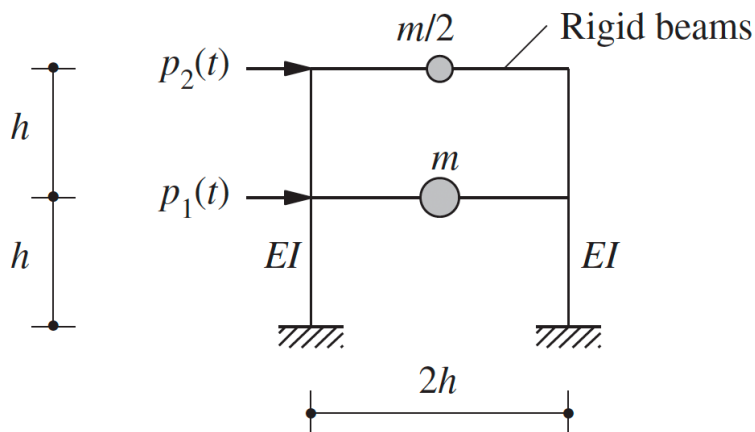


Figure 1.1