

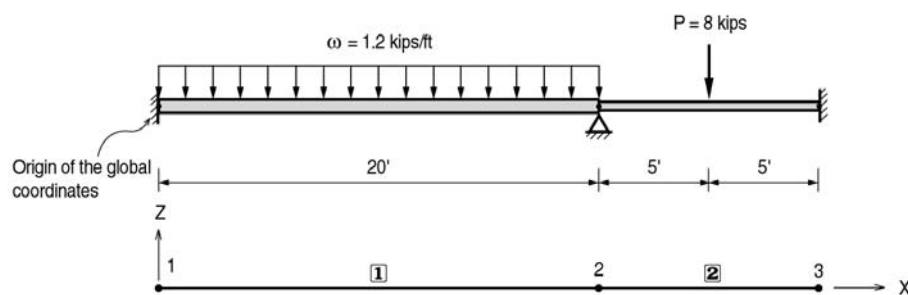
Static-2

Title

Continuous beam with fixed ends and an intermediate hinge support

Description

A continuous beam with fixed ends and an intermediate hinge support is subjected to a uniformly distributed load and a concentrated load. Determine the bending moments of the structure.



Structural geometry and analysis model

Model

Analysis Type

2-D static analysis (X-Z plane)

Unit System

ft, kip

Dimension

Length 30.0 ft

Element

Beam element

Material

Modulus of elasticity $E = 4320.0 \times 10^3$ ksf

Section Property

Element **1** – Moment of inertia $I_{yy} = 0.0201$ ft⁴

Element **2** – Moment of inertia $I_{yy} = 0.0067$ ft⁴

Boundary Condition

Nodes 1 and 3 ; Constrain all DOFs.

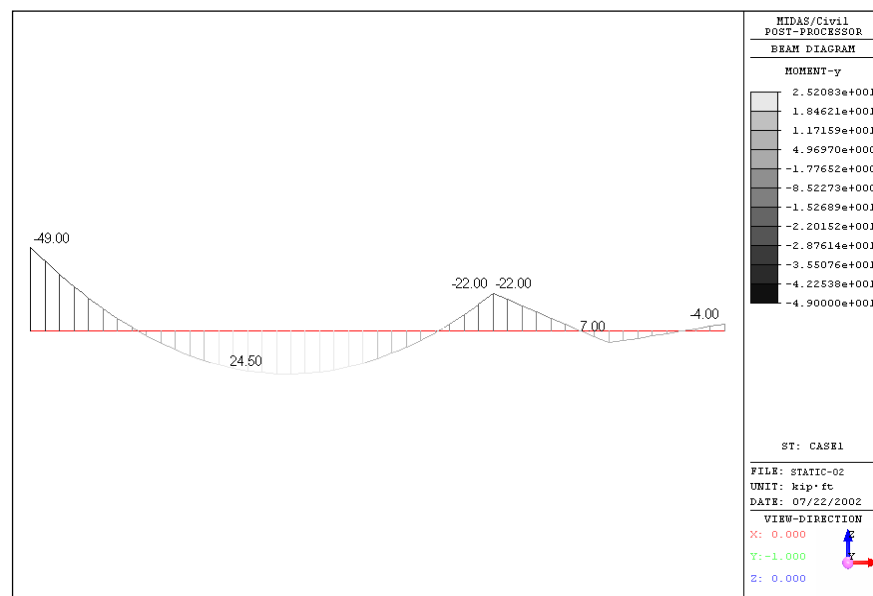
Node 2 ; Constrain Dx and Dz. (Rotational hinge about the Y-axis)

Load Case

A uniformly distributed load, 1.2 kips/ft, is applied at the element **1** in the $-Z$ direction.

A concentrated load, 8.0 kips is applied to the mid-point of the element **2** in the $-Z$ direction.

Results



Bending moment diagram of the structure

Comparison of Results

Unit : kip-ft

| Element | Node | Bending Moment (M_y) | |
|---------|------|--------------------------|-------------|
| | | Theoretical | MIDAS/Civil |
| 1 | 1 | -49.0 | -49.0 |
| 2 | 2 | -22.0 | -22.0 |
| 2 | 2 | -22.0 | -22.0 |
| | 3 | -4.0 | -4.0 |

References

Lausen, Harold I, “*Structural Analysis*”, McGraw Hill Book Co. Inc., New York, 1969.
pp. 323 ~ 325.