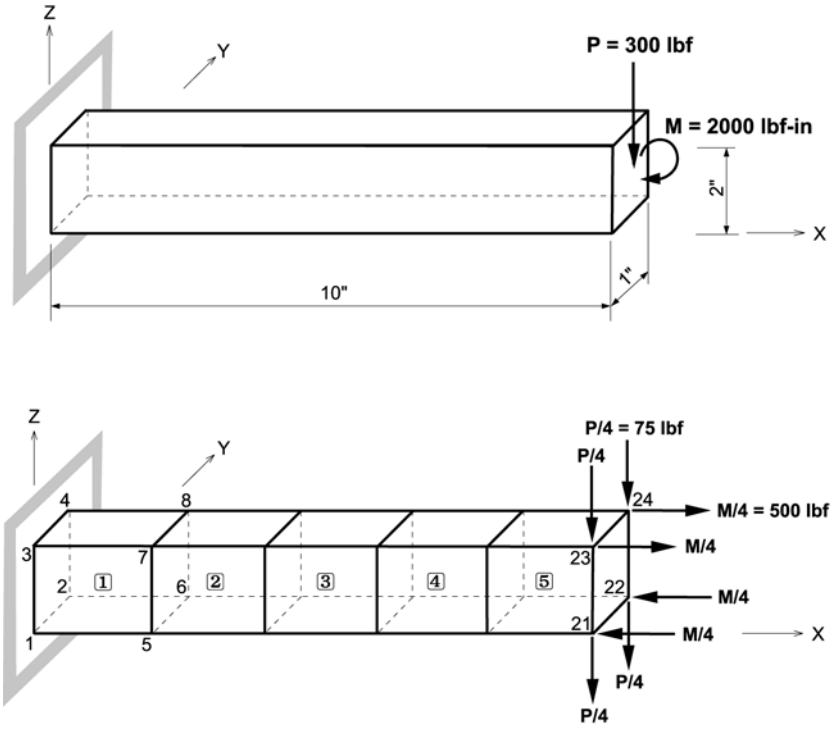
Static-30

Title

Solid cantilever beam subjected to shear force and bending moment

Description

A straight cantilever beam is individually subjected to a shear force and a bending moment at the free end.
Determine the displacement at the free end in the Z direction.



Structural geometry and analysis model

MODEL

Analysis Type

3-D static analysis

Unit System

in, lbf

Dimension

Length 10 in

Element

Solid element

Material

Modulus of elasticity $E = 3.0 \times 10^6$ psi
Poisson's ratio $\nu = 0.0$

Sectional Property

Rectangular cross-section: b = 1 in, h = 2 in

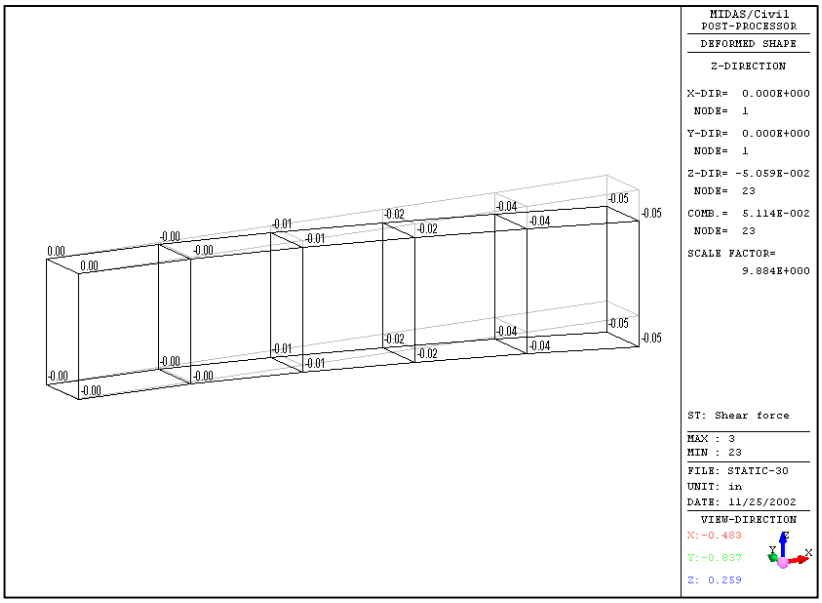
Boundary Condition

Node1~4: Constrain D_X, D_Y and D_Z

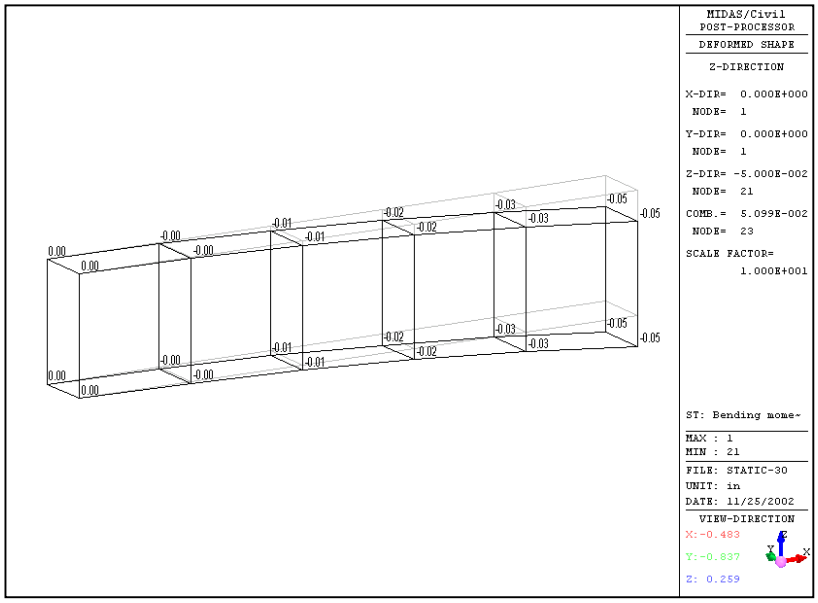
Load Case

Case 1: Shear force, P = 300 lbf at the free end in the - Z direction
Case 2: Bending moment, M = 2000 lbf-in at the free end about the Y axis

Results



Displacements at the free end in the Z direction (Case 1)



Displacements at the free end in the Z direction (Case 2)

Comparison of Results

Unit: in

Results	Load case	Theoretical	MIDAS/Civil
Displacement (δ_Z)	Case1	-0.05	-0.05
	Case2	-0.05	-0.05

Reference

Roark, R. J., and Young, W. C. (1975). "*Formulas for Stress and Strain*", 5th ed., McGraw-Hill, New York, NY.