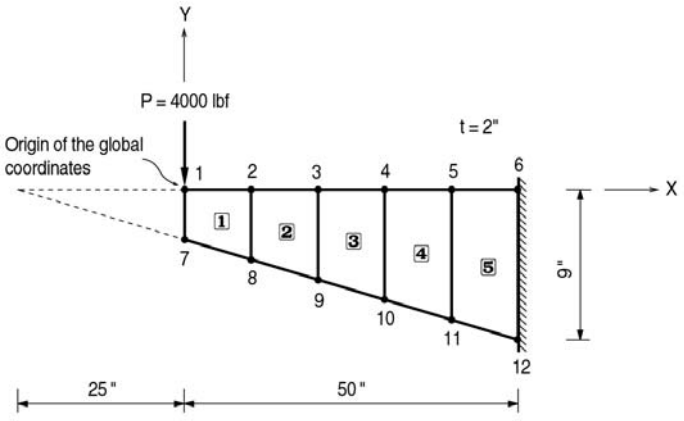
Static-14

Title

Tapered cantilever beam subjected to a vertical load at the free end

Description

Calculate the deflections of a tapered cantilever beam subjected to a concentrated load at the free end.



Structural geometry and analysis model

Model

Analysis Type

2-D static analysis (X-Y plane)

Unit System

in, lbf

Dimension

Length 50 in Depth 3 ~ 9 in Thickness 2 in

Element

Plate element (Thick type)

Material

Modulus of elasticity $E = 30 \times 10^6$ psi

Poisson's ratio $\nu = 0.3$

Element Property

Thickness $t = 2$ in

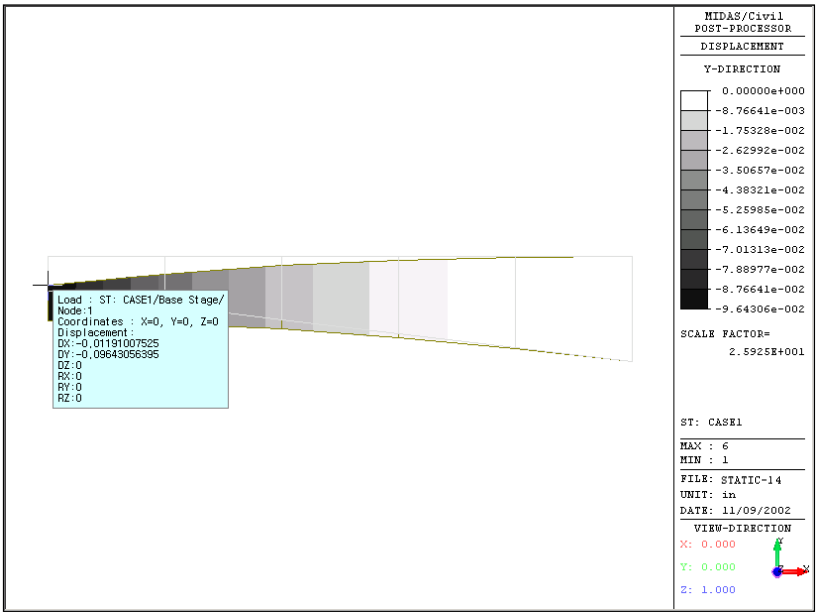
Boundary Condition

Nodes 6 and 12 ; Constrain Dx and Dy.

Load Case

A concentrated load, 4000 lbf is applied to the node 1 in the -Y direction.

Results



Y-displacements of the structure (Node 1)

Comparison of Results

Unit : in

Node	Y-displacement			
	Theoretical	ANSYS	NISA II	MIDAS/Civil
1	-0.0971	-0.0968	-0.0956	-0.0964

References

"*ANSYS, Engineering Analysis System Verification Manual*", Revision 4.4, SWANSON Analysis Systems, Inc., 1990. VM 5.

"*NISA II, Verification Manual*", Version 91.0, Engineering Mechanics Research Corporation, 1991