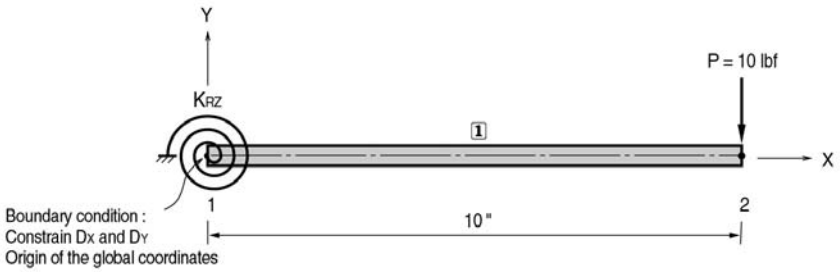
Static-8

Title

Cantilever beam with a rotational spring at the support

Description

Determine the displacements of a cantilever subjected to a concentrated load at the free end.



Rotational spring constant K_{RZ} = 10000 lbf-in/rad

Structural geometry and analysis model

Model

Analysis Type

2-D static analysis (X-Y plane)

Unit System

in, lbf

Dimension

Length 10 in

Element

Beam Element

Material

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

Section Property

Moment of inertia $I_{yy} = 1000$ in^4

Boundary Condition

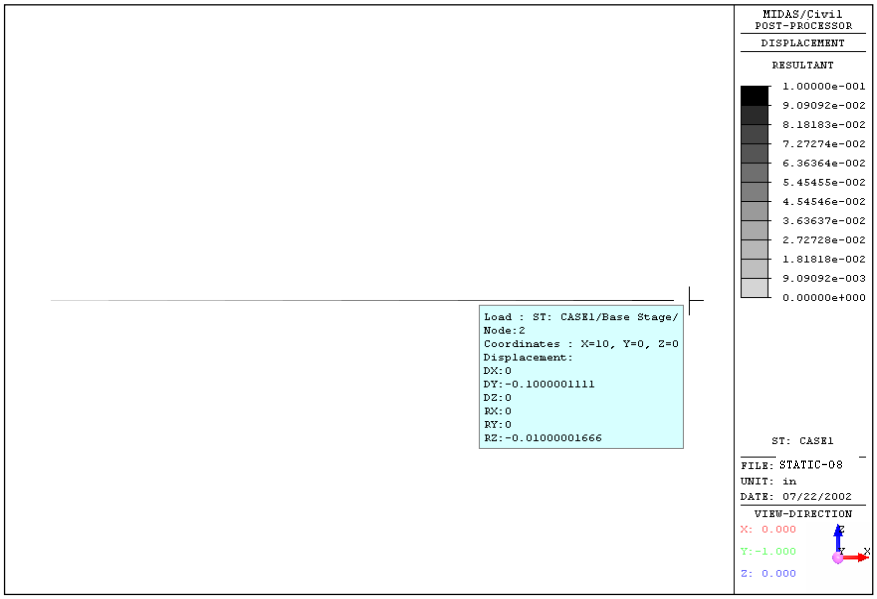
Node 1 ; Constrain Dx and Dy

Rotational spring constant about Z-axis, $K_{\theta Z} = 10000$ lbf-in/rad

Load Case

A concentrated load, 10 lbf is applied to the node 2 in the -Y direction.

Results



Displacements of the structure (node 2)

Comparison of Results

Unit : in, rad

Displacement(Node 2)	Theoretical	ANSYS	MIDAS/Civil
δ_X	0.00	0.00	0.00
δ_Y	-0.10	-0.10	-0.10
θ_Z	-0.01	-0.01	-0.01

Reference

"*ANSYS, Engineering Analysis System Verification Manual*", Revision 4.4, SWANSON Analysis Systems, Inc., 1990, VM41.