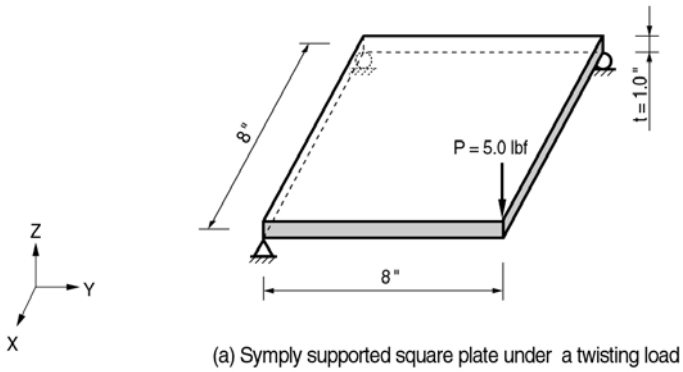
Static-21

Title

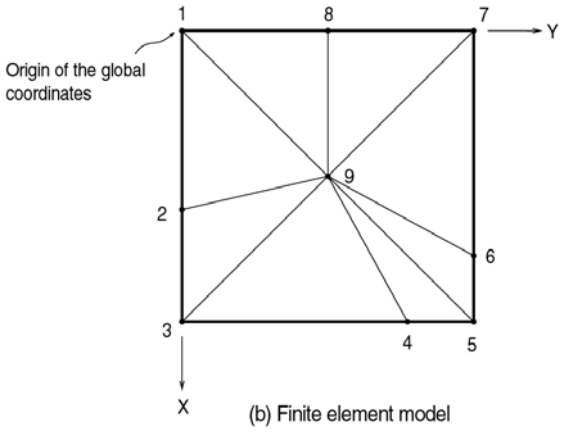
Twisting effect of a simply supported square plate

Description

Compute the displacements of a square plate simply supported at three corners subjected to an eccentric point load at the fourth corner.



(a) Symply supported square plate under a twisting load



(b) Finite element model

Structural geometry and analysis model

MODEL

Analysis Type

3-D static analysis

Unit System

in, lbf

Dimension

Length 8.0 in Width 8.0 in

Element

Plate element (Thin type)

Material

Modulus of elasticity $E = 1.0 \times 10^4$ psi

Poisson's ratio $\nu = 0.3$

Element Property

Triangular height 8.0/2 in.

Thickness t = 1.0 in

Boundary Condition

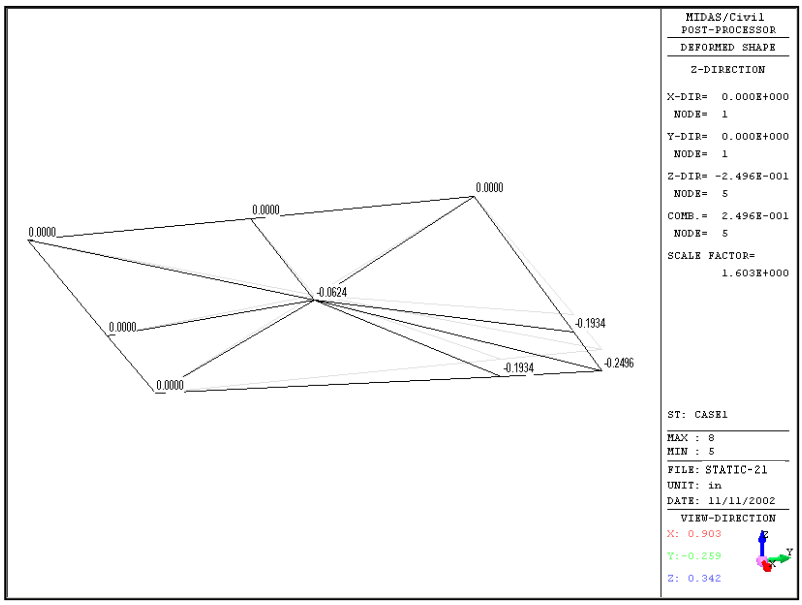
Nodes 1 and 7 ; Constrain Dz. (Roller supports)

Node 3 ; Constrain Dx, Dy, Dz and Rz.

Load Case

A concentrated load, 5.0 lbf is applied to the node 5 in the -Z direction.

Results



Deformed shape of the structure

Comparison of Results

Unit : in

Node	Z-displacement(δ_Z)			
	Theoretical	ADINA	NISA II	MIDAS/Civil
5	0.2496	0.2496	0.2496	0.2496
9	0.0624	0.0624	0.0624	0.0624

References

Batoz, J. L., Bathe, K. J. and Ho, L. W., "*A Study of Three-Node Triangular Plate Bending Elements*", Int. J. Num. Meth. in Eng., Vol. 15, pp. 1771-1812, 1980.

"*ADINA, Verification Manual - Linear Problems*", Version 6.1, ADINA R&D, Inc, 1992, Example A. 28.

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