

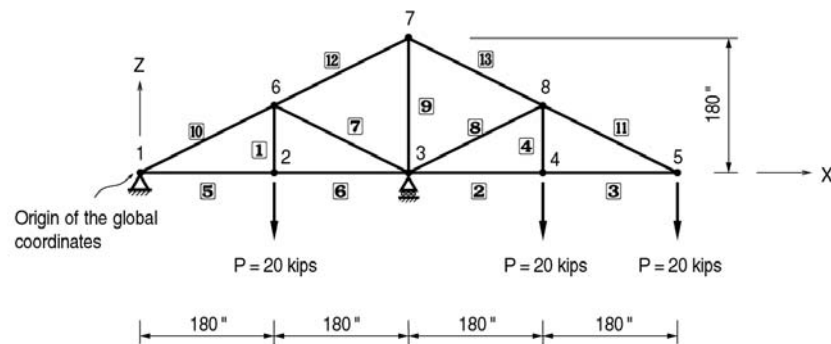
Static-11

Title

2-D plane truss

Description

Determine the vertical displacements of a plane truss structure subjected to concentrated loads.



Structural geometry and analysis model

Model

Analysis Type

2-D static analysis (X-Z plane)

Unit System

in, kip

Dimension

Length 720 in Height 180 in

Element

Truss Element

Material

Modulus of elasticity $E = 30 \times 10^3$ ksi

Section Property

Area $A = 1.0 \text{ in}^2$ (Elements **1** ~ **4**)
 $= 2.0 \text{ in}^2$ (Elements **5** and **6**)
 $= 1.5 \text{ in}^2$ (Elements **7** and **8**)
 $= 3.0 \text{ in}^2$ (Elements **9** ~ **11**)
 $= 4.0 \text{ in}^2$ (Elements **12** and **13**)

Boundary Condition

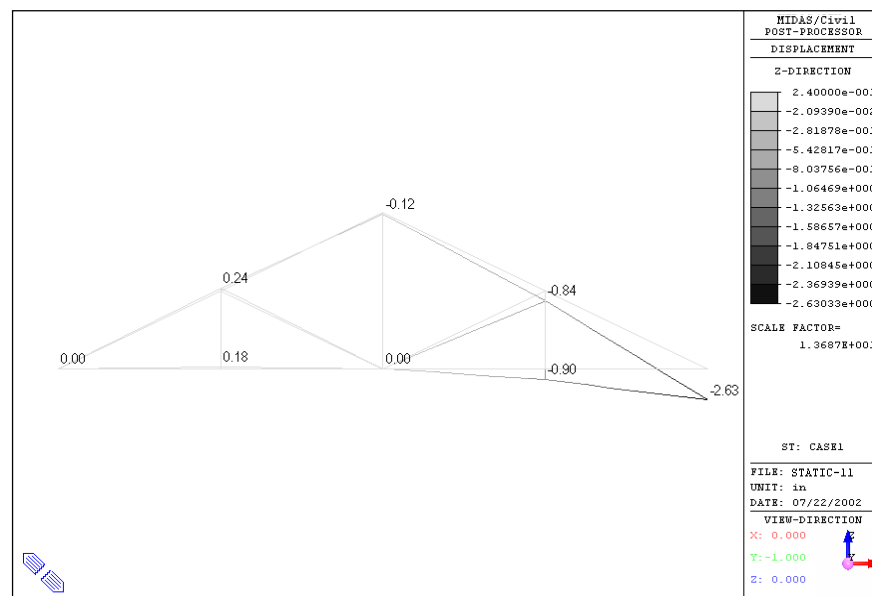
Node 1 ; Constrain Dx and Dz. (Hinge support)

Node 3 ; Constrain Dz (Roller support)

Load Case

A concentrated load, 20 kips each is applied to the nodes 2, 4 and 5 in the -Z direction.

Results



Displacements of the structure

Comparison of Results

Unit : in

Node 5	Theoretical	STAAD-III	MIDAS/Civil
Maximum vertical deflection (δ_z)	-2.63	-2.63	-2.63

References

Jack C. McComack, "Structural Analysis", p. 271, Example 18-2.

"STAAD-III/ISDS, Getting Started and Example Manual", Research Engineers, Inc., 1994, Verification Problem No. 7.