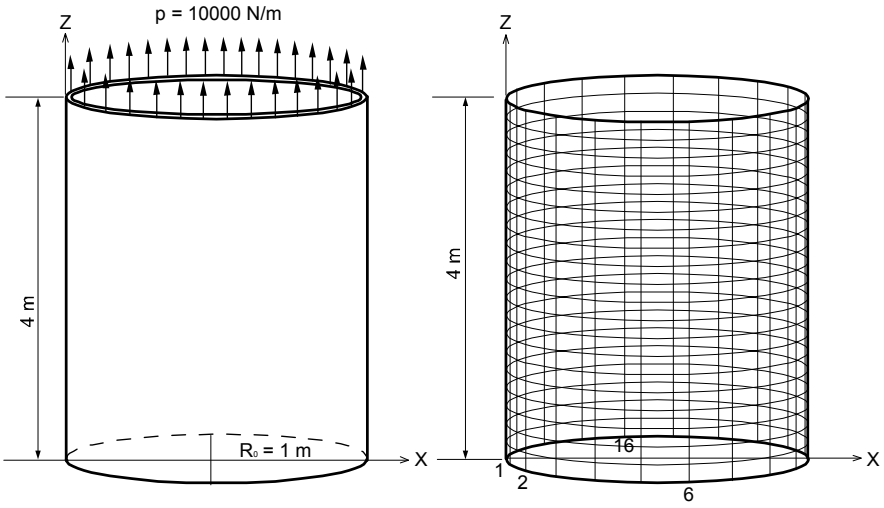
Static-40

Title

A thin cylinder subjected to a uniform axial loading

Description

Determine the displacements and the stresses.



Structural geometry and analysis model

MODEL

Analysis Type

3-D static analysis

Unit System

m, N

Dimension

Radius 1 m Height 4 m

Element

Plate element

Material

Modulus of elasticity $E = 2.1\times10^{11}$ Pa
Poisson's ratio $\nu = 0.3$

Sectional Property

Thickness 0.02 m

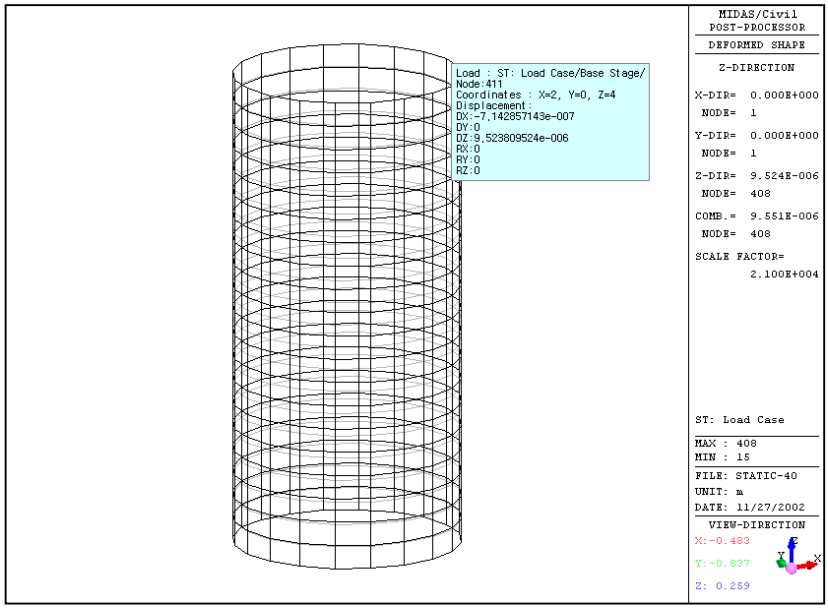
Boundary Condition

Node 1, 11: Constrain D_Y and D_Z
Node 2~5, 7~10, 12~15, 17~20: Constrain D_Z
Node 6, 16: Constrain D_X and D_Z

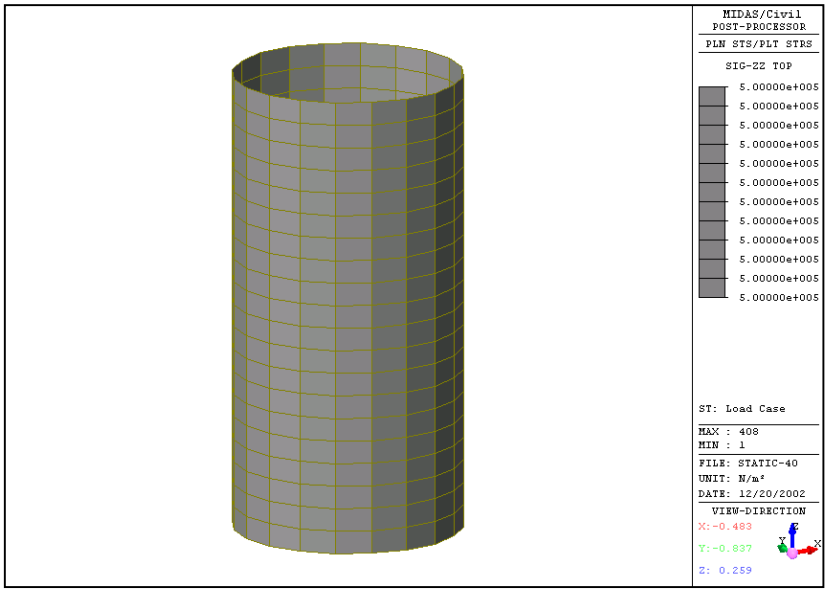
Load Case

An axial pressure load, p = 10000 N/m is applied to the top of the cylinder.

Results



X-displacement (δ_X) and Z-displacement (δ_Z)



Stresses (σ_Z)

Comparison of Results

Unit: m, N/m^2

Results	Theoretical	MIDAS/Civil
Displacement (δ_X)	9.52×10^{-6}	9.52×10^{-6}
Displacement (δ_Z)	-7.14×10^{-7}	-7.14×10^{-7}
Stress (σ_Z)	5.00×10^{5}	5.00×10^{5}

Reference

R.J. Roark et, W.C. Young, "*Formulas for stress and strain*", 5th edition, New York McGraw-Hill, 1975