

Atir Software Development LTD

STRAP - Pipe (elements)

Verification

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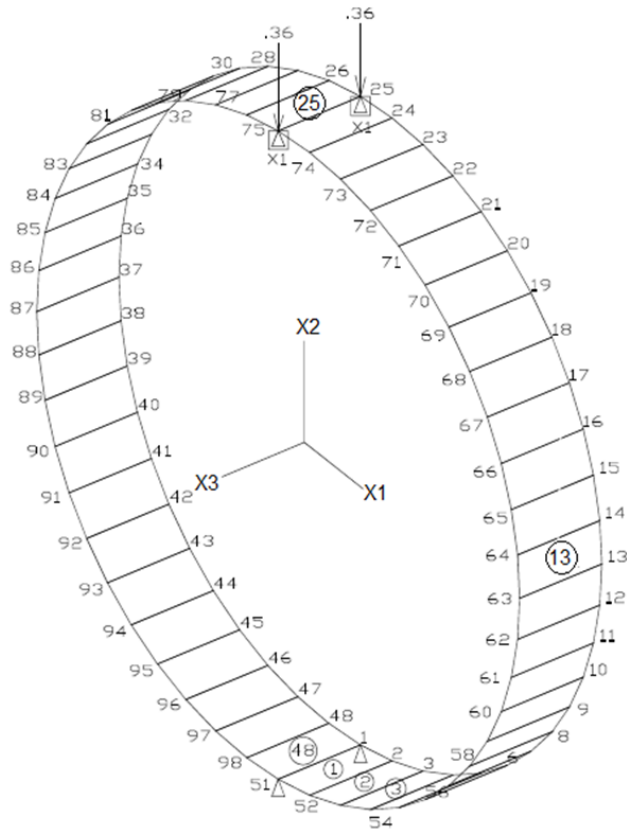
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1. Description

A round concrete pipe simply supported along its bottom edge only, is subjected to a vertical knife edge load along the top edge line.



2. Geometry

Inner diameter: 0.6[m]; Outer diameter: 0.8[m]; Thickness: 0.2[m]

Modulus of Elasticity: 3,000,000[t/m²]; Poisson ratio: 0.3

Elements: 48 rectangular elements

Supports: Pinned

3. Loads

Concentrated load: -3.6 at nodes 25 and 75.

4. Reference

Raymond J Roark, *Roark's Formulas for Stress and Strain, Fourth Edition. (Table VIII- Case 1)*, 1965 4th edition, McGraw – Hill book company.

5. Calculations

$$+M_{max} = 0.3183 WR \text{ (at } x=0\text{)}$$

$$-M_{max} = 0.1817 WR \text{ (at } x= \pi/2\text{)}$$

$$Dy = -0.149ky \text{ (WR}^3/EI\text{); where } ky = 1.03833 \text{ for } Ro/Ri = 1.3333$$

6. Comparison of Results

Element	Node	Result type	Result		Deviation
			Theoretical	STRAP	
-	25	Deflection - y	0.000191	0.000190	0.52%
25	25	+M _{max}	0.08021	0.08130	1.34%
13	13	-M _{max}	-0.04579	-0.04598	0.41%