

Atir Software Development LTD

STRAP - Plane frame

Verification

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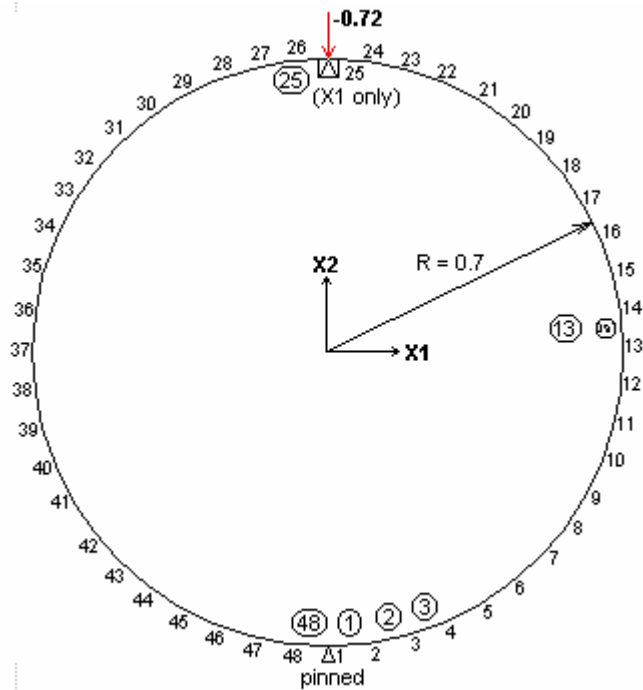
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1. Description

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].

E (elastic modulus) = 3,000,000 [t/m²]

48 beam elements; Supports: pinned

3. Loads

Point load: FX2 = -0.72 at node 25.

4. Reference

Raymond J Roark, *Roark's Formulas for Stress and Strain, Fourth Edition. (Table VIII - Case 1, page 172)*, 1965 4th edition, McGraw – Hill book company.

5. Calculation

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

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

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

6. Comparison of Results

Node/beam	Result type	Result		Deviation
		Theoretical	STRAP	
Node 25	Deflection - X2	0.000191	0.000190	0.52%
Beam 25	+M _{max}	0.08021	0.08010	0.12%
Beam 13	-M _{max}	-0.04579	-0.04590	0.24%