Atir Software Development LTD

STRAP - Plane frame

Verification

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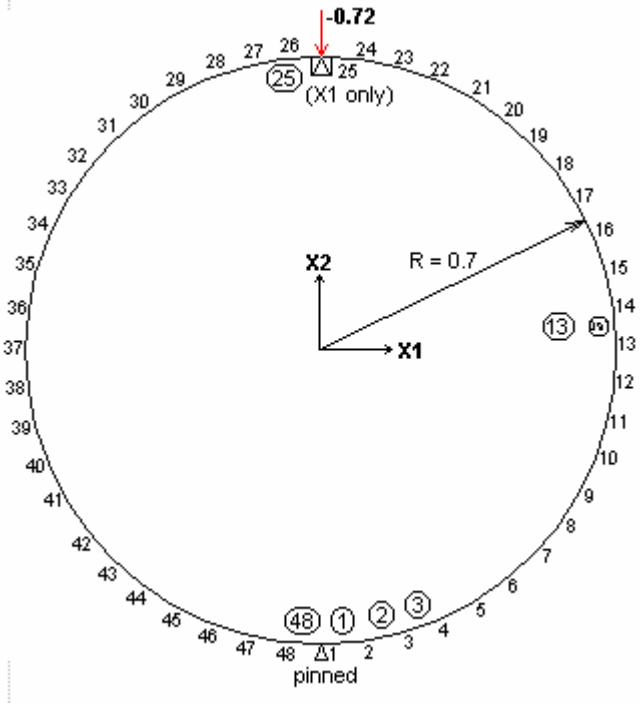
1. Description

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/m^2]

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 at x = 0

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

Dy = -0.149ky (WR3/EI), where ky = 1.03833 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%