

SSLV301 - Cylindrical beam comforts under load linearly distributed

Summary:

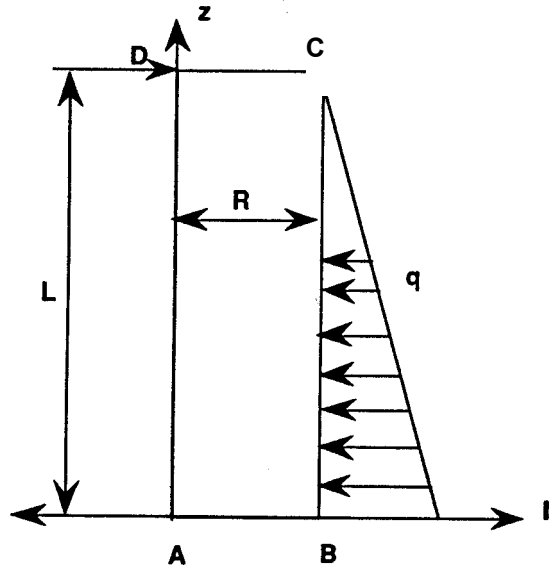
The goal of the test is to validate a load linearly distributed, starting from an analysis 2D with decomposition in Fourier series of the load.

2 calculations here are carried out:

- 1) a calculation with the first 2 modes (0 and 1),
- 2) a calculation with the first 10 modes.

1 Problem of reference

1.1 Geometry



Length : $L=0.240\text{ m}$
Ray : $R=0.006\text{ m}$

1.2 Material properties

$E=2.1 \times 10^{11}\text{ N/m}^2$
 $\nu=0.3$

1.3 Boundary conditions and loadings

- Edge AB embedded
- Load varying linearly according to z on the generator BC , being worth:

$$q=0 \text{ in } C \text{ and } q=-3000\text{ N/m in } B$$

1.4 Initial conditions

Without object for the static analysis.

2 Reference solution

2.1 Method of calculating used for the reference solution

The reference solution is obtained analytically [bib1].

2.2 Results of reference

- 1) Radial displacement of the point C : $u_{rc} = -1.552 \times 10^{-3} m$
- 2) Constraints of embedding at the point B : $\sigma_{zz}(B) = 169.8 \times 10^6 Pa$

2.3 Uncertainty on the solution

Analytical solution.

2.4 Bibliographical reference

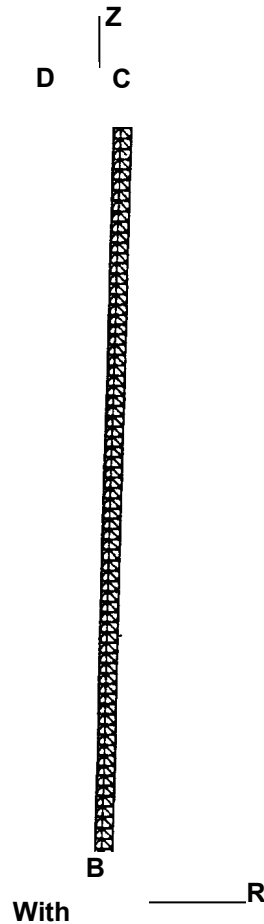
- 1) S. TIMOSHENKO: Resistance of materials, 1st part. Polytechnic bookstore CH. Béranger, Paris, 1947

3 Modeling A

3.1 Characteristics of modeling

AXIS_FOURIER, T6 nets

Cutting: 80 elements according to the length
2 elements in the thickness



3.2 Characteristics of the grid

Many nodes: 805
Many meshes and types: 320 TRIA6

3.3 Values tested

Values provided for $\theta=0$.

Localization	Type of value	Reference	Aster	% difference
Calculation 1 (2 modes)				
Not C	$u_r(m)$	-1.552×10^{-3}	-1.54839×10^{-3}	- 0,232
Not B	$\sigma_{zz}(Pa)$	169.8×10^6	168.73×10^6	- 0.63

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Calculation modes)	2	(10			
Not C		$u_r(m)$	-1.552×10^{-3}	-1.54839×10^{-3}	- 0,232
Not B		$\sigma_{zz}(Pa)$	169.8×10^6	168.59×10^6	- 0.71

3.4 Notice

The values of the arrow of the beam and the constraint of embedding are obtained with precision with the first two modes only.

4 Summary of the results

The results resulting from calculation are in concord with the analytical solution.