
SDLS501 - Free vibrations of a corrugated iron

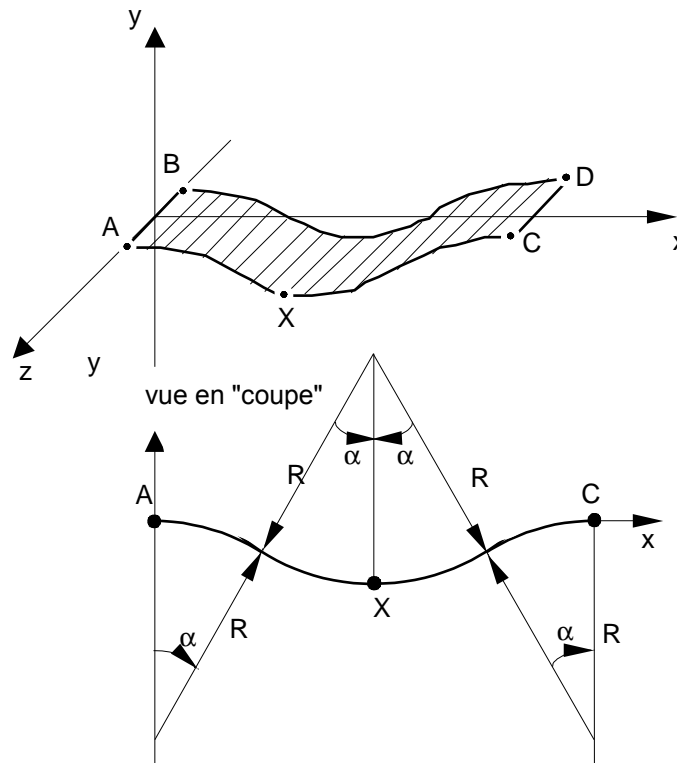
Summarized:

This test represents a computation in dynamic modal analysis of a corrugated iron into free-free. This test makes it possible to validate the modelization finite elements `COQUE_D_PLAN`. There exists a test of same structure in static not - linear material (SSNV115) [V6.04.115].

The frequencies and the modes obtained are compared with a reference solution obtained with *Code_Aster* from a modelization `D_PLAN`.

1 Problem of reference

1.1 Geometry



Characteristics of the shell:

thickness $h=0.05\text{m}$,
radius of curvature $R=1.\text{m}$
width = $AB = CD = 0.1\text{m}$,
the angle α selected so that the surface **upper** of the shell than the point X is with ($y=0$), i.e. is aligned with A and C .

$$\cos \alpha = 1 - \frac{1}{4} \frac{h}{R}$$

1.2 Properties of the material

the properties of the material constituting the plate are:

$E=2.E+11\text{ Pa}$ Modulus Young
 $\nu=0.3$ Poisson's ratio
 $\rho=7800.\text{Kg/m}^3$ Density

1.3 Boundary conditions and loadings

No boundary condition: dynamic analysis into free-free

1.4 Initial conditions

Without Reference solution

2 object

2.1 Méthode de calcul used for the reference solution

The modelization A (D_PLAN) is used as reference for modelization COQUE_D_PLAN.

2.2 Results of reference

the first Three non-zero eigenfrequencies.

Frequency mode 4: 658.24 Hz
Frequency mode 5: 1749.35 Hz
Frequency mode 6: 3225.42 Hz

2.3 Uncertainties on the non regression

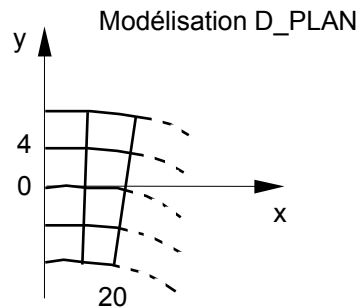
solution for the modelization A
< 2% for the modelization B

2.4 bibliographical References

None.

3 Modelization A

3.1 Characteristic of the modelization



3.2 Characteristics of the mesh

Many nodes: 289

Number of meshes and types: 80 QUAD8

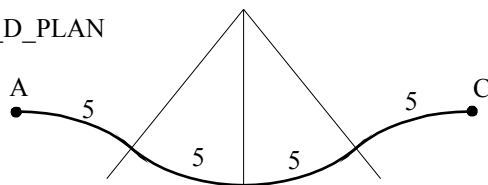
3.3 Quantities tested and results

Identification	Times	Reference	Aster	% difference
Frequency mode 4		658.24	658.24	0.
Frequency mode 5		1749.35	1749.35	0.
Frequency mode 6		3225.42	3225.42	0.

4 Modelization B

4.1 Characteristic of the modelization

Modélisation COQUE_D_PLAN



4.2 Characteristics of the mesh

Many nodes: 41

Number of meshes and types: 20 SEG3

4.3 Quantities tested and results

Identification	Times	Reference	Aster	% difference
Frequency mode 4		658.24	660.51	0.345
Frequency mode 5		1749.35	1759.09	0.557
Frequency mode 6		3225.42	3222.28	- 0.097

5 Summary of the results

This benchmark made it possible to test modelization `COQUE_D_PLAN`. The compared got results has a solution resulting from a modelization `D_PLAN` are very good, the maximum change observed is of 0.5% .