
AHLV100 - Guide wave at anechoic exit

Abstract:

A guide of wave rectilinear at anechoic exit, with rigid walls, whose propagation medium is "normal" air, is excited by a harmonically vibrating piston.

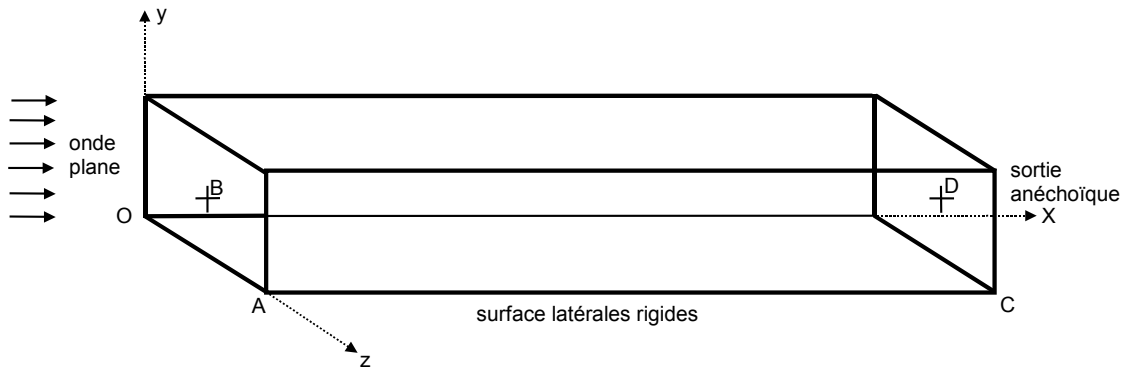
One calculates by an acoustic formulation the acoustic field of pressure of the harmonic response for 13 different modelizations. The results are tested in 2 points at the entry and 2 points at the exit.

They make it possible to validate the stiffness matrixes, of mass, damping (impedance), the vector source (imposed normal velocity) as well as the operators of postprocessings.

The results of reference come from an analytical computation.

1 Problem of reference

1.1 Geometry



Tubes with rectangular section:

length: $L = l_x = 1.0 \text{ m}$

height: $h = l_y = 0.1 \text{ m}$

width: $l = l_z = 0.2 \text{ m}$

Coordinates of the points (in m):

	A	B	C	D
x	0.	0.	1.00	1.00
y	0.	0.05	0.	0.05
z	0.20	0.10	0.20	0.10

1.2 Properties of the materials

Air:

$$\rho_c = 1.3 \text{ kg} \cdot \text{m}^{-3}$$

$$c_0 = 343. \text{ m} \cdot \text{s}^{-1}$$

1.3 Boundary conditions and loading

normal Velocity at the entry $V = V_n \times \exp(i\omega t)$ with $V_n = 0.014 \text{ m} \cdot \text{s}^{-1}$
 $f = 500 \text{ Hz}$

Impedance at the Reference solution $Z = \rho_0 \cdot c_0 = 445.9 \text{ kg} \cdot \text{m}^{-2} \cdot \text{s}^{-1}$
 CD

2 end

2.1 Method of calculating used for the reference solution

the general analytical solution for a guide of wave is written:

$(\mathbf{e}_x, \mathbf{e}_y, \mathbf{e}_z)$ being the orthonormal reference associated with the Cartesian coordinates (x, y, z)

- for the pressure:

$$p(x, y, z) = A \exp(ikx) + B \exp(-ikx)$$

- for the vibratory velocity:

$$\mathbf{V}(x, y, z) = -\frac{1}{\rho_0 \cdot c_0} [A \exp(ikx) - B \exp(-ikx)] \mathbf{e}_x$$

- A and B are determined by the boundary conditions:

$$\text{en } x = 0 \quad V_n = V_{n0}$$

$$\text{en } x = L \quad p(L, y, z) = Z \cdot \mathbf{V}(L, y, z) \cdot \mathbf{n}_L$$

$$A = B \left(\frac{Z - \rho_0 \cdot c_0}{Z + \rho_0 \cdot c_0} \right) \exp(-2ikL) \quad \text{et} \quad B = \frac{\rho_0 \cdot c_0 \cdot V_n}{\left(\frac{Z - \rho_0 \cdot c_0}{Z + \rho_0 \cdot c_0} \right) \exp(-2ikL) - 1} \quad \text{avec } k = \frac{\omega}{c_0}$$

In the studied case, the output of the guide is anechoic: $Z = \rho_0 c_0$. One thus has:

- for the pressure:

$$p(x, y, z) = \rho_0 c_0 V_n \exp(-ikx)$$

- for the velocity:

$$\mathbf{V}(x, y, z) = -V_n \exp(-ikx) \cdot \mathbf{e}_x$$

- and for the acoustic intensity:

$$\mathbf{I} = \frac{1}{2} p \mathbf{V}^* = \frac{1}{2} \rho_0 c_0 V_n^2 \cdot \mathbf{e}_x$$

I.e. acoustic Intensity activates uniform in all the guide and parallel with the axis.

The eigenfrequencies are given for the guide closed at the two ends by:

$$f_{m,n,p} = \frac{c_0}{2} \left(\frac{m^2}{1_x^2} + \frac{n^2}{1_y^2} + \frac{p^2}{1_z^2} \right)^{1/2} \quad \text{where } m, n, p \text{ are positive integers.}$$

2.2 Results of reference

Pressure to the points A, B, C, D (for the modelizations A, B, C, D, E).

Acoustic intensity at the points A, B, C, D (for the modelizations A and C).

Eigenfrequencies n^2 with n^9 .

2.3 Uncertainty on the analytical

solution Solution

2.4 bibliographical References

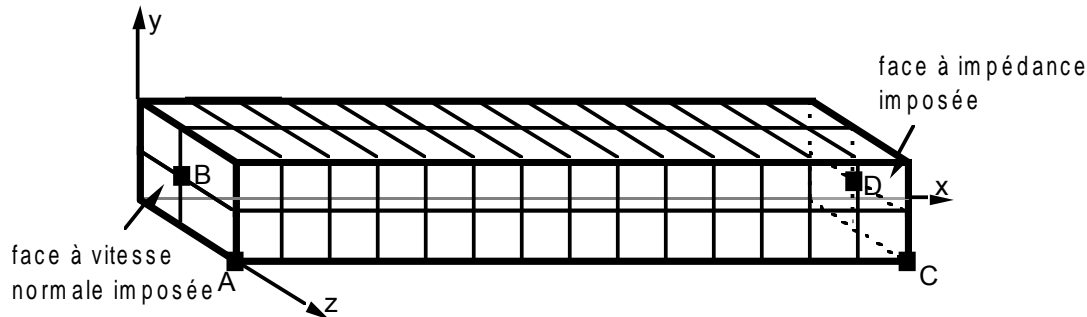
- 1) BOUIZI A. Résolution of the equations of the linear acoustics by a method of mixed finite elements - Thesis (1989).

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3 Modelization A

3.1 Characteristic of the modelization

"ACOUSTIC" Formulation pressure elements 3D (ACOU_HEXA20 and ACOU_FACE8)



Cutting = 15 meshes HEXA20 according to the axis of x
 the 2 meshes HEXA20 according to the axis of y
 the 2 meshes HEXA20 according to the axis of z

the limiting
 Conditions:

VITE_FACE: (Group_ma: Vnor entry: IH 0.014 0.)
 IMPE_FACE: (Group_ma: Impe output: IH 445.9 0.)

Name of the nodes $A=No1$ $B=No780$ $C=No751$ $D=No763$

3.2 Characteristic of the mesh

Many nodes: 471
 Number of meshes and types: 60 HEXA20 8 QUAD8

4 Results of the modelization A

4.1 Values tested

Localization	Quantities	Reference	tolerance
A	$p(\text{réel})$	-6.2426	0.1%
	$p(\text{imag})$	0.0000	0.1%
	$p(\text{dB})$	109.9	0.1%
	Acoustic Intensity (reality)	0.0437	3%
	Acoustic Intensity (imag)		0.3.5E-4
B	$p(\text{réel})$	-6.2426	0.1%
	$p(\text{imag})$	0.0000	0.1%
	$p(\text{dB})$	109.9	0.1%
	Acoustic Intensity (reality)	0.0437	3%
	Acoustic Intensity (imag)		0.3.5E-4
C	$p(\text{réel})$	6.0237	0.1%
	$p(\text{imag})$	1.6387	0.1%
	$p(\text{dB})$	109.9	0.1%
	Acoustic Intensity (reality)	0.04037	3%
	Acoustic Intensity (imag)		0.3.5E-4
D	$p(\text{réel})$	6.0237	0.1%

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$p(imag)$	1.6387	0.1%
$p(dB)$	109.9	0.1%
Acoustic Intensity (reality)	0.0437	3%
Acoustic Intensity (imag)		0.3.5E-4

Order of the eigen mode				Frequency	tolerance
	m	n	p	Reference	
i					
2	1	0	0	171.5	0.01%
3	2	0	0	343.0	0.01%
4	3	0	0	514.5	0.1%
5	4	0	0	686.0	1%
6	5	0	0	857.5	0.1%
7	0	0	1	857.5	0.5%
8	1	0	1	874.482	0.5%
9	2	0	1	923.556	0.5%

4.2 Remark

One tests the results in two different ways:

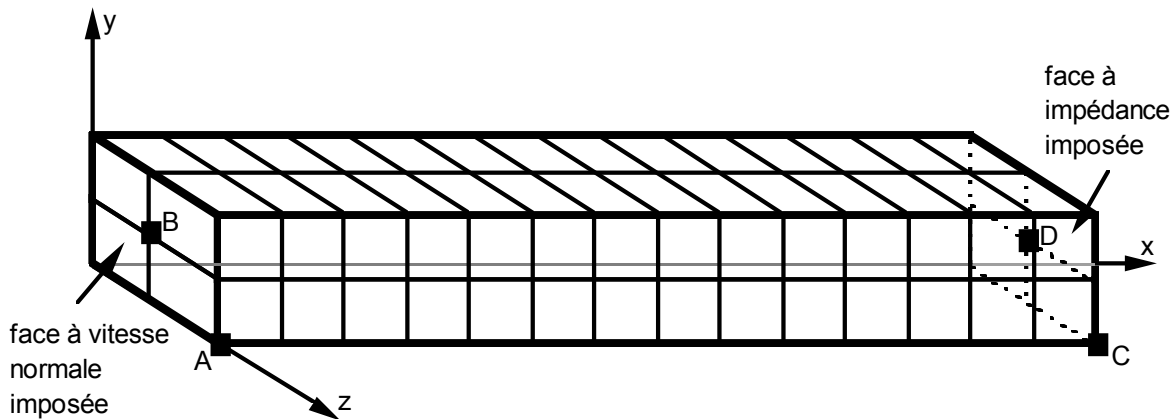
- by usual procedure by means of `DYNA_LINE_HARM` ;
- by a computation broken up into commands of linear algebra `COMB_MATR_ASSE`, `CREA_CHAMP`, `TO_FACTORIZE`, `SOLVE`.

The tests are thus duplicated and it is checked that the results are coherent.

5 Modelization B

5.1 Characteristic of the modelization

Formulation pressure potential of displacements elements "3D_FLUIDE" (MEFL_HEX20 and MEFL_FACE8)



Cutting = 15 meshes HEXA20 according to the axis of x
 the 2 meshes HEXA20 according to the axis of y
 the 2 meshes HEXA20 according to the axis of z

the limiting
 Conditions:

VITE_FACE: (GROUP_MA: Entry VNOR: 0.014)
 IMPE_FACE: (GROUP_MA: Output IMPE: 445.9)

Name of the nodes $A = No1$ $B = No780$ $C = No751$ $D = No763$

5.2 Characteristic of the mesh

Many nodes: 471
 Number of meshes and types: 60 HEXA20 8 QUAD8

6 Results of the modelization B

6.1 Values tested

Localization	Reference	Reference	tolerance
A	$p(\text{réel})$	- 6.2426	0.1%
	$p(\text{imag})$	0.0	0.1%
	$p(\text{dB})$	109.8867	0.1%
B	$ p $	6.2426	0.1%
	$p(\text{angle})$	180.0°	0.1%
	$p(\text{dB})$	109.8867	0.1%

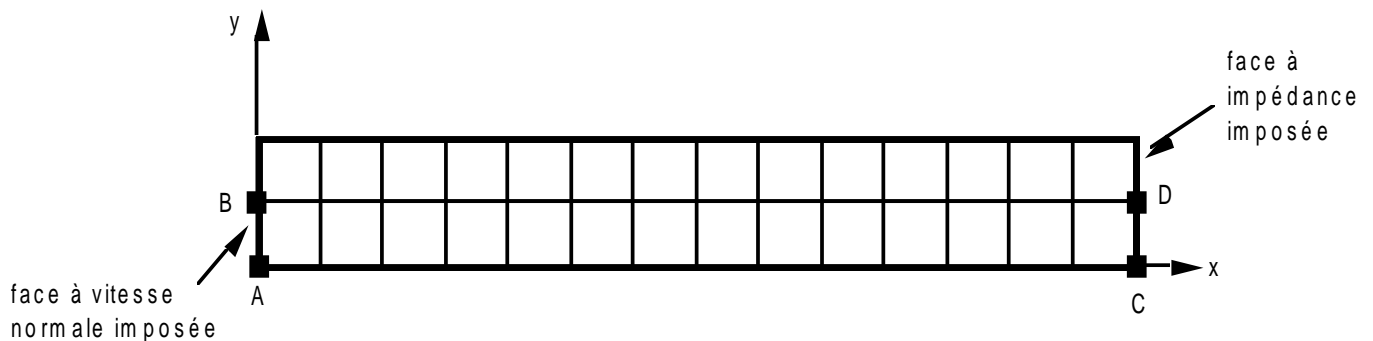
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C	$ p $	6.2426	0.1%
	$p(\text{angle})$	15.2186°	0.1%
	$p(\text{dB})$		0.1%
D	$ p $	6.2426	0.1%
	$p(\text{angle})$	15.2186°	0.1%
	$p(\text{dB})$	109.8867	0.1%

7 Modelization D

7.1 Characteristic of the modelization

Formulation pressure potential of displacements elements "2D_FLUIDE" (MEFLSE3 and MEFLQU8)



Cutting = 15 meshes QUAD8 according to the axis of x
 the 2 meshes QUAD8 according to the axis of y

the limiting
 Conditions:

VITE_FACE: (GROUP_MA: Entry VNOR: 0.014)
 IMPE_FACE: (GROUP_MA: Output IMPE: 445.9)

Name of the nodes $A=No1$ $B=No780$ $C=No151$ $D=No153$

7.2 Characteristic of the mesh

Many nodes: 125
 Number of meshes and types: 30 QUAD8 4 SEG3

8 Results of the modelization D

8.1 Values tested

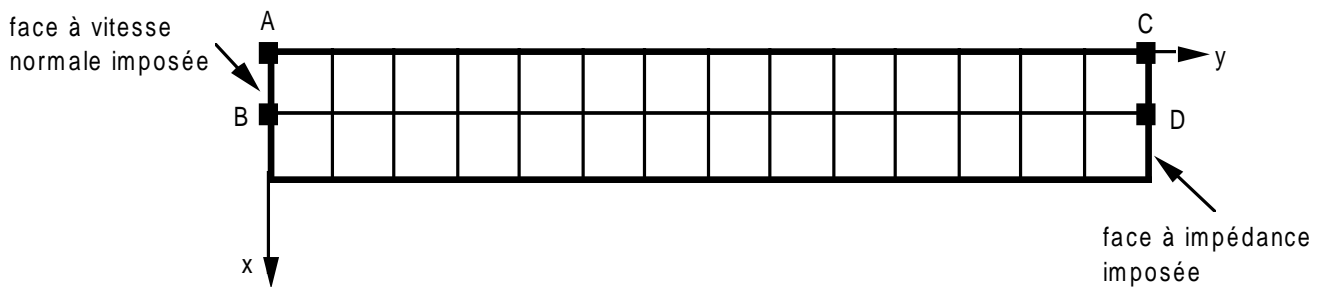
Localization	Quantities	Reference	% difference
A	$p(\text{réel})$	-6.2426	0.1%
	$p(\text{imag})$	0.0	0.1%
	$p(\text{dB})$	109.8867	0.1%

<i>B</i>	<i>p</i> (réel)	- 6.2426	0.1%
	<i>p</i> (imag)	0.0	0.1%
	<i>p</i> (dB)	109.8867	0.1%
<i>C</i>	<i>p</i> (réel)	6.0237	0.1%
	<i>p</i> (imag)	1.6387	0.1%
	<i>p</i> (dB)	109.8867	0.1%
<i>D</i>	<i>p</i> (réel)	6.0237	0.1%
	<i>p</i> (imag)	1.6387	0.1%
	<i>p</i> (dB)	109.8867	0.1%

9 Modelization E

9.1 Characteristic of the modelization

Formulation pressure potential of displacements elements "AXIS_FLUIDE" (MEAXFLS3 and MEAXFLQ8)



Cutting = 15 meshes QUAD8 according to the axis of *x*
 the 2 meshes QUAD8 according to the axis of *y*

the limiting
 Conditions:

VITE_FACE: (GROUP_MA: Entry VNOR: 0.014)
 IMPE_FACE: (GROUP_MA: Output IMPE: 445.9)

Name of the nodes *A*=No1 *B*=No780 *C*=No151 *D*=No153

9.2 Characteristic of the mesh

Many nodes: 125
 Number of meshes and types: 30 QUAD8 4 SEG3

10 Results of the modelization E

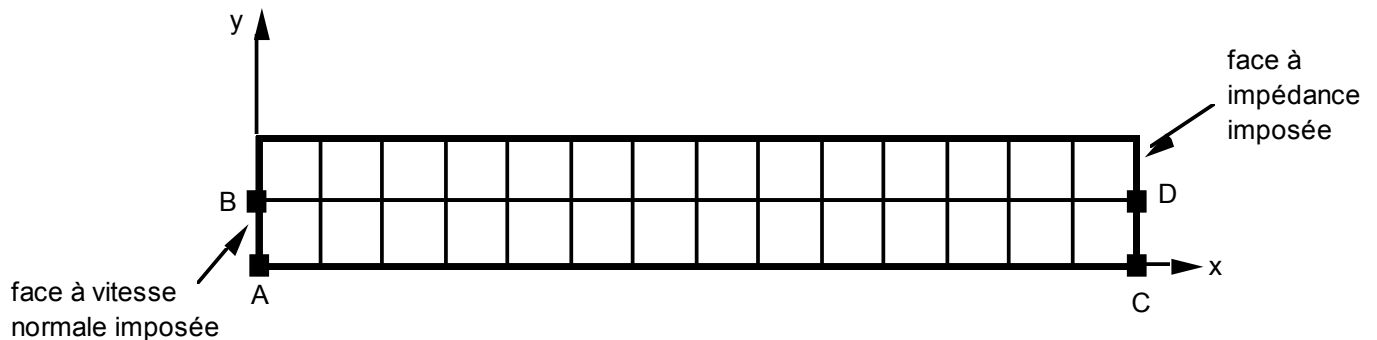
10.1 Values tested

Localization	Quantities	Reference	% difference
A	$p(\text{réel})$	- 6.2426	0.1%
	$p(\text{imag})$	0.0	0.1%
	$p(\text{dB})$	109.8867	0.1%
B	$p(\text{réel})$	- 6.2426	0.1%
	$p(\text{imag})$	0.0	0.1%
	$p(\text{dB})$	109.8867	0.1%
C	$p(\text{réel})$	6.0237	0.1%
	$p(\text{imag})$	1.6387	0.1%
	$p(\text{dB})$	109.8867	0.1%
D	$p(\text{réel})$	6.0237	0.1%
	$p(\text{imag})$	1.6387	0.1%
	$p(\text{dB})$	109.8867	0.1%

11 Modelization F

11.1 Characteristic of the modelization

Formulation pressure elements "ACOUSTIC" PLANE (SEG3 and QUAD8)



Cutting = 15 meshes QUAD8 according to the axis of x
 the 2 meshes QUAD8 according to the axis of y

the limiting
 Conditions:

VITE_FACE: (Group_ma: Vnor entry: 0.014)
 IMPE_FACE: (Group_ma: Impe output: 445.9)

Name of the nodes A = No1 B = No33 C = No2 D = No34

11.2 Characteristic of the mesh

Many nodes: 125
 Number of meshes and types: 30 QUAD8 4 SEG3

12 Results of the modelization F

Warning : The translation process used on this website is a "Machine Translation". It may be imprecise and inaccurate in whole or in part and is provided as a convenience.

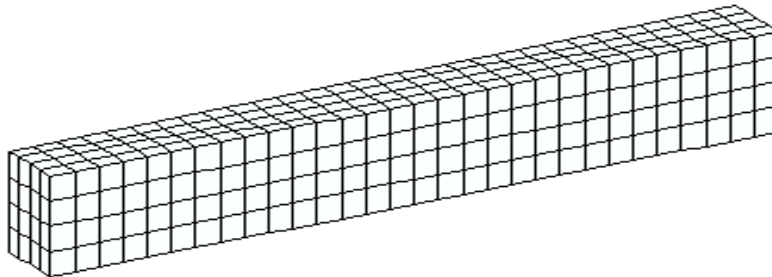
12.1 Values tested

Localization	Quantities	Reference	tolerance
<i>A</i>	$p(\text{réel}, \text{imag})$	(- 6.2426, 0.0)	0.1%
<i>B</i>	$p(\text{réel}, \text{imag})$	(- 6.2426, 0.0)	0.1%
<i>C</i>	$p(\text{réel}, \text{imag})$	(6.0237, 1.6387)	0.1%
<i>D</i>	$p(\text{réel}, \text{imag})$	(6.0237, 1.6387)	0.1%

13 Modelization G

13.1 Characteristic of the modelization

"ACOUSTIC" Formulation pressure elements 3D (ACOU_HEXA8 and ACOU_FACE4)



Cutting = 30 meshes HEXA8 according to the axis of *x*
 the 4 meshes HEXA8 according to the axis of *y*
 the 4 meshes HEXA8 according to the axis of *z*

the limiting
 Conditions:

VITE_FACE: (Group_ma: Vnor bicycle: IH 0.014
 0.)
 IMPE_FACE: (Group_ma: impe Impe: IH 445.9 0.)

Name of the nodes *A* = No69 *B* = No95 *C* = No65 *D* = No876

13.2 Characteristic of the mesh

Many nodes: 775
 Number of meshes and types: 480 HEXA8 32 QUAD4

14 Results of the modelization G

14.1 Values tested

Localization	Quantities	Reference	Intensité_Acou
<i>A</i>	$p(\text{réel}, \text{imag})$	(- 6.2426, 0.0000)	0.3%
	tolerance	0.0437	3%

Warning : The translation process used on this website is a "Machine Translation". It may be imprecise and inaccurate in whole or in part and is provided as a convenience.

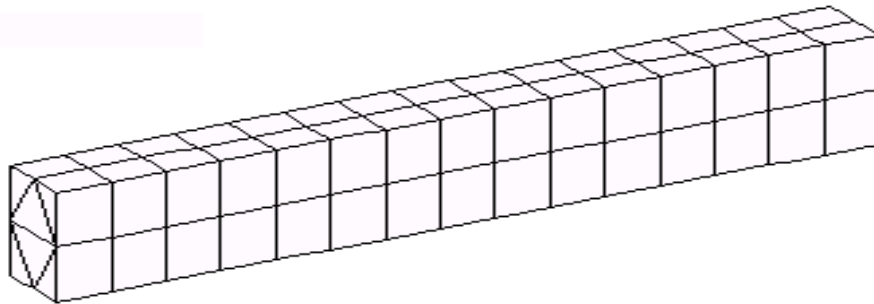
<i>B</i>	$p(\text{réel}, \text{imag})$ Intensité_Acou	(- 6.2426, 0.0000) 0.0437	0.3% 3%
<i>C</i>	$p(\text{réel}, \text{imag})$ Intensité_Acou	(6.0237, 1.6387) 0.0437	4% 3%
<i>D</i>	$p(\text{réel}, \text{imag})$ Intensité_Acou	(6.0237, 1.6387) 0.0437	4% 3%

Order of the eigen mode <i>i</i>	Frequency			Reference	tolerance
	<i>m</i>	<i>n</i>	<i>p</i>		
2	1	0	0	171.5	0.1%
3	2	0	0	343.0	0.2%
4	3	0	0	514.5	0.5%
5	4	0	0	686.0	1%
6	5	0	0	857.5	2%
7	0	0	1	857.5	3%
8	1	0	1	874.482	3%
9	2	0	1	923.556	3%

15 Modelization H

15.1 Characteristic of the modelization

"ACOUSTIC" Formulation pressure elements 3D (ACOU_PENTA15 and ACOU_FACE6)



Cutting = 15 meshes PENTA15 according to the axis of *x*
 the 2 meshes PENTA15 according to the axis of *y*
 the 2 meshes PENTA15 according to the axis of *z*

the limiting
 Conditions:

VITE_FACE: (Group_ma: Vnor bicycle: IH 0.014
 0.)
 IMPE_FACE: (Group_ma: impe Impe: IH 445.9 0.)

Name of the nodes *A*=No28 *B*=No64 *C*=No24 *D*=No720

15.2 Characteristic of the mesh

Many nodes: 456
 Number of meshes and types: 90 PENTA15 12 TRIA6

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16 Results of the modelization H

16.1 Values tested

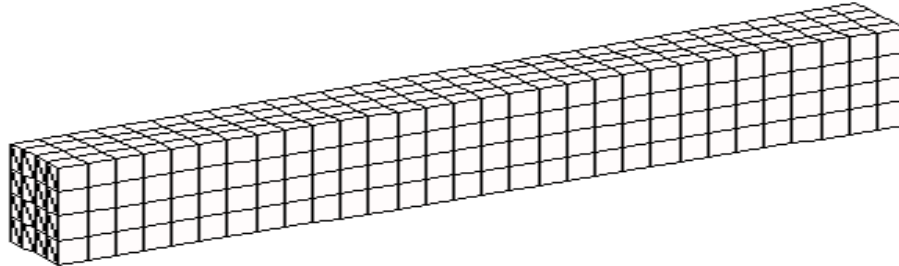
Localization	Quantities	Reference	Intensité_Acou
<i>A</i>	$p(\text{réel}, \text{imag})$	(- 6.2426, 0.0000)	0.1%
	tolerance	0.0437	3%
<i>B</i>	$p(\text{réel}, \text{imag})$	(- 6.2426, 0.0000)	0.1%
	Intensité_Acou	0.0437	3%
<i>C</i>	$p(\text{réel}, \text{imag})$	(6.0237, 1.6387)	0.1%
	Intensité_Acou	0.0437	3%
<i>D</i>	$p(\text{réel}, \text{imag})$	(6.0237, 1.6387)	0.1%
	Intensité_Acou	0.0437	3%

Order of the eigen mode	Frequency			Reference	tolerance
	<i>m</i>	<i>n</i>	<i>p</i>		
<i>i</i>					
2	1	0	0	171.5	0.01%
3	2	0	0	343.0	0.01%
4	3	0	0	514.5	0.1%
5	4	0	0	686.0	0.1%
6	5	0	0	857.5	0.1%
7	0	0	1	857.5	0.5%
8	1	0	1	874.482	0.5%
9	2	0	1	923.556	0.5%

17 Modelization I

17.1 Characteristic of the modelization

“ACOUSTIC” Formulation pressure elements 3D (ACOU_PENTA6 and ACOU_FACE3)



Cutting = 30 meshes PENTA6 according to the axis of x
 the 4 meshes PENTA6 according to the axis of y
 the 4 meshes PENTA6 according to the axis of z

the limiting
 Conditions:

VITE_FACE: (Group_ma: Vnor bicycle: IH 0.014
 0.)
 IMPE_FACE: (Group_ma: impe Impe: IH 445.9 0.)

Name of the nodes $A=No110$ $B=No156$ $C=No106$ $D=No939$

17.2 Characteristic of the mesh

Many nodes: 775
 Number of meshes and types: 960 PENTA6 64 TRIA3

18 Results of the modelization I

18.1 Values tested

Localization	Quantities	Reference	Intensité_Acou
A	$p(\text{réel}, \text{imag})$ tolerance	(- 6.2426, 0.0000) 0.0437	0.3% 2%
B	$p(\text{réel}, \text{imag})$ Intensité_Acou	(- 6.2426, 0.0000) 0.0437	0.3% 2%
C	$p(\text{réel}, \text{imag})$ Intensité_Acou	(6.0237, 1.6387) 0.0437	4% 2%
D	$p(\text{réel}, \text{imag})$ Intensité_Acou	(6.0237, 1.6387) 0.0437	4% 2%

Order of the eigen mode i	Frequency			Reference	tolerance
	m	n	p		

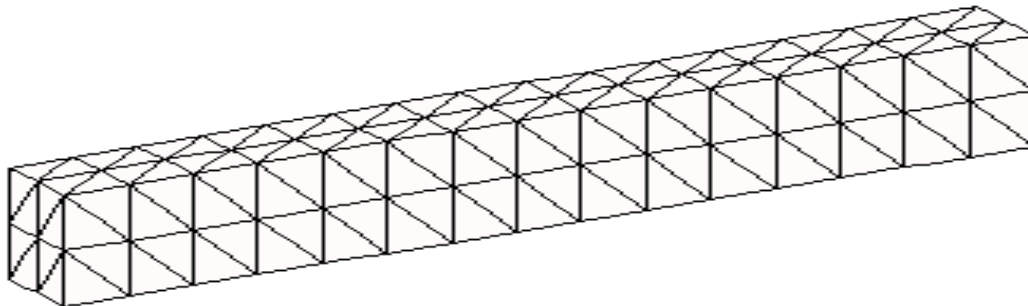
Warning : The translation process used on this website is a "Machine Translation". It may be imprecise and inaccurate in whole or in part and is provided as a convenience.

2	1	0	0	171.5	0.1%
3	2	0	0	343.0	0.2%
4	3	0	0	514.5	0.5%
5	4	0	0	686.0	1%
6	5	0	0	857.5	2%
7	0	0	1	857.5	3%
8	1	0	1	874.482	3%
9	2	0	1	923.556	3%

19 Modelization J

19.1 Characteristic of the modelization

“ACOUSTIC” Formulation pressure elements 3D (ACOU_TETRA10 and ACOU_FACE6)



Cutting = 15 meshes TETRA10 according to the axis of x
 the 2 meshes TETRA10 according to the axis of y
 the 2 meshes TETRA10 according to the axis of z

the limiting
 Conditions:

VITE_FACE: (Group_ma: Vnor bicycle: IH 0.014
 0.)
 IMPE_FACE: (Group_ma: impe Impe: IH 445.9 0.)

Name of the nodes $A = No4$ $B = No76$ $C = No7$ $D = No73$

19.2 Characteristic of the mesh

Many nodes: 870
 Number of meshes and types: 421 TETRA10 16 TRIA6

20 Results of the modelization J

20.1 Values tested

Localization	Quantities	Reference	Intensité_Acou
A	$p(\text{réel}, \text{imag})$ tolerance	(- 6.2426, 0.0000) 0.0437	0.3% 3%

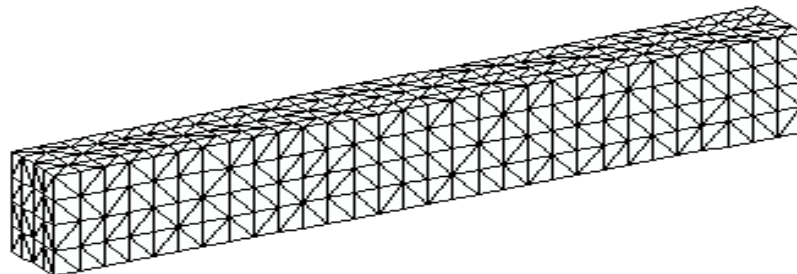
<i>B</i>	$p(\text{réel}, \text{imag})$ Intensité_Acou	(- 6.2426, 0.0000) 0.0437	0.3% 4%
<i>C</i>	$p(\text{réel}, \text{imag})$ Intensité_Acou	(6.0237, 1.6387) 0.0437	0.2% 2%
<i>D</i>	$p(\text{réel}, \text{imag})$ Intensité_Acou	(6.0237, 1.6387) 0.0437	0.2% 3%

Order of the eigen mode <i>i</i>	Frequency			Reference	tolerance
	<i>m</i>	<i>n</i>	<i>p</i>		
2	1	0	0	171.5	0.01%
3	2	0	0	343.0	0.01%
4	3	0	0	514.5	0.01%
5	4	0	0	686.0	0.1%
6	5	0	0	857.5	0.1%
7	0	0	1	857.5	0.5%
8	1	0	1	874.482	0.5%
9	2	0	1	923.556	0.5%

21 Modelization K

21.1 Characteristic of the modelization

"ACOUSTIC" Formulation pressure elements 3D (ACOU_TETRA4 and ACOU_FACE3)



Cutting = 30 meshes TETRA4 according to the axis of *x*
 the 4 meshes TETRA4 according to the axis of *y*
 the 4 meshes TETRA4 according to the axis of *z*

the limiting
 Conditions:

VITE_FACE: (Group_ma: Vnor bicycle: IH 0.014
 0.)
 IMPE_FACE: (Group_ma: impe Impe: IH 445.9 0.)

Name of the nodes *A=No18 B=No521 C=No15 D=No1028*

21.2 Characteristic of the mesh

Many nodes: 685
 Number of meshes and types: 2180 TETRA4 64 TRIA6

22 Results of the modelization K

22.1 Values tested

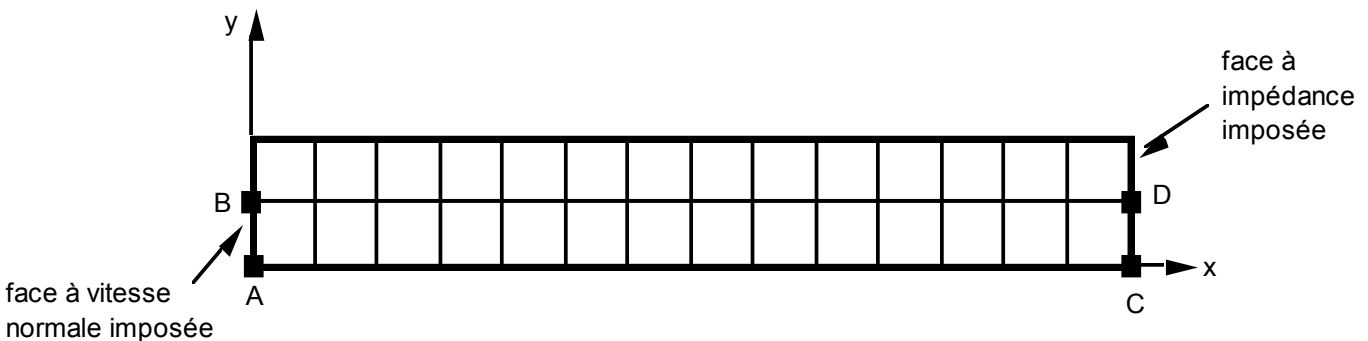
Localization	Quantities	Reference	Intensité_Acou
A	$p(\text{réel}, \text{imag})$	(- 6.2426, 0.0000)	1%
	tolerance	0.0437	3%
B	$p(\text{réel}, \text{imag})$	(- 6.2426, 0.0000)	2%
	Intensité_Acou	0.0437	3%
C	$p(\text{réel}, \text{imag})$	(6.0237, 1.6387)	5%
	Intensité_Acou	0.0437	3%
D	$p(\text{réel}, \text{imag})$	(6.0237, 1.6387)	5%
	Intensité_Acou	0.0437	3%

Order of the eigen mode	Frequency			Reference	tolerance
	m	n	p		
i					
2	1	0	0	171.5	0.2%
3	2	0	0	343.0	0.3%
4	3	0	0	514.5	0.6%
5	4	0	0	686.0	1%
6	5	0	0	857.5	2%
7	0	0	1	857.5	3%
8	1	0	1	874.482	3%
9	2	0	1	923.556	4%

23 Modelization M

23.1 Characteristic of the modelization

Formulation pressure elements "ACOUSTIC" PLANE (SEG3 and QUAD8)



Cutting = 15 meshes QUAD8 according to the axis of x
 the 2 meshes QUAD8 according to the axis of y

the limiting
 Conditions:

Warning : The translation process used on this website is a "Machine Translation". It may be imprecise and inaccurate in whole or in part and is provided as a convenience.

VITE_FACE: (Group_ma: Vnor entry: 0.014)
 IMPE_FACE: (Group_ma: Impe output: 445.9)

Name of the nodes $A=No1$ $B=No33$ $C=No2$ $D=No34$

23.2 Characteristic of the mesh

Many nodes: 125
 Number of meshes and types: 30 QUAD8 4 SEG3

24 Results of the modelization M

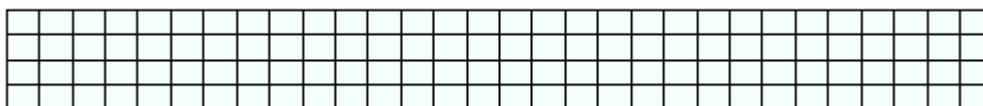
24.1 Values tested

Localization	Quantities	Reference	tolerance
<i>A</i>	$p(\text{réel}, \text{imag})$	(- 6.2426, 0.0)	1%
<i>B</i>	$p(\text{réel}, \text{imag})$	(- 6.2426, 0.0)	1%
<i>C</i>	$p(\text{réel}, \text{imag})$	(6.0237, 1.6387)	1%
<i>D</i>	$p(\text{réel}, \text{imag})$	(6.0237, 1.6387)	1%

25 Modelization Q

25.1 Characteristic of the modelization

Formulation pressure elements "ACOUSTIC" PLANE (SEG2 and QUAD4)



Cutting = 30 meshes QUAD4 according to the axis of x
 the 4 meshes QUAD4 according to the axis of y

the limiting
 Conditions:

VITE_FACE: (Group_ma: Vnor entry: 0.014)
 IMPE_FACE: (Group_ma: Impe output: 445.9)

Name of the nodes $A=No1$ $B=No237$ $C=No2$ $D=No205$

25.2 Characteristic of the mesh

Many nodes: 155
 Number of meshes and types: 120 QUAD8 8 SEG2

26 Results of the modelization Q

26.1 Values tested

Localization	Quantities	Reference	tolerance
<i>A</i>	$p(\text{réel}, \text{imag})$	(- 6.2426, 0.0)	0.3%
<i>B</i>	$p(\text{réel}, \text{imag})$	(- 6.2426, 0.0)	0.3%
<i>C</i>	$p(\text{réel}, \text{imag})$	(6.0237, 1.6387)	4%
<i>D</i>	$p(\text{réel}, \text{imag})$	(6.0237, 1.6387)	4%

27 Modelization R

27.1 Characteristic of the modelization

Formulation pressure elements "ACOUSTIC" PLANE (SEG3 and TRIA6)



Cutting = 15 meshes TRIA6 according to the axis of x
the 2 meshes TRIA6 according to the axis of y

the limiting
Conditions:

VITE_FACE: (Group_ma: Vnor entry: 0.014)
IMPE_FACE: (Group_ma: Impe output: 445.9)

Name of the nodes $A=No1$ $B=No5$ $C=No2$ $D=No6$

27.2 Characteristic of the mesh

Many nodes: 155
Number of meshes and types: 60 TRIA6 4 SEG3

28 Results of the modelization R

28.1 Values tested

Localization	Quantities	Reference	tolerance
<i>A</i>	$p(\text{réel}, \text{imag})$	(- 6.2426, 0.0)	0.2%
<i>B</i>	$p(\text{réel}, \text{imag})$	(- 6.2426, 0.0)	0.1%

Warning : The translation process used on this website is a "Machine Translation". It may be imprecise and inaccurate in whole or in part and is provided as a convenience.

<i>C</i>	$p(\text{réel}, \text{imag})$	(6.0237, 1.6387)	0.3%
<i>D</i>	$p(\text{réel}, \text{imag})$	(6.0237, 1.6387)	0.1%

29 Modelization S

29.1 Characteristic of the modelization

Formulation pressure elements "ACOUSTIC" PLANE (SEG2 and TRIA3)



Cutting = 30 meshes TRIA3 according to the axis of *x*
 the 4 meshes TRIA3 according to the axis of *y*

the limiting
 Conditions:

VITE_FACE: (Group_ma: Vnor entry: 0.014)
 IMPE_FACE: (Group_ma: Impe output: 445.9)

Name of the nodes *A=No1* *B=No237* *C=No2* *D=No205*

29.2 Characteristic of the mesh

Many nodes: 155
 Number of meshes and types: 240 TRIA3 8 SEG2

30 Results of the modelization S

30.1 Values tested

Localization	Quantities	Reference	tolerance
<i>A</i>	$p(\text{réel}, \text{imag})$	(- 6.2426, 0.0)	1%
<i>B</i>	$p(\text{réel}, \text{imag})$	(- 6.2426, 0.0)	0.1%
<i>C</i>	$p(\text{réel}, \text{imag})$	(6.0237, 1.6387)	7%
<i>D</i>	$p(\text{réel}, \text{imag})$	(6.0237, 1.6387)	6%

31 Modelization T

31.1 Characteristic of the modelization

One completely take again the modelization A by modifying only celerity CELE_C of the material: its real part remains unchanged to 343 m.s^{-1} whereas the imaginary part passes from 0 to 10 m.s^{-1} .

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32 Results of the modelization T

32.1 Values tested

One analyzes the same quantities as for the modelization A, but only for tests of non- regression.

33 Summary of the results

the modelizations give the expected results.

In the modelizations using of the tetrahedrons or the triangles, the distribution of the pressures is less uniform than in the other cases, consequence of the non-uniformity of the mesh.