

ZZZZ119 - PROJ_CHAMP for surfaces in 3D

Summary:

One treats the case of a quarter of cylinder (modelled by hulls DKQ) subjected to an internal pressure on a first grid $ma1$. The field of displacement obtained ($ch1$) is supposed just. One projects this field of displacement on another grid ($ma2$) same quarter of cylinder. One obtains $ch2$. One Re-projects $ch2$ on $ma1$, one obtains $ch1bis$. The result ($ch1bis$) is close to $ch1$ (2% of difference). This validates the method of projection of a field of a surface on the other.

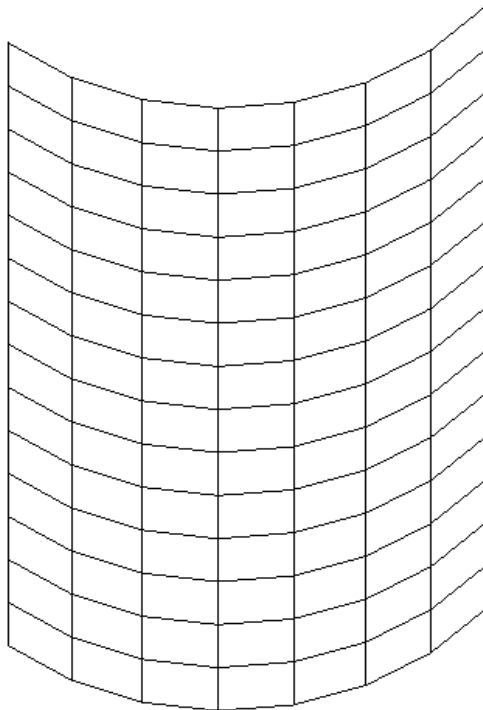
1 Problem of reference

1.1 Geometry

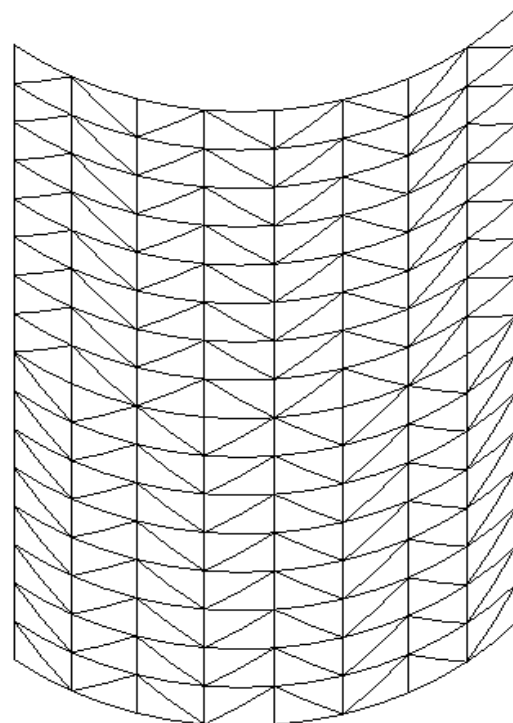
A cylindrical hull (1/4 of cylinder) of height $h=40$ and of ray $R=10$ and thickness $e=0.2$ is embedded on its line of centers and subjected to an internal pressure $p=2$.

It is with a grid twice:

$ma1$: 7×14 QUAD4
 $ma2$: $8 \times 16 \times 2$ TRIA6



$ma1$



$ma2$

1.2 Material properties

$$E = 1.10^6$$

$$\nu = 0.3$$

1.3 Boundary conditions, loading

The group of nodes ABI is embedded (three displacements and three rotations are blocked).

$$DX = DY = DZ = 0.$$

$$DRX = DRY = DRZ = 0.$$

The hull is subjected to an internal pressure $p=2$.

1.4 Validated features

The validation relates to the method 'ELEM' in case of the surface meshes plunged in space $R3$. The keyword is also tested `VIS_A_VIS` for the method 'ELEM'.

2 Reference solution

2.1 Method of calculating used for the reference solution

For the field *chl* , calculated on the grid *mal* , the reference solution is obtained with *Code_Aster* (version 5.02.07).

For the field *chlbis* obtained by a projection "return ticket" ($mal \rightarrow ma2 \rightarrow mal$), the reference solution is the field *chl* .

One thus measures the error due to 2 successive projections of fields: $chl \rightarrow ch2 \rightarrow chlbis$

3 Modeling A

Field	Node	CMP	Reference	Found value	Difference (%)
			<i>CHI</i>	<i>CHIBIS</i>	
<i>CHIBIS</i>	<i>N123</i>	<i>DX</i>	- 2.17555E-01	- 2.14000E-01	- 1,634
<i>CHIBIS</i>	<i>N123</i>	<i>DY</i>	- 3.96143E-01	- 3.99026E-01	0,728
<i>CHIBIS</i>	<i>N48</i>	<i>DX</i>	- 9.35364E-02	- 9.18094E-02	- 1,846
<i>CHIBIS</i>	<i>N48</i>	<i>DY</i>	- 1.90742E-01	- 1.93265E-01	1,323
<i>CHIBIS</i>	<i>N66</i>	<i>DX</i>	- 2.17555E-01	- 2.14000E-01	- 1,634

4 Summary of the results

This case test makes it possible to check the good performance of the order `PROJ_CHAMP` for surfaces in 3D.