SSLV157 – Relations of the type RBE3 between a cube and discrete

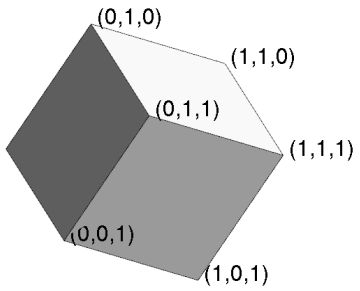
Abstract:

The purpose of this test is to check 3D the relation of the type RBE3 between an element and discrete.

1 Problem of reference

1.1 Geometry

One considers a cubic unit and a discrete element with the following coordinates.



.(2,3,4)

1.2 Properties of the material

$E=210000\text{MPa}$	Modulus Young
$\nu=0.3$	Poisson's ratio

1.3 Boundary conditions and loadings

the node of the cube of coordinates $(0,0,0)$ is blocked according to DZ.
The node of the cube of coordinates $(1,0,0)$ is blocked according to $DX \quad DY \quad DZ$.
The node of the cube of coordinates $(1,1,0)$ is blocked according to $DX \quad DZ$.
The node of the cube of coordinates $(0,1,0)$ is subjected to a nodal force $FX=-0.123456701636 \quad FY=-0.246913403273 \quad FZ=-0.370370090008$.

1.4 Initial conditions

Nothing

2 Reference solution

2.1 Method of calculating

the reference solution is obtained by software Nastran.

2.2 Quantities and results of reference

One notes displacement on various nodes of which the discrete one.

Identification	Value of reference
NOEUD=' N000007', NOM_CMP=' DX',	2.09288E-05
NOEUD=' N000006', NOM_CMP=' DY',	-7.29517E-06
NOEUD=' N000002', NOM_CMP=' DZ',	0.00000E+00
NOEUD=' N000002', NOM_CMP=' DX',	-6.23697E-06

NOEUD=' N000002', NOM_CMP=' DY',	-2.45257E-05
NOEUD=' N000007', NOM_CMP=' DZ',	-2.79835E-05
NOEUD=' N000009', NOM_CMP=' DX',	8.655062E-05
NOEUD=' N000009', NOM_CMP=' DY',	3.349630E-05
NOEUD=' N000009', NOM_CMP=' DZ',	-7.131093E-05
NOEUD=' N000009', NOM_CMP=' DRX',	-1.834213E-05
NOEUD=' N000009', NOM_CMP=' DRY',	1.222809E-05
NOEUD=' N000009', NOM_CMP=' DRZ',	-1.493772E-05

2.3 Uncertainties on the solution

No

3 Modelization A

3.1 Characteristic of the modelization

One uses a linear relation of type RBE3.

3.2 Characteristics of the mesh

The mesh contains 9 nodes, 1 elements of the type POI1, 1 element of type HEXA8.

3.3 Quantities tested and results

Identification	Value of reference	Tolerance
NOEUD=' N000007', NOM_CMP=' DX',	2.09288E-05	3rd-4%
	-7.29517E-06	1e-4%
NOEUD=' N000006', NOM_CMP=' DY',	0.00000E+00	1e-10
	-6.23697E-06	1e-4%
NOEUD=' N000002', NOM_CMP=' DZ',	-2.45257E-05	2nd-4%
	-2.79835E-05	1e-4%
NOEUD=' N000002', NOM_CMP=' DX',	8.655062E-05	1e-4%
	3.349630E-05	1e-4%
NOEUD=' N000002', NOM_CMP=' DY',	-7.131093E-05	1e-4%
	-1.834213E-05	1e-4%
NOEUD=' N000007', NOM_CMP=' DZ',	1.222809E-05	1e-4%
	-1.493772E-05	1e-4%
NOEUD=' N000009', NOM_CMP=' DX',		
NOEUD=' N000009', NOM_CMP=' DY',		
NOEUD=' N000009', NOM_CMP=' DZ',		
NOEUD=' N000009', NOM_CMP=' DRX',		
NOEUD=' N000009', NOM_CMP=' DRY',		
NOEUD=' N000009', NOM_CMP=' DRZ',		

4 Modelization B

4.1 Characteristic of the modelization

One uses a classical linear relation equivalent to the linear constraint of type RBE3.

4.2 Characteristics of the mesh

The mesh contains 9 nodes, 1 elements of the type POI1, 1 element of type HEXA8.

4.3 Quantities tested and results

Identification	Value of reference	Tolerance
NOEUD=' N000007', NOM_CMP=' DX',	2.09288E-05	3rd-4%
	-7.29517E-06	1e-4%

NOEUD=' N000006', NOM_CMP=' DY',	0.00000E+00	1e-10
NOEUD=' N000002', NOM_CMP=' DZ',	-6.23697E-06	1e-4%
NOEUD=' N000002', NOM_CMP=' DX',	-2.45257E-05	2nd-4%
NOEUD=' N000002', NOM_CMP=' DY',	-2.79835E-05	1e-4%
NOEUD=' N000007', NOM_CMP=' DZ',	8.655062E-05	1e-4%
NOEUD=' N000009', NOM_CMP=' DX',	3.349630E-05	1e-4%
NOEUD=' N000009', NOM_CMP=' DY',	-7.131093E-05	1e-4%
NOEUD=' N000009', NOM_CMP=' DZ',	-1.834213E-05	1e-4%
NOEUD=' N000009', NOM_CMP=' DRX',	1.222809E-05	1e-4%
NOEUD=' N000009', NOM_CMP=' DRY',	-1.493772E-05	1e-4%
NOEUD=' N000009', NOM_CMP=' DRZ',		

5 Summary of the results

the results are in very good agreement with software Nastran.