

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

---

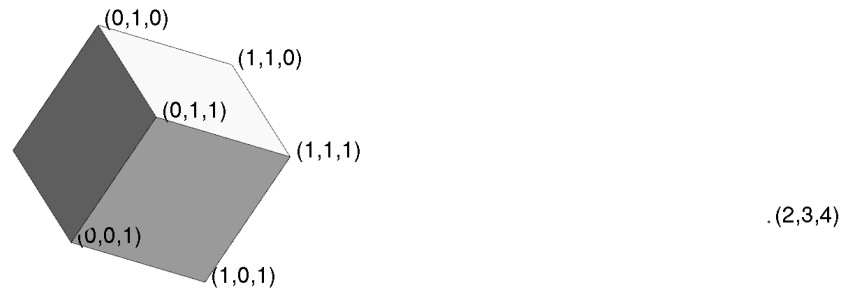
### Summary:

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

## 1 Problem of reference

### 1.1 Geometry

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



### 1.2 Properties of material

$E = 210000 \text{ MPa}$  Young modulus  
 $\nu = 0.3$  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  $DX$ ,  $DY$ ,  $DZ$ .

The node of the cube of coordinates  $(1,1,0)$  is blocked according to  $DX$ ,  $DZ$ .

The node of the cube of coordinates  $(0,1,0)$  is subjected to a nodal force  $F_X = -0.123456701636$ ,  $F_Y = -0.246913403273$ ,  $F_Z = -0.370370090008$ .

### 1.4 Initial conditions

Nothing

## 2 Reference solution

### 2.1 Method of calculating

The reference solution is obtained by software Nastran.

### 2.2 Sizes 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='	-1.834213E-05
DRX',	1.222809E-05
NOEUD=' N000009', NOM_CMP='	-1.493772E-05
DRY',	
NOEUD=' N000009', NOM_CMP='	
DRZ',	

## 2.3 Uncertainties on the solution

None

## 3 Modeling A

### 3.1 Characteristics of modeling

One uses a linear relation of type RBE3.

### 3.2 Characteristics of the grid

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

### 3.3 Sizes 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 Modeling B

### 4.1 Characteristics of modeling

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

### 4.2 Characteristics of the grid

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

### 4.3 Sizes 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 -6.23697E-06	1e-10 1e-4%
NOEUD=' N000002', NOM_CMP=' DZ',	-2.45257E-05 -2.79835E-05	2nd-4% 1e-4%
NOEUD=' N000002', NOM_CMP=' DX',	8.655062E-05 3.349630E-05	1e-4% 1e-4%
NOEUD=' N000002', NOM_CMP=' DY',	-7.131093E-05 -1.834213E-05	1e-4% 1e-4%
NOEUD=' N000007', NOM_CMP=' DZ',	1.222809E-05 -1.493772E-05	1e-4% 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',		

## 5 Summary of the results

---

The results are in very good agreement with software Nastran.