

## SSLS136 – Relations of the type RBE3 between a plate and discrete

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### Abstract:

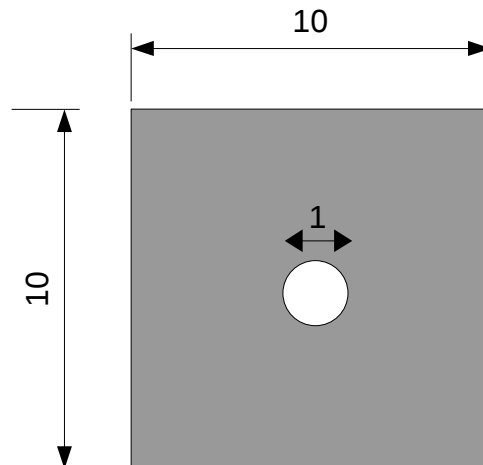
The purpose of this test is to check the relation of the type RBE3 between a plate perforated with a grid in DKT and discrete.

## 1 Problem of reference

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### 1.1 Geometry

One considers a plate of with dimensions  $10\text{mm}$  pierced with a hole of  $1\text{mm}$  diameter.



### 1.2 Properties of the material

$E = 1\text{MPa}$  Modulus Young  
 $\nu = 0.3$  Poisson's ratio

### 1.3 Boundary conditions and loadings

the plate is blocked on all its periphery according to its degrees of freedom  $DX$   $DY$   $DZ$   $DRX$   $DRY$   $DRZ$ .

Discrete equipped with degrees of freedom  $DX$   $DY$ ,  $DZ$  is placed in the center of hole. It is connected by a connection of the type *RBE3* to all the periphery of circular hole.

The center of the circle 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

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### 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 with the periphery of central hole of the plate.

Identification	Value of reference
NOEUD=' N000109 ', NOM_CMP=' DX '	-8.24903E-06 -1.65058E-05
NOEUD=' N000010 ', NOM_CMP=' DY '	-1.10249E-01 5.39179E-03
NOEUD=' N000009 ', NOM_CMP=' DZ '	5.57828E-03 0.00000E+00
NOEUD=' N000009 ', NOM_CMP=' DRX '	-8.42702E-06 -1.68364E-05
NOEUD=' N000010 ', NOM_CMP=' DRY '	-1.10747E-01 -5.53148E-03
NOEUD=' N000002 ', NOM_CMP=' DRZ '	-5.66054E-03 0.00000E+00
NOEUD=' N000002 ', NOM_CMP=' DX '	
NOEUD=' N000009 ', NOM_CMP=' DY '	
NOEUD=' N000014 ', NOM_CMP=' DZ '	
NOEUD=' N000003 ', NOM_CMP=' DRX '	
NOEUD=' N000002 ', NOM_CMP=' DRY '	
NOEUD=' N000002 ', NOM_CMP=' DRZ '	

## 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 419 nodes, 1 elements of the type POI1, 79 element of type QUAD4, 598 elements of the type TRIA3.

### 3.3 Quantities tested and results

Identification	Value of reference	Tolerance
NOEUD=' N000109', NOM_CMP=' DX'	-8.24903E-06	1.E-4%
	-1.65058E-05	1.E-4%
NOEUD=' N000010', NOM_CMP=' DY'	-1.10249E-01	1.E-4%
	5.39179E-03	1.E-4%
NOEUD=' N000009', NOM_CMP=' DZ'	5.57828E-03	1.E-4%
	0.00000E+00	1.E-10
NOEUD=' N000009', NOM_CMP=' DRX'	-8.42702E-06	1.E-4%
	-1.68364E-05	1.E-4%
NOEUD=' N000010', NOM_CMP=' DRY'	-1.10747E-01	1.E-4%
	-5.53148E-03	1.E-4%
NOEUD=' N000002', NOM_CMP=' DRZ'	-5.66054E-03	1.E-4%
	0.00000E+00	1.E-10
NOEUD=' N000002', NOM_CMP=' DX'		
NOEUD=' N000009', NOM_CMP=' DY'		
NOEUD=' N000014', NOM_CMP=' DZ'		
NOEUD=' N000003', NOM_CMP=' DRX'		
NOEUD=' N000002', NOM_CMP=' DRY'		
NOEUD=' N000002', NOM_CMP=' DRZ'		

## 4 Modelization B

### 4.1 Characteristic of the modelization

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

### 4.2 Characteristics of the mesh

The mesh contains 419 nodes, 1 elements of the type POI1, 79 element of type QUAD4, 598 elements of the type TRIA3.

### 4.3 Quantities tested and results

Identification	Value of reference	Tolerance
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NOEUD=' N000109', NOM_CMP=' DX'	-8.24903E-06 -1.65058E-05	1.E-4% 1.E-4%
NOEUD=' N000010', NOM_CMP=' DY'	-1.10249E-01 5.39179E-03	1.E-4% 1.E-4%
NOEUD=' N000009', NOM_CMP=' DZ'	5.57828E-03 0.00000E+00	1.E-4% 1.E-10
NOEUD=' N000009', NOM_CMP=' DRX'	-8.42702E-06 -1.68364E-05	1.E-4% 1.E-4%
NOEUD=' N000010', NOM_CMP=' DRY'	-1.10747E-01 -5.53148E-03	1.E-4% 1.E-4%
NOEUD=' N000002', NOM_CMP=' DRZ'	-5.66054E-03 0.00000E+00	1.E-4% 1.E-10
NOEUD=' N000002', NOM_CMP=' DX'		
NOEUD=' N000009', NOM_CMP=' DY'		
NOEUD=' N000014', NOM_CMP=' DZ'		
NOEUD=' N000003', NOM_CMP=' DRX'		
NOEUD=' N000002', NOM_CMP=' DRY'		
NOEUD=' N000002', NOM_CMP=' DRZ'		

## 5 Summary of the results

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the results are in very good agreement with software Nastran.