

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

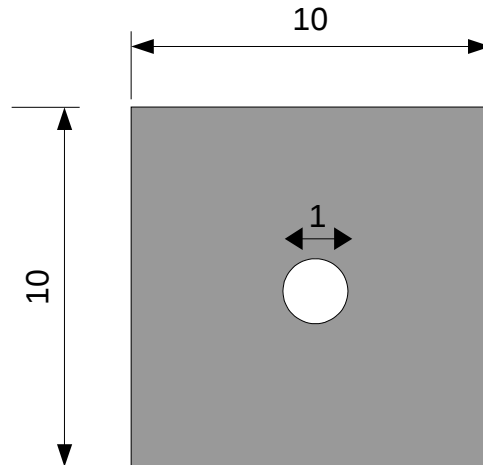
Summary:

The objective 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

1.1 Geometry

One considers a plate of with dimensions 10mm opening of a hole of 1mm of diameter.



1.2 Properties of material

$E = 1\text{MPa}$ Young modulus
 $\nu = 0.3$ 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 the hole. It is connected by a connection of the type *RBE3* with all the periphery of the circular hole.

The center of the circle is subjected to a nodal force $FX = -0.123456701636$, $FY = -0.246913403273$, $FZ = -0.370370090008$.

1.4 Initial conditions

Nothing

2 Reference solution

2.1 Method of calculating

The reference solution is obtained by software Nastran.

2.2 Sizes and results of reference

One notes displacement on various nodes with the periphery of the 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

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

3.3 Sizes tested and results

Identification	Value of reference	Tolerance
NOEUD=' N000109', NOM_CMP=' DX'	-8.24903E-06	1.E-4%
NOEUD=' N000010', NOM_CMP=' DY'	-1.65058E-05	1.E-4%
NOEUD=' N000010', NOM_CMP=' DZ'	-1.10249E-01	1.E-4%
NOEUD=' N000009', NOM_CMP=' DRX'	5.39179E-03	1.E-4%
NOEUD=' N000009', NOM_CMP=' DRY'	5.57828E-03	1.E-4%
NOEUD=' N000010', NOM_CMP=' DRZ'	0.00000E+00	1.E-10
NOEUD=' N000002', NOM_CMP=' DX'	-8.42702E-06	1.E-4%
NOEUD=' N000010', NOM_CMP=' DY'	-1.68364E-05	1.E-4%
NOEUD=' N000002', NOM_CMP=' DZ'	-1.10747E-01	1.E-4%
NOEUD=' N000009', NOM_CMP=' DRX'	-5.53148E-03	1.E-4%
NOEUD=' N000002', NOM_CMP=' DRY'	-5.66054E-03	1.E-4%
NOEUD=' N000002', NOM_CMP=' DRZ'	0.00000E+00	1.E-10
NOEUD=' N000009', NOM_CMP=' DRX'		
NOEUD=' N000014', NOM_CMP=' DZ'		
NOEUD=' N000003', NOM_CMP=' DRX'		
NOEUD=' N000002', NOM_CMP=' DRY'		
NOEUD=' N000002', 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 419 nodes, 1 elements of the type POI1, 79 element of the type QUAD4, 598 elements of the type TRIA3.

4.3 Sizes tested and results

Identification	Value of reference	Tolerance
----------------	--------------------	-----------

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

5 Summary of the results

The results are in very good agreement with software Nastran.