

Operator CREA_MAILLAGE

1 Goal

To create a structure of data of the type `grid` starting from another grid. The new grid is created starting from an existing grid while duplicating, while destroying, while transforming or while bursting of the meshes or by recopying a grid (case of `GEOM_FIBRE`).

Product a structure of data `grid`.

2 Syntax

```
ma_2 (grid) =CREA_MAILLAGE (
    ◊ GRID = ma_1, [grid]
    ◆ | CREA_MAILLE = _F (
        ◆ NOM= named, [K8]
        ◆ | MESH = lmail, [l_maille]
          | GROUP_MA = lgma, [l_group_ma]
          | ALL = 'YES',
        ◆ PREF_MAILLE = pre_ma, [KN]
    ◊ PREF_NUME = ind, [I]
    ),
    | MODI_MAILLE = _F (
        ◆ | ALL = 'YES',
          | GROUP_MA = lgma, [l_group_ma]
          | MESH = lmail, [l_maille]
        ◆ / OPTION = / 'TRIA6_7' ,
                    / 'QUAD8_9' ,
                    / 'SEG3_4' ,
                    / 'QUAD_TRIA3' ,
        ◊ PREF_NOEUD = / 'NS', [DEFECT]
                    / pre_nd, [KN]
        ◊ PREF_NUME = / ind , [I]
                    / 1, [DEFECT]
        / OPTION = 'QUAD_TRIA3',
        ◊ PREF_MAILLE = / 'Ms', [DEFECT]
                    / pre_ma, [KN]
        ◊ PREF_NUME = / ind , [I]
                    / 1, [DEFECT]
    ),
)
```

```
| REFERENCE MARK = _F (
  ◆ TABLE = , [tabl_cara_geom]
  ◇ NOM_ORIG = / 'CDG', [DEFECT]
  / 'TORSION',
  ◇ NOM_ROTA = / 'INERTIA', [DEFECT]
  ◇ GROUP_MA = gma, [group_ma]
  ),

| CREA_POI1 = _F (
  ◆ | ALL = 'YES',
  | GROUP_MA = lgma, [l_group_ma]
  | MESH = lmail, [l_maille]
  | GROUP_NO = lno, [l_group_no]
  | NODE = lnoeud, [l_noeud]
  ◆ NOM_GROUP_MA = nom_ma, [group_ma]
  ),

| LINE_QUAD = _F (
  ◆ | ALL = 'YES',
  | GROUP_MA = lgma, [l_group_ma]
  | MESH = lmail, [l_maille]
  ◇ PREF_NOEUD = / 'NS', [DEFECT]
  / pre_nd, [KN]
  ◇ PREF_NUME = / ind, [I]
  / 1, [DEFECT]
  ),

| PENTA15_18 = _F (
  ◆ | ALL = 'YES',
  | GROUP_MA = lgma, [l_group_ma]
  | MESH = lmail, [l_maille]
  ◇ PREF_NOEUD = / 'NS', [DEFECT]
  / pre_nd, [KN]
  ◇ PREF_NUME = / ind, [I]
  / 1, [DEFECT]
  ),

| HEXA20_27 = _F (
  ◆ | ALL = 'YES',
  | GROUP_MA = lgma, [l_group_ma]
  | MESH = lmail, [l_maille]
  ◇ PREF_NOEUD = / 'NS', [DEFECT]
  / pre_nd, [KN]
  ◇ PREF_NUME = / ind, [I]
  / 1, [DEFECT]
  ),

| QUAD_LINE = _F (
  ◆ | ALL = 'YES',
  | GROUP_MA = lgma, [l_group_ma]
  | MESH = lmail, [l_maille]
  ),

| COQU_VOLU = _F (
  ◆ NOM= named, [TXM]
  ◆ GROUP_MA = gma, [group_ma]
  ◆ THICK = ep, [R8]
  ◇ PREF_MAILLE = / 'Ms', [DEFECT]
  / pre_ma, [KN]
```

```

    ◇ PREF_NOEUD = / 'NS', [DEFECT]
                  / pre_nd, [KN]
    ◇ PREF_NUME = / ind, [I]
                  / 1, [DEFECT]
    ◆ / PLAN = / 'SUP', [TXM]
        / 'INF',
        / PLAN = 'MOY',
    ◆ TRANSLATION = / 'SUP', [TXM]
                  / 'INF', [DEFECT]
                ),

| CREA_FISS = _F (
    ◆ NAME = nogma, [TXM]
    ◆ GROUP_NO_1 = gno1, [group_no]
    ◆ GROUP_NO_2 = gno2, [group_no]
    ◆ PREF_MAILLE = pre_ma, [KN]
    ◇ PREF_NUME = / ind, [I]
                  / 1, [DEFECT]
                ),
| RESTRICTED = _F (
    ◆ | GROUP_MA = lgma, [l_group_ma]
      | MESH = lmail, [l_maille]
    ◇ GROUP_NO = lgno, [l_group_no]
    ◇ TOUT_GROUP_MA = / 'NOT', [DEFECT]
                      / 'YES',
    ◇ TOUT_GROUP_NO = / 'NOT', [DEFECT]
                      / 'YES',
                ),

| ECLA_PG = _F (...) # used by [U4.44.14]

| GEOM_FIBRE = gfibre, [gfibre]

◇ INFORMATION = / 1, [DEFECT]
                / 2,
◇ TITLE = tit, [TXM]

)
```

3 Risk to produce a grid nonin conformity

A certain number of features of the order CREA_MALLAGE can result in producing a grid nonin conformity. For this reason, the user must be particularly vigilant when it employs CREA_MALLAGE to transform meshes.

A grid is nonin conformity when the functions of form of 2 adjacent elements do not have the same trace on their common border.

For example:

- 2 pentahedrons assembled to form a hexahedron and posed on another hexahedron (1 quadrangle in with respect to 2 triangles).
- 1 QUAD8 dividing one stops with 1 QUAD4 or 1 TRIA3
- 1 TRIA6 dividing one stops with 2 TRIA3

The grids nonin conformity lead in general to false results (at least locally).

Among the possibilities of CREA_MALLAGE, several situations are potentially dangerous:

- Use of the one of the keywords QUAD_TRIA3 [§4.4.1], LINE_QUAD [§4.5], QUAD_LINE [§4.8], HEXA20_27 [§4.7], PENTA15_18 [§4.6] with the keyword GROUP_MA (or MESH).
If for example one transforms **partially** a linear grid in quadratic grid, the grid will be nonin conformity on the border between the linear elements and the quadratic elements.
During the use of the keyword GROUP_MA , **it is necessary to take care to provide all the meshes implied in the transformation** , in particular meshes of skin or else, one HEXA27 could for example be bordered of meshes of skin QUAD8 .
- Use of the keyword HEXA20_27 [§4.7] (or PENTA15_18 [§4.6]) if there exists in the grid of the voluminal elements with quadrangular faces of type different from the elements which one modifies. For example, if there exist pentahedrons or pyramids when hexahedrons are modified.
The risk is that, for example, a quadrangular face of HEXA27 (9 nodes) that is to say coupled with a quadrangular face with 8 nodes of one PENTA15 adjacent.
- Use of the keyword QUAD_TRIA3 if there exists in the grid of the elements TRIA6 . In this case, quadrangles transformed into TRIA3 will be incompatible with TRIA6.

4 Operands

4.1 Operand GRID

- ◆ GRID = ma_1

ma_1 is the name of the initial grid which one wants to reproduce before “enriching it” by new meshes or nodes, or “to impoverish it”.

Note:

The keyword *GRID* is obligatory except for the use of the keywords *ECLA_PG* and *GEOM_FIBRE*.

4.2 Keyword CREA_MAILLE

- ◇ CREA_MAILLE

An occurrence of this keyword factor makes it possible to define a new group of meshes made up of new meshes, being based themselves on existing nodes.

To duplicate several groups of meshes, the keyword factor will be repeated CREA_MAILLE.

Contrary to the order *DEFI_GROUP* [U4.22.01] for which the concept grid always preserves the same number of meshes and nodes, here the number of meshes of the new grid is increased (the number of nodes remains identical because the new meshes are based on already existing nodes).

This can facilitate the creation of new loci to be able to apply modelings different to the same group from meshes.

4.2.1 Operand NAME

- ◆ NAME = named

One gives here the name of the new group of meshes which will be created.

4.2.2 Operands MESH / GROUP_MA / ALL

- ◆ | MESH = lmail,
| GROUP_MA = lgma,
| ALL = 'YES',

The whole of the meshes provided by the user with these three keywords will be duplicated and the new meshes will be gathered in a group of meshes bearing the name stipulated by the keyword *NAME*. If the whole of the meshes to be duplicated contains meshes in double, they are eliminated.

4.2.3 Operands PREF_MAILLE / PREF_NUME

- ◆ PREF_MAILLE = pre_ma

The value of this keyword makes it possible to define the prefix of the new meshes. One obtains the name of the new mesh while adding in front of his old name, the text specified under the keyword *PREF_MAILLE*. If this new name has a length higher than eight characters, one stops in fatal error with an error message.

- ◇ PREF_NUME = / ind

If an entirety *ind* is given under the keyword *PREF_NUME*, the number of the new meshes is built by concaténant the text capital letter given under the keyword *PREF_MAILLE* and an entirety obtained while incrementing *ind* from 1 with each creation of new meshes.

Note: L'utilisateur doit être attentif dans le choix de son préfixe pour éviter que les nouveaux maillages aient le même nom que les anciens maillages. Cette collision de noms est détectée par l'ordre et conduit à l'arrêt de Code_Aster.

4.3 Keyword CREA_POI1

◇ CREA_POI1

Une occurrence de ce facteur de mot-clé permet de définir des maillages de type 'POI1' (maillage avec un seul nœud) à partir de nœuds ou de groupes de nœuds, ou de maillages ou de groupes de maillages.

4.3.1 Operands ALL / GROUP_MA / MESH / GROUP_NO / NODE

◆ | ALL = 'YES',
| GROUP_MA = lgma,
| MESH = lmail,
| GROUP_NO = lno,
| NODE = lnoeud,

Tous les nœuds qui appartiennent à des entités stipulées par l'utilisateur avec ces cinq mots-clés, génèrent un maillage de type POI1. Le maillage créé aura le même nom que le nœud qui le supporte.

4.3.2 Operand NOM_GROUP_MA

◆ NOM_GROUP_MA = nom_ma

Tous les maillages POI1 ainsi créés peuvent être regroupés dans le même groupe de maillages nommé nom_ma.

4.3.3 How to create several meshes POI1 on each node?

Les maillages POI1 créés par le mot-clé CREA_POI1 ont le même nom que les nœuds à partir desquels ils ont été créés. Il n'est donc pas possible de créer plusieurs maillages POI1 sur le même nœud en utilisant plusieurs occurrences du mot-clé CREA_POI1.

Une solution possible pour contourner ce problème est de combiner l'utilisation de CREA_MAILLAGE/CREA_POI1 avec CREA_MAILLAGE/CREA_MAILLE. Par exemple, pour créer 2 maillages POI1 sur chaque nœud du groupe 'GNO1', on sera en mesure de le faire :

```
MA2=CRÉA_MAILLAGE (MAILLAGE=MA1,  
  CREA_POI1 = _F (NOM_GROUP_MA=' GM1', GROUP_NO=' GNO1'))  
MA3=CRÉA_MAILLAGE (MAILLAGE=MA2,  
  CREA_MAILLE = _F (NOM_GROUP_MA=' GM2', GROUP_MA=' GM1', PREF_MAIL=''))
```

4.4 Keyword MODI_MAILLE

◇ MODI_MAILLE

Une occurrence de ce facteur de mot-clé permet de transformer un ensemble de maillages.

4.4.1 Operand OPTION

◆ OPTION = / 'SEG3_4'
/ 'TRIA6_7'

```
/ 'QUAD8_9'  
/ 'QUAD_TRIA3'
```

This keyword indicates the transformation to be carried out:

- 1) transformation of the segments with three nodes into segments with four nodes (usable for example for modeling 'PIPE' [U3.11.06],
- 2) transformation of the triangles with six nodes into triangles with seven nodes,
- 3) transformation of the quadrangles with eight nodes into quadrangles with nine nodes,
- 4) transformation of the quadrangles into triangles with 3 nodes:
 - transformation of meshes of the type QUAD4 in two meshes of the type TRIA3
 - transformation of meshes of the type QUAD8 in six meshes of the type TRIA3
 - transformation of meshes of the type QUAD9 in eight meshes of the type TRIA3

4.4.2 Operands PREF_NOEUD/PREF_MAILLE/PREF_NUME

```
◇ PREF_NOEUD = / pre_nd,  
/ 'NS',
```

The value of this keyword makes it possible to define the prefix of the new nodes. One obtains the name of the new node while adding in front of his old name, the text specified under the keyword PREF_NOEUD. If this new name has a length higher than eight characters, one stops in fatal error with an error message.

```
◇ PREF_MAILLE = pre_ma
```

The value of this keyword makes it possible to define the prefix of the new meshes. One obtains the name of the new mesh while adding in front of his old name, the text specified under the keyword PREF_MAILLE. If this new name has a length higher than eight characters, one stops in fatal error with an error message.

```
◇ PREF_NUME = / ind,  
/ 1,
```

If an entirety `ind` is given under the keyword PREF_NUME, the number of the new nodes (news meshes) is built by concaténant the text capital letter given under the keyword PREF_NOEUD (PREF_MAILLE) and an entirety obtained while incrementing `ind` from 1 with each creation of new nodes (news meshes).

Note:

The user must be careful in the choice of his prefix to prevent that the new ones nodes (news meshes) have the same name as old nodes (news meshes). This collision of names is detected by the order and conduit with a stop of Code_Aster.

An automatic procedure of cutting of the meshes quadrangles in triangles can generate a kind of "polarization" of the grid: starting from a grid QUAD given, all the diagonals are found directed in the same direction.

Caution: the use of the option 'QUAD_TRIA3' can lead to a grid nonin conformity. See [§3].

4.5 Keyword LINE_QUAD

```
◇ LINE_QUAD
```

This functionality makes it possible to create a quadratic grid starting from a linear grid.

One can apply it only to part of the grid (keywords GROUP_MA and MESH), but it is disadvised. See [§3].

The groups of meshes are preserved, the groups of nodes also (without change).
As at the time of the refinement of a grid, the nodes created are not introduced into the groups of existing nodes.

If a group of nodes corresponds on a board, afterwards `LINE_QUAD`, this group does not contain the nodes mediums of edges. To obtain one `GROUP_NO` complete, one can use for example the order `DEFI_GROUP/OPTION = 'SUPPORT'`.

4.5.1 Operands `MESH / GROUP_MA / ALL`

```
♦ | MESH      = lmail,  
  | GROUP_MA = lgma,  
  | ALL      = 'YES',
```

The whole of the meshes stipulated by the user with these three keywords will be transformed into quadratic meshes.

Attention, the use of the keywords `GROUP_MA` and `MESH` is disadvised. See [§3].

4.5.2 Operands `PREF_NOEUD / PREF_NUME`

As for `MODI_MAILLE`.

4.6 Keyword `PENTA15_18`

This keyword factor functions like the keyword factor `LINE_QUAD` (even syntax). It is used to transform `PENTA15` in `PENTA18` by adding nodes to the mediums of the quadrangular faces.

Attention, the use of this keyword is disadvised if the grid contains other types of voluminal meshes (`HEXA` and `PYRAM`). See [§3].

4.7 Keyword `HEXA20_27`

This keyword factor functions like the keyword factor `PENTA15_18` with the hexahedrons. It is used to transform `HEXA20` in `HEXA27` by adding nodes to the mediums of the faces and the center of each hexahedron.

Attention, the use of this keyword is disadvised if the grid contains other types of voluminal meshes (`PENTA` and `PYRAM`). See [§3].

4.8 Keyword `QUAD_LINE`

```
◇ QUAD_LINE
```

This functionality makes it possible to create a linear grid starting from a quadratic grid, one can apply it only to part of the grid (attention in this case with the connection of the linear and quadratic zones). See [§3].

4.8.1 Operands `MESH / GROUP_MA / ALL`

```
♦ | MESH      = lmail,  
  | GROUP_MA = lgma,  
  | ALL      = 'YES',
```

The whole of the meshes stipulated by the user with these three keywords will be transformed into linear meshes.

Attention, the use of the keywords `GROUP_MA` and `MESH` is disadvised. See [§3].

4.9 Keyword REFERENCE MARK

◇ REFERENCE MARK

An occurrence of this keyword factor makes it possible to define a new grid starting from the old grid by carrying out a change of reference mark.

This functionality is used in particular in the macro-order MACR_CARA_POUTRE [U4.42.02] for the calculation of the constant of warping.

4.9.1 Operands TABLE / NOM_ORIG / NOM_ROTA / GROUP_MA

◆ TABLE =

One gives here the name of the table of concept "geometrical characteristics" which contains in particular, the coordinates of the centre of inertia and the center of torsion, the nautical angles defining the principal reference mark of inertia,... This table can be obtained by the order POST_ELEM with the keywords factors CARA_GEOM or CARA_POUTRE [U4.81.22].

◇ NOM_ORIG = / `CDG`,
/ `TORSION`,

The center of the new reference mark is indicated: the centre of gravity or the center of torsion.

◇ NOM_ROTA = / `INERTIA`,

The direction of the new reference mark is indicated. Only one solution is possible: the directions are those of the principal reference mark of inertia.

◇ GROUP_MA = gma

If NOM_ORIG = `CDG`, one can indicate the name of the group of meshes whose centre of gravity will be the origin of the new reference mark. If one does not use GROUP_MA, the centre of gravity of the whole of MODEL will be the origin of the new reference mark.

If NOM_ORIG = `TORSION`, the keyword GROUP_MA is inoperative.

4.10 Keyword COQU_VOLU

◇ COQU_VOLU

From the data of a group of surface meshes (QUAD, TRIA3), one builds the voluminal grid (HEXA8, PENTA6) by extrusion according to the normal of the elements (in a node, one takes the average of the normals of the convergent elements). Only one layer of elements is created.

The operation applies only to linear grids; if one wishes to create a quadratic grid, it is enough to use then CREA_MAILLAGE/LINE_QUAD.

4.10.1 Operands NAME

◆ NAME = named,

Name of the group of meshes made up of the voluminal meshes created at the time of this operation.

4.10.2 Operands GROUP_MA

◆ GROUP_MA = lgma,

Groups of meshes constituting the surface grid to extrude.

4.10.3 Operands THICK

◆ THICK = ep,

Thickness of the layer of elements created (thickness of the hull).

4.10.4 Operands PLAN

◆ PLAN = / 'SUP',
 / 'INF',
 / 'MOY',

It is specified here that surface made up of `lgma` will be the Higher, Lower plan or Means of the hull.

4.10.5 Operands TRANSLATION

◆ TRANSLATION = / 'SUP',
 / 'INF',

If `PLAN=' MOY '`, it is specified if initial surface made up of `lgma` is relocated in Higher or Lower skin.

4.10.6 Operands PREF_MAILLE / PREF_NOEUD / PREF_NUME

As for `MODI_MAILLE`.

4.11 Keyword CREA_FISS

```
◇ CREA_FISS = _F (  
          ◆ NOM= nogma, [TXM]  
          ◆ GROUP_NO_1 = gno1, [group_no]  
          ◆ GROUP_NO_2 = gno2, [group_no]  
          ◆ PREF_MAILLE = pre_ma , [KN]  
          ◇ PREF_NUME = / ind, [I]  
                          / 1, [DEFECT]  
                          ),
```

Allows to create a crack with elements of joint [R3.06.09] or elements with discontinuity [R7.02.12] along a line defined by two groups of nodes laid out in glance. The two groups of node will have to have the same number of nodes and to be ordered as a preliminary (for example with `DEFI_GROUP/CREA_GROUP_NO/OPTION='NEUD_ORDO'`) so that their classification "begins" same side (see Illustration 1).

One will be able, then to affect a modeling of the type "joint" on these new meshes `QUAD4` (for example `'PLAN_JOINT'`).

The meshes created will bear a name formed starting from the prefix `pre_ma` follow-up of a number. For example, if `PREF_MAILLE=' FS '` and `PREF_NUME=7`, the meshes create will be called: `FS7`, `FS8`, ...

One will create also new `GROUP_MA` (called `nogma`) containing the whole of the meshes `QUAD4` created.

4.11.1 Operand NAME

Name of the group of meshes made up of the voluminal meshes created at the time of this operation.

4.11.2 Operands GROUP_NO_1/GROUP_NO_2

Groups of node constituting the lips of the crack. The group of node `GROUP_NO_1` carry the local nodes 1 and 2 (the first node of the group has a local classification equalizes to 1), it `GROUP_NO_2` carry the local nodes 3 and 4 (the first node of the group has a local classification equalizes to 4). It is necessary to choose these groups of nodes according to the geometry so that the local classification of the elements is carried out in the trigonometrical direction.

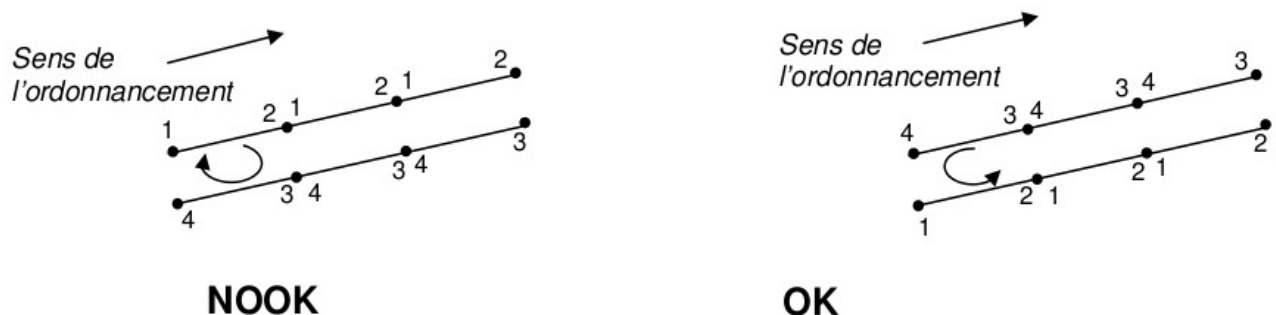


Illustration 1: Scheduling of the segments

4.11.3 Operands PREF_MAILLE/PREF_NUME

As for `MODI_MAILLE`.

4.12 Keyword ECLA_PG

◇ `ECLA_PG`

This keyword factor does not have to be used directly. It is used by the order `MACR_ECLA_PG` [U4.44.14].

4.13 Keyword GEOM_FIBRE

◇ `GEOM_FIBRE`

This key word makes it possible to obtain the grid created by `DEFI_GEOM_FIBRE` [U4.26.01]. This grid contains the whole of the groups of fibres of the study as well as the grid containing all fibres.

4.14 Keyword RESTRICTED

This keyword factor (non-répétable) makes it possible to generate “under” grid extracted from an existing grid.

Grid `ma_2` extract (or “restricted”) is formed starting from a list of meshes provided by the user.

4.14.1 Meshes

Keywords `GROUP_MA` and `MESH` allow to define the meshes of the restricted grid. All meshes of the groups of meshes `lgma` and all meshes of `lmail` are retained.

4.14.2 Nodes

The nodes selected are those of the meshes selected. Moreover, if the keyword `GROUP_NO=lgno` is used, the nodes of the groups of `lgno` are added.

4.14.3 Groups of meshes

Grid `ma_2` will contain all them `GROUP_MA` of `lgma`. Moreover, if the keyword `TOUT_GROUP_MA='OUI'` is used, the groups of meshes of `ma_1` not vacuums are added.

4.14.4 Groups of nodes

Grid `ma_2` will contain all them `GROUP_NO` of `lgno`. Moreover, if the keyword `TOUT_GROUP_NO='OUI'` is used, the groups of nodes of `ma_1` not vacuums are added.

4.15 Operand INFORMATION

◇ `INFORMATION = inf`

Specify the information printed in the file message (1: no impression, 2: details on the number of meshes create, modified...).

4.16 Operand TITLE

◇ `TITLE = tit`

Allows to specify a title.

5 Examples

5.1 Duplication of meshes

That is to say `ma_1` a grid containing the meshes already:

```
M1 M2 M3
```

and groups it meshes:

```
hull: M1 M2
```

Each mesh `S` supports on the following nodes :

```
M1: N1 N2 N3
M2: N3 N4 N5
M3: N4 N5 N6
```

```
ma_2 = CREA_MAILLAGE ( GRID = ma_1,
                      CREA_MAILLE = _F ( NAME = ground,
                                          GROUP_MA = 'hull',
                                          PREF_MAILLE = 'with',
                                          PREF_NUME = 100, ),
                      )
```

After call to the order `CREA_MAILLAGE` , the new grid contains then:

- groups of meshes:
 - hull (initial)
 - ground = (meshes: A100 A101)
- the meshes are based on the following nodes:
 - M1: N1 N2 N3
 - M2: N3 N4 N5
 - M3: N4 N5 N6
 - A100 : N1 N2 N3
 - A101 : N3 N4 N5

5.2 Transformation of triangles with 6 nodes into triangles with 7 nodes

```
ma_2 = CREA_MAILLAGE ( GRID = ma_1,
                      MODI_MAILLE = _F ( GROUP_MA = 'triangle',
                                          OPTION = 'TRIA6_7',
                                          PREF_NOEUD = 'NMI',
                                          PREF_NUME = 10, ),
                      )
```

Let us suppose that in `ma_1` `GROUP_MA` triangle is composed of two meshes `M1`, `M2` having the following nodes:

```
M1: N1 N2 N3 N4 N5 N6
M2: N1 N2 N7 N4 N8 N9
```

In the grid `ma_2`, two meshes `M1`, `M2` will have the following nodes:

```
M1: N1 N2 N3 N4 N5 N6 NMI10
M2: N1 N2 N7 N4 N8 N9 NMI11
```

5.3 Transformation of quadrangles with 4 nodes into triangles with 3 nodes

This example is resulting from test `SSLV04E`:

The geometry, representing a quarter of disc, is with a grid in quadrangle. It is wished that a eighth of the disc be with a grid in triangle.

```
my = CREA_MALLAGE ( GRID = m0,  
                   MODI_MAILLE = _F ( GROUP_MA      = 'S2',  
                                     OPTION          = 'QUAD_TRIA3',  
                                     PREF_MAILLE     = 'Ms',  
                                     PREF_NUME      = 1,      ),  
                   )
```