

Operator MODI_MAILLAGE

1 Goal

To carry out modifications on an existing grid. The possibilities of modifications are:

- to reorientate meshes of edge being used to apply a pressure,
- to reorientate the meshes `HEXA8` modeling `SHB`,
- to check the orientation of the normals on the elements of hull,
- to reorientate the meshes of full-course of elements of joint,
- to reactualize the grid starting from a deformation calculated previously,
- to transform a grid of plate into grid of tube, then possibly of elbow, (macro order `MACR_ASCOUF_MAIL`),
- to transform a grid of square into grid of pricking (`MACR_ASPIC_MAIL`),
- in a grid with bottom of crack, to move the nodes mediums of the edges touching the bottom of crack to the quarter of these edges,
- to relocate a grid,
- to impose one or more rotations of unspecified axes on a grid,
- to generate a symmetrical grid compared to a plan in 3D or a line in 2D.
- to calculate the curvilinear X-coordinate along a formed line by linear elements (`SEG`)
- to modify the coordinates of the nodes by chance

Product a structure of data of the type `grid` or the structure of data (operator entering `D`) modifies.

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2 Syntax

```
netted [grid] = MODI_MAILLAGE

(
  ♦ reuse      = netted,
  ♦ GRID      = my,                                [grid]

  ♦ ORIE_FISSURE = _F (
    ♦ GROUP_MA = l_gm                                [l_gr_ma]
  ),

  ♦ ORIE_SHB    = _F (
    ♦ GROUP_MA = l_gm                                [l_gr_ma]
  ),

  ♦ DEFORM     = _F (
    ♦ OPTION    = 'TRAN',
    ♦ / DEPL    = depl, [cham_no]
    ♦ / RISK    = epsi, [R]
  ),

  ♦ ORIE_PEAU_2D = _F (
    ♦ GROUP_MA   = lgrma, [l_gr_ma]
    ♦ GROUP_MA_SURF= l_gms), [l_gr_ma]
  ),

  ♦ ORIE_PEAU_3D = _F (
    ♦ GROUP_MA   = lgrma, [l_gr_ma]
    ♦ GROUP_MA_VOLU= l_gmv), [l_gr_ma]
  ),

  ♦ ORIE_NORM_COQUE= _F (
    ♦ GROUP_MA   = lgrma, [l_gr_ma]
    ♦ VECT_NORM  = (n1, N2, [n3]), [l_R]
    ♦ / NODE     = No, [node]
    ♦ / GROUP_NO= grno, [gr_no]
  ),

  ♦ ORIE_LIGNE= _F (
    ♦ GROUP_MA   = lgrma, [l_gr_ma]
    ♦ VECT_TANG  = (n1, N2, [n3]), [l_R]
    ♦ / NODE     = No, [node]
    ♦ / GROUP_NO= grno, [gr_no]
  ),

  ♦ MODI_MAILLE = _F (
    ♦ OPTION    = 'NOEUD_QUART',
    ♦ / | GROUP_MA_FOND= lgma_fo, [l_gr_ma]
    ♦   | MAILLE_FOND  = lma_fo, [l_maille]
    ♦ / | GROUP_NO_FOND= lgno_fo, [l_gr_no]
    ♦   | NOEUD_FOND   = lno_fo, [l_noeud]
  ),
)
```

```

◇ / EQUÉ_PQUA = _F ( ◇ GROUP_NO = square, [gr_no]
                    ◇ E_BASE = thickness, [R]
                    ◇ DEXT_BASE = diameter, [R]
                    ◇ L_BASE = length, [R]
                    ◇ L_CHANF = length, [R]
                    ◇ H_SOUD = height, [R]
                    ◇ ANGL_SOUD = angle, [R]
                    ◇ JEU_SOUD = game, [R]
                    ◇ E_CORP = thickness, [R]
                    ◇ EXT_CORP = diameter, [R]
                    ◇ AZIMUTH = angle, [R]
                    ◇ X_MAX = length, [R]
                    ◇ RAFF_MAIL = raff, [Txm]
                    ◇ TYPE = / 'TYPE_1' , [Txm]
                               / 'TYPE_2' ,
                    ) ,
/ | PLAQ_TUBE = _F ( ◇ DEXT = Of, [R]
                    ◇ THICK = E, [R]
                    ◇ AZIMUTH = / Q, [R]
                               / 90. , [DEFECT]
                    ◇ L_TUBE_P1 = l_tube_p1, [R]
                    ◇ SEAM = / 'YES', [DEFECT]
                               / 'NOT',
                    ) ,
| TUBE_COUDE = _F ( ◇ ANGLE =  $\alpha$  [R]
                    ◇ R_CINTR = Rc, [R]
                    ◇ L_TUBE_P1 = l_tube_p1, [R]
                    ) ,
◇ TRANSLATION = (n1, N2, [n3]), [l_R]
◇ ROTATION = _F ( ◇ POIN_1 = (n1, N2, [n3]), [l_R]
                  ◇ / POIN_2 = (n1, N2, [n3]), [l_R]
                  ◇ / DIR = (n1, N2, [n3]), [l_R]
                  ◇ ANGLE = / has, [R]
                               / 0. , [DEFECT]
                  ) ,
◇ SCALE = n1, [R]
◇ MODI_BASE = _F ( ◇ VECT_X = (n1, N2, [n3]), [l_R]
                  ◇ VECT_Y = (n1, N2, [n3]), [l_R]
                  ) ,
◇ SYMMETRY = _F ( ◇ NOT = (n1, N2, [n3]), [l_R]
                  ◇ AXE_1 = (n1, N2, [n3]), [l_R]
                  ◇ AXE_2 = (n1, N2, n3), [l_R]
                  ) ,
◇ ABSC_CURV = _F ( ◇ / ALL = 'YES' ,
                  ◇ / | GROUP_MA = (gm1, gm2,...), [l_gr_ma]
                    | MESH = (m1, m2,...), [l_maille]
                    ◇ / GROUP_NO_ORIG = gnorig, [gr_no]
                    ◇ / NOEUD_ORIG = norig, [node]
                  ) ,

```

Code_Aster

Version
default

Titre : Opérateur MODI_MALLAGE
Responsable : PELLET Jacques

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de1e2365c628

```
    ◇ INFORMATION = / 1,  
  [DEFECT]  
    / 2,  
  )
```

3 Operands

3.1 Operand GRID

- ◆ GRID = my,
Grid of the type [grid] on which will amend and/or checks.

3.2 Operand INFORMATION

- ◇ INFORMATION =
Indicate the level of impression of the results of the operator,
 - 1 = no impression,
 - 2 = impression of the meshes whose connectivity was modified, including the impression of old and new connectivities.

The impressions are done in the file 'MESSAGE'.

3.3 Keyword ORIE_FISSURE

- ◇ ORIE_FISSURE =
This keyword is used to reorientate (if necessary) the meshes of a group forming "mono lay down" elements. It functions in 2D or 3D, with a linear or quadratic grid [Figure 3.4-a].

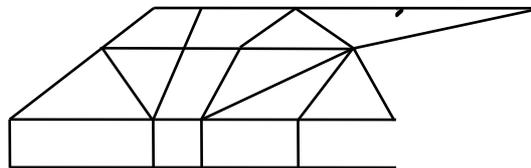


Figure 3.4-a

Currently, this keyword is used to reorientate the elements of joint and the elements of interface (modelings `AXIS_xxx`, `PLAN_xxx` and `3D_xxx` with `xxx=JOINT` or `INTERFACE`).

The user specifies (with the keyword `GROUP_MA`) which are the meshes candidates with the reorientation (the "mono one sleeps"). These meshes must be "prisms" (`QUAD` in 2D, `HEXA` and `PENTA` in 3D).

The "transverse" direction with the layer is given in a topological way (and not according to a criterion of flatness). To be able to be reorientated, the elements of the layer must be pressed (via the bases of the prisms) on other of the same meshes dimension (2D or 3D) which do not belong to the group of the meshes to be reorientated.

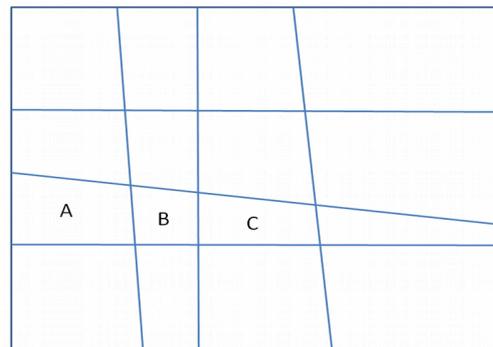
That is to say the grid (2D) opposite.

One wishes to reorientate the group of the 3 meshes `WITH`, `B` and `C`.

For the meshes `With` and `B`, the meshes of support (with the top and the lower part) determine a nonambiguous transverse orientation (vertical).

On the other hand, the mesh `C` has 3 meshes of support high (, low, right-hand side) and one cannot determine the transverse direction.

The algorithm of reorientation will fail.



Note:

The "reorientation" which one speaks here actually consists in modifying the definition of the connectivity of the meshes. For example, in 2D, convention is that sides 2 and 4 of the quadrangles are transverse with the layer.

- ◆ GROUP_MA= l_gm,

List of the groups of meshes which one wishes the checking (and possibly modification) of the orientation.

3.4 Keyword ORIE_SHB

- ◇ ORIE_SHB =

The purpose of this keyword factor is to correctly reorientate the voluminal meshes of finite elements SHB. It is necessary to modify the local classification of the nodes of the meshes to be able to recognize the direction of the normal to the hull.

The connectivity of the meshes thus is possibly modified by this operator.

- ◆ GROUP_MA= l_gm,

List of the groups of meshes which one wishes the modification of the orientation.

3.5 Keyword DEFORMATION

- ◆ DEFORM / OPTION = ' TRAN '

Option allowing to add to the initial geometry of the grid my:

- values of TRANslation (dx, Dy (+ dz in 3D)) field of displacement `depl` given by the keyword `DEPL` ;
- Or a random quantity.

/ DEPL = depl,

Field of displacement being used to reactualize the geometry

/ RISK = epsi,

One adds to each coordinate of each node of the grid a quantity (`delta`) random.

This quantity is obtained by the formula: `delta=epsi*dim*alea ()`

Where:

- `epsi` is a number provided by the user (1.e-8 for example)
- `dim` is the dimension of the grid in the direction concerned with the component (X, Y or Z)
- `risk ()` is a function turning over a pseudo-random number in the interval
- [- 1.1].

Note:

The possibility of modifying by chance the coordinates of a grid is, a priori, a functionality of "developer". It is dangerous in certain situations: very flattened meshes (joined,...)

3.6 Keywords ORIE_PEAU_2D / ORIE_PEAU_3D

- ◇ ORIE_PEAU_2D =
- ◇ ORIE_PEAU_3D =

These keywords are used to reorientate meshes of edge so that their normals are coherent (towards the outside of the matter). It is an essential precondition if, for example, one wants to apply a loading of pressure to this "skin".

- ◆ GROUP_MA = lgrma, [l_gr_ma]

Groups of meshes to be reorientated.

The meshes are directed in such way that the normal is outgoing. For each mesh of edge (edge or face), one seeks the "voluminal" mesh which it "borders". One directs it in such way that its normal is direction opposed to the vector connecting its first node to the barycentre of the voluminal mesh.

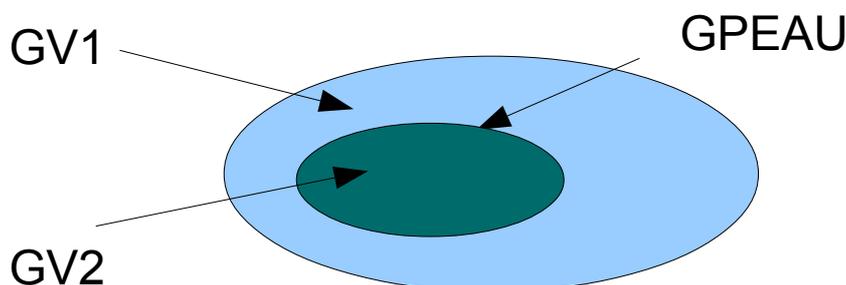
It happens sometimes that the "skin" which one wishes to direct is inserted in the matter (for example, when one does a calculation for which, of the meshes is gradually added or withdrawn from the model: modeling of an excavation, or a construction by layers). The algorithm of orientation describes above fails then because one in general finds 2 meshes voluminal on both sides of the mesh of skin. One does not know then which to use to direct the mesh of skin.

For that, one introduced the keywords optional GROUP_MA_VOLU (or GROUP_MA_SURF in the case 2D). These keywords make it possible to the user to specify which are the "voluminal" meshes to use to direct the meshes of skin.

Example:

That is to say 1 group of mesh of skin (GPEAU) that one wants to direct with a directed normal towards outside. It should be indicated that it is the skin of the group of "voluminal" meshes GV2. One will write:

```
ORIE_PEAU_2D=_F (GROUP_MA=' GPEAU', GROUP_MA_SURF=' GV2'),
```



3.7 Keyword ORIE_NORM_COQUE

◇ `ORIE_NORM_COQUE = _F (`

This keyword is used to check that in a list of surface meshes (hulls), the normals are coherent between them. In the contrary case, certain meshes are reorientated.

◆ `GROUP_MA = lgrma, [l_gr_ma]`

Surface groups of meshes to reorientate. Meshes of `lgrma` must form a "related" group so that one can reorientate them by continuity.

One can impose the sense of direction using the keywords `NOEUD/GROUP_NO/VECT_NORM`. If it is not done, the followed orientation will be that of the 1st mesh of `lgrma`, but it is not inevitably the 1st mesh of 1st `GROUP_MA` ! It is thus advised always to use the keyword `VECT_NORM`.

◇ `VECT_NORM = (n1, N2, [n3]), [l_R]`

`nor` : 2 or 3 components (according to dimension) of the normal vector. It is also necessary to specify the node support of this normal:

◇ `/ NODE = node, [node]`
`/ GROUP_NO = grno, [gr_no]`

`grno` must be one `GROUP_NO` containing one node.

The selected normal will be that which forms an acute angle with the vector given by `VECT_NORM`.

3.8 Keyword ORIE_LIGNE

◇ `ORIE_LIGNE = _F (`

This keyword is used to check that in a list of linear meshes (beams), the tangents are coherent between them. In the contrary case, certain meshes are reorientated.

◆ `GROUP_MA = lgrma, [l_gr_ma]`

Linear groups of meshes to reorientate. Meshes of `lgrma` must form a "related" group so that one can reorientate them by continuity.

One can impose the sense of direction using the keywords `NOEUD/GROUP_NO/VECT_TANG`. If it is not done, the followed orientation will be that of the 1st mesh of `lgrma`, but it is not inevitably the first mesh of the first `GROUP_MA` ! It is thus advised always to use the keyword `VECT_TANG`.

◇ `VECT_TANG = (n1, N2, [n3]), [l_R]`

`nor` : 2 or 3 components (according to dimension) of the tangent vector. It is also necessary to specify the node support of this normal:

◇ `/ NODE = node, [node]`
`/ GROUP_NO = grno, [gr_no]`

`grno` must be one `GROUP_NO` containing one `Nœud`.

The selected tangent will be that which forms an acute angle with the vector given by `VECT_TANG`.

3.9 Keyword MODI_MAILLE

- ◆ OPTION = 'NOEUD_QUART' ,

Activate the displacement of the nodes mediums of the edges touching the bottom of crack to the quarter of these edges (towards the bottom of crack).

```
◆ / | GROUP_MA_FOND = lgma_fo, [l_gr_ma]
    | MAILLE_FOND   = lma_fo , [l_maille]

    / | GROUP_NO_FOND = lgno_fo, [l_gr_no]
    | NOEUD_FOND    = lno_fo , [l_noeud]
```

In 2D, one returns the node of the bottom of crack (by NOEUD_FOND or GROUP_NO_FOND).

In 3D, one returns either the nodes of the bottom of crack, or meshes SEG3 of the bottom of crack (and not meshes of the lips of the crack or the matter meshes leaned with the bottom).

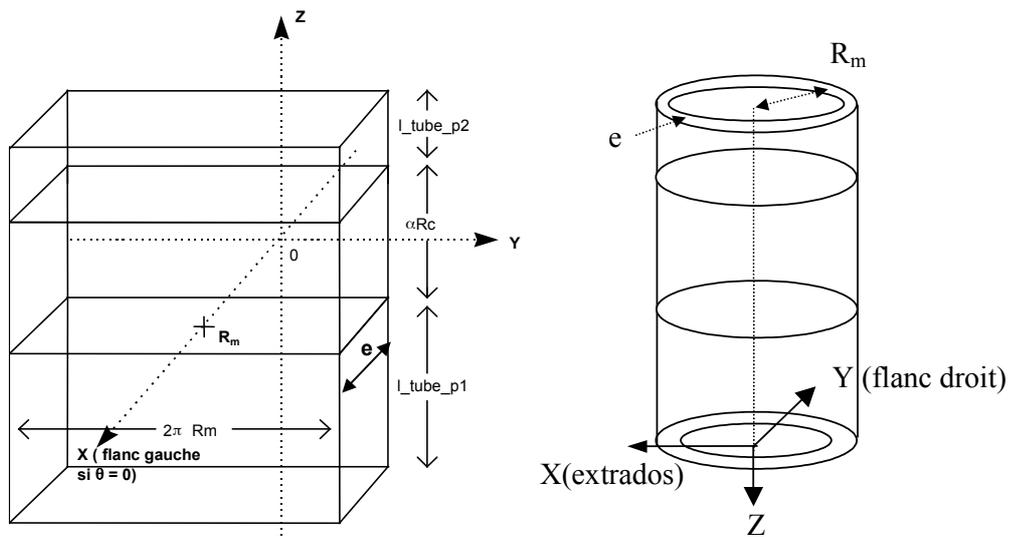
3.10 Keyword PLAQ_TUBE

Caution

[This functionality is called by the macro-order MACR_ASCOUF_MAIL.

/ | PLAQ_TUBE =

Keyword factor for the transformation of the grid of a plate thickness e and of width $2\pi R_m$ in a grid of tube per rolling up around the axis (Z), rotation of an angle θ given around the axis (Z) and change of reference mark:



◆ DEXT = Of,
Diameter external of the tube $(2R_m + e)$.

◆ THICK = E,
Thickness of the tube or the plate.

◇ AZIMUTH = θ ,
Swing angle in degrees (counted positively starting from the suction face to the under-surface via the left side) applied to the tube starting from initial rolling up (useful for the positioning of a crack defined on the plate). The angle $\theta = 90^\circ$ corresponds to a crack located at the center of the plate and consequently on the left side of the tube.

◆ L_TUBE_P1 = l_tube_p1,
Length of the lower end (intervenes in the change of reference mark). It is recommended to take an end length higher than the length of damping of the wave of inflection being propagated since the part bends and being worth $L_{amor} = \frac{3}{2} \sqrt{\frac{R_m^3}{e}}$.

◇ SEAM = / 'YES', [DEFECT]
/ 'NOT',

In the case of a grid of a quarter of structure (keyword SYME of MACR_ASCOUF_MAIL for a grid with only one under-thickness), this keyword SEAM is used to prevent the sticking together ('NOT') at the time of the transformation into tube.

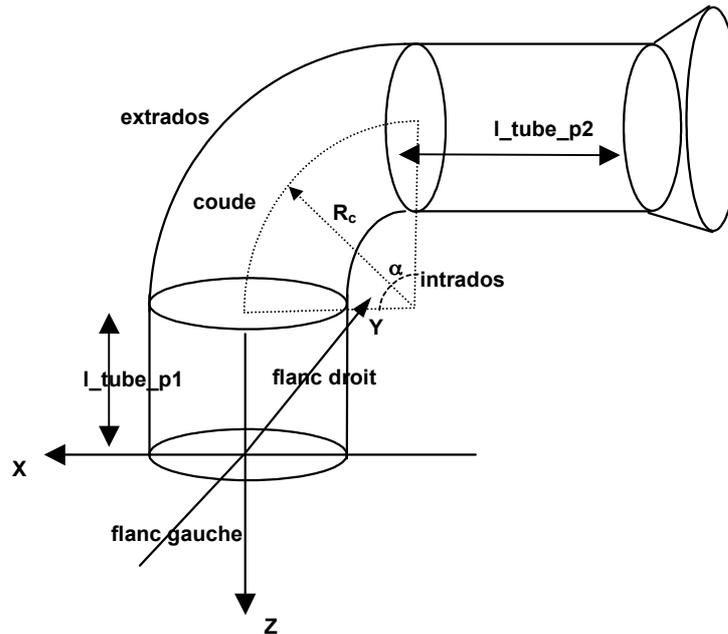
3.11 Keyword TUBE_COUDE

Caution

| This functionality is called by the macro-order `MACR_ASCOUF_MAIL`.

| TUBE_COUDE =

Keyword factor for the transformation of the grid of tube into a grid of elbow.



- ◆ ANGLE = α .

Angle in degrees of the elbow.

- ◆ R_CINTR = R_c ,

Value of the ray of bending of the elbow.

- ◆ L_TUBE_P1 = l_tube_p1 ,

Length of the lower end of the tube (intervenes in the change of reference mark). It is recommended to take an end length higher than the length of damping of the wave of

inflection being propagated since the part bends and being worth $L_{amor} = \frac{3}{2} \sqrt{\frac{R_m^3}{e}}$.

3.12 Keyword `EQUE_PIQUA`

Caution

|This functionality is called by the macro-order `MACR_ASPIC_MAIL`.

◇ `EQUE_PIQUA` =

Keyword factor for the transformation of the grid of thick square into a grid of pricking.

◆ `GROUP_NO` = `square`, [gr_no]

Group of nodes undergoing the transformation.

◆ `E_BASE` = `thickness`, [R]

Value thickness of the pipe in the zone of connection with the body.

◆ `DEXT_BASE` = `diameter`, [R]

Value of the diameter external of the pipe in the zone of connection with the body.

◆ `L_BASE` = `length`, [R]

Value length of the base of the pipe counted starting from surface external of the body.

◆ `L_CHANF` = `length`, [R]

Value length of the chamfer.

◆ `H_SOUD` = `height`, [R]

Value height of the welding counted starting from surface external of the body.

◆ `ANGL_SOUD` = `angle`, [R]

Value of the angle of the welding **in degrees**.

◆ `JEU_SOUD` = `game`, [R]

Value of the space located between the body and the pipe representing the game of the welding.

◆ `E_CORP` = `thickness`, [R]

Value thickness of the body.

◆ `DEXT_CORP` = `diameter`, [R]

Value of the diameter external of the pipe with the top of the chamfer.

◆ `AZIMUTH` = `angle`, [R]

Position of the center of the crack, counted positively starting from the axis X body.

◆ `X_MAX` = `length`, [R]

Value length of the body on both sides of the origin of the reference mark specifying the localization of the torque of effort. This value must correspond to the computed value with a relative precision of thousandths.

◆ `RAFF_MAIL` = / `'LARGE'`,
/ `'FINE'`,

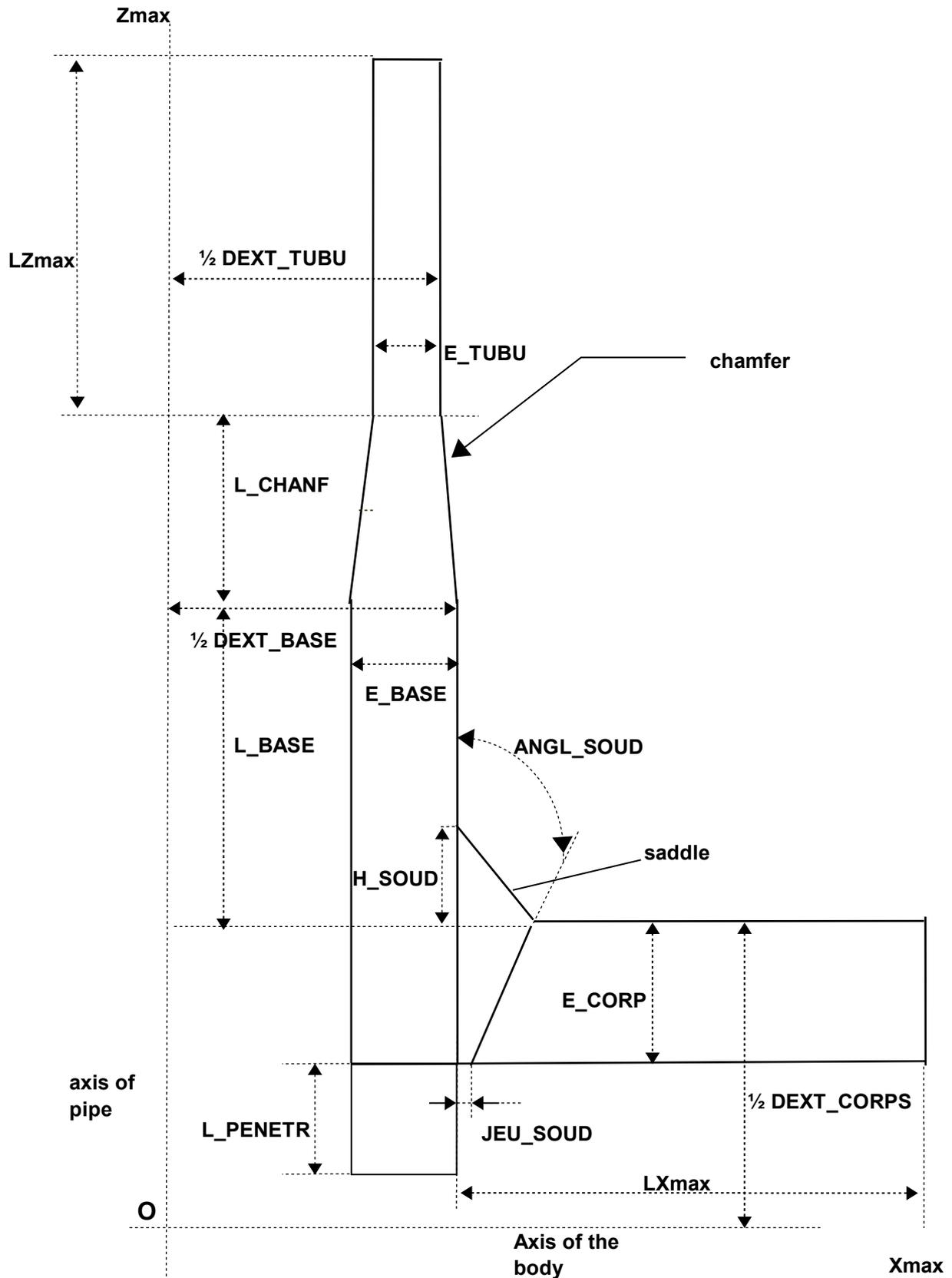
Is used to indicate if one wants a grid coarse or fine around the crack.

Maximum dimensions of the body (X_{max}) and of the pipe (Z_{max}) are calculated starting from the maximum the two lengths of damping $\max\left(\frac{3}{2}\sqrt{\frac{R_m^3}{e}}, 3\sqrt{R_m \cdot e}\right)$ noted respectively LX_{max} and LZ_{max} . These lengths of damping are counted starting from the foot of welding (according to X) and with the top of the chamfer (according to Z).

In the pipe, one will take for LZ_{max} the maximum of maximum calculated with R_m and it e corresponding respectively to the base of the pipe or the current part of the pipe, the top of the chamfer.

One thus obtains:

$$\begin{aligned} X_{max} &= LX_{max} + 1/2 \text{ DEXT_BASE} \\ Z_{max} &= LZ_{max} + 1/2 \text{ DEXT_CORP} + L_BASE + L_CHANF \end{aligned}$$



i

of the various geometrical parameters of pricking with a welding of the type 1

Descr
ption

- ◆ TYPE = / 'TYPE_1', [Txm]
/ 'TYPE_2',
The position of the welding, cf [U4.PC.10] defines.
/ 'TYPE_1' the bevel of the welding is located in the body
/ 'TYPE_2' the bevel of the welding is located in the pipe

3.13 Keyword TRANSLATION

Caution

One can combine this functionality with ROTATION, but these operations are not commutative. The translation is always carried out before rotation. One cannot combine this functionality with SYMMETRY.

- ◇ TRANSLATION = (n1, N2, [n3]), [1_R]
Simple keyword for the translation of a grid following a vector.

3.14 Keyword ROTATION

Caution

One can combine this functionality with TRANSLATION, but these operations are not commutative. On the other hand, it is not authorized to use ROTATION, MODI_BASE and SYMMETRY at the same time. The translation is always carried out before rotation.

- ◇ ROTATION =
Keyword factor for the unspecified rotation of axis of a grid.
- ◆ POIN_1 = (nor, N2, [n3]), [1_R]
Coordinates of the first point to define the axis of rotation.
- ◆ / POIN_2 = (nor, N2, [n3]), [1_R]
/ DIR = (nor, N2, [n3]), [1_R]
Coordinates of the second point or direction to define the axis of rotation completely.
- ◆ ANGLE = has, [R]
Swing angle expressed in degrees.

Rotation is done in the direct direction, compared to its directed axis. This axis passes by the point POIN_1 and its orientation is given, that is to say by the vector DIR, that is to say by the vector of origin POIN_1 and of end POIN_2.

Rotation is defined by:

That is to say $\mathbf{M}(x, y, z)$ a point of space, one imposes a rotation of angle to him α (in radians) whose axis passes by $\mathbf{P}(px, py, pz)$ and has as a direction $\mathbf{D}(dx, dy, dz)$. Then \mathbf{M} becomes \mathbf{M}' after rotation:

$$\mathbf{M}' = \mathbf{P} + \cos \alpha \cdot \mathbf{PM} + (1 - \cos \alpha) \cdot (\mathbf{PM} \cdot \mathbf{D}) \cdot \mathbf{D} + \sin \alpha (\mathbf{D} \wedge \mathbf{PM})$$

3.15 Keyword SCALE

Caution

*This functionality is usable with TRANSLATION and ROTATION . The scaling, when she is asked, is always made afterwards TRANSLATION and ROTATION .
One cannot combine this functionality with SYMMETRY.*

◇ SCALE = n1, [R]

Simple keyword for the setting at the level of a grid according to a reality.

That is to say $\mathbf{M}(x, y, z)$ a point of the grid,
it will become, by this transformation of report $n1$: $\mathbf{M}'(n1 \cdot x, n1 \cdot y, n1 \cdot z)$.

3.16 Keyword MODI_BASE

Caution

This functionality is not authorized with ROTATION and SYMMETRY .

◇ MODI_BASE =

Keyword factor for the basic change in which one expresses the coordinates of a grid. The change of reference mark always takes place between 2 orthonormal bases.

◆ VECT_X = (n1, N2, [n3]), [1_R]

Coordinated first vector of the new base, unspecified standard.

◇ VECT_Y = (n1, N2, [n3]), [1_R]

Coordinated second vector of the new base (not used in 2D), also of unspecified standard.

In 2D, it is enough to give the axis VECT_X, and Code_Aster automatically built the second vector to define a direct orthogonal base. A test checks if VECT_X is of nonworthless standard.

In 3D, it is checked that VECT_X and VECT_Y are of nonworthless standard and it is checked that they are orthogonal. The third vector which supplements the base is built as being the vector product of VECT_X with VECT_Y. One thus makes sure construction of a direct orthogonal base.

Then, in all the cases (2D and 3D), the vectors of the base are normalized to 1, the user does not have thus to be concerned with it. There is thus finally a direct orthonormal base.

In 3D, one thus expects the data of VECT_X and VECT_Y, the first two vectors of the new base. Then the basic change is defined as:

3.17 Keyword SYMMETRY

Caution

|One cannot combine this functionality with TRANSLATION, ROTATION, SCALE and MODI_BASE.

- ◆ NOT = (n1, N2, [n3]) [1_R]
Punctual coordinates pertaining to the right-hand side in 2D or the plan in 3D.
- ◆ AXE_1 = (n1, N2, [n3]) [1_R]
Directing vector of the right-hand side in 2D or 1^{er} vector allowing to describe the plan.
- ◆ AXE_2 = (n1, N2, n3) [1_R]
2nd vector allowing to describe the plan.

In 2D, symmetry is done compared to a line, which is in the plan OXY . To define this line it is necessary to give the directing vector of the right-hand side (AXE_1) and a point (NOT) belonging on this line.

In 3D, symmetry is done compared to a plan. To define this plan, it is necessary to give 2 vectors of the plan (AXE_1, AXE_2) and a point (NOT) belonging to this plan.

In all the cases (2D or 3D), symmetry is carried out compared to a plan. In 2D, the second vector necessary to the definition of the plan is fixed at $AXE_2 = (0.0, 0.0, -1.0)$.

The algebraic distance δ between a point $\mathbf{M}(x, y, z)$ and a plan passing by the point $\mathbf{Mo}(x_0, y_0, z_0)$ with for perpendicular vector $\mathbf{V} = AXE_1 \wedge AXE_2 = (a, b, c)$ is:

$$\delta = \frac{a(x-x_0) + b(y-y_0) + c(z-z_0)}{\sqrt{a^2 + b^2 + c^2}}$$

Coordinates of the point \mathbf{M}' symmetrical of the point \mathbf{M} compared to the plan are given by:

$$OM' = -2\delta \cdot \frac{\mathbf{V}}{\|\mathbf{V}\|} + OM$$

3.18 Keyword ABS_CURV

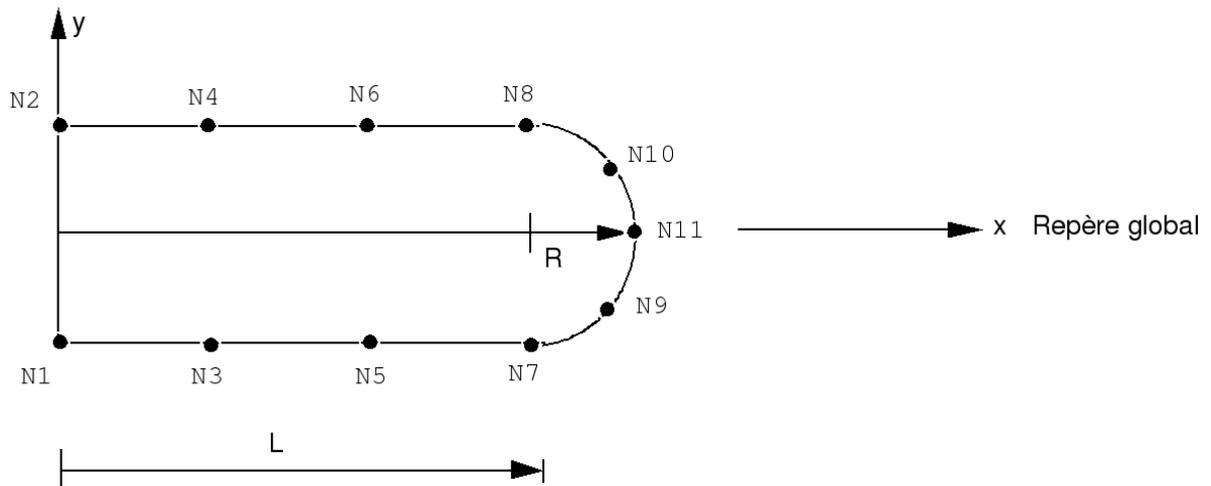
- ◆ ABS_CURV = _F (...),

Calculate the curvilinear X-coordinate for the whole of the meshes SEG provided via the keywords GROUP_MA, MESH or TOUT=' OUI '.

For each node of the meshes concerned, one calculates his curvilinear X-coordinate by taking account of his possible curve.

Keywords GROUP_NO_ORIG (or NOEUD_ORIG) allow the user to choose the origin of the curvilinear X-coordinates (the node where the X-coordinate is worthless). The origin must be one of the ends of the line on which one wants to calculate the curvilinear X-coordinate.

This option is necessary, for example, to carry out a modal calculation for a tube with external fluid and intern, when the density of the external fluid is defined according to the curvilinear X-coordinate.



Note:

- All the meshes concerned must be of the type `SEG2`, `SEG3` or `SEG4`.
- Meshes of the type `SEG2` are regarded as right-hand sides and the meshes `SEG3` and `SEG4` are supposed in the shape of arc of a circle.