

## Operator MACR\_LIGN\_COUPE

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### 1 Goal

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Extraction in a table of the values of a result on lines of cut defined by two points and an interval or groups of nodes.

The result can be mechanical (`evol_elas`, `evol_noli`, `mode_meca`, `comb_fourier`, `mult_elas`, `fourier_elas`, `dyna_trans`) or thermics (`evol_ther`).

Principle:

This macro-order creates a grid linear, right and regular of segments to two nodes.

This grid can be:

- right, defined by the data of its ends and a number of intervals the component;
- curve, defined by the data of the center and the angle of a circle, first point of the line of cut, amongst wished points, and possibly of a normal vector to the plan containing the line of cut (in 3D only);
- unspecified, when the line of cut constitutes a way connecting the nodes of a group of nodes.

The fields of the provided result (by default displacement or temperature) are projected on this grid thanks to the order `PROJ_CHAMP`. Then the nodal values on the line of cut of the field post-to be treated are recovered in a table by `POST_RELEVE_T`. It is this table which is produced by the macro - order.

## 2 Syntax

```
[Table] = MACR_LIGN_COUPE (
♦ / RESULT = resu, [evol_elas, evol_noli, mode_meca, evol_ther,
                  comb_fourier, mult_elas, fourier_elas,
                  dyna_trans ]
  ◊ NOM_CHAM = / 'SIGM_NOEU', [So mechanical DEFECT]
              / 'TEMP', [So thermal DEFECT]
♦ / NUME_ORDRE = lordre, [1_I]
  / NUME_MODE = lmode, [listis]
  / LIST_ORDRE = lenti, [listis]
  / INST = llinst, [1_R]
  / LIST_INST = llinst, [listr8]
  ◊ PRECISION = / prec, [R]
              / 1.D-6, [DEFECT]
  ◊ CRITERION = / 'RELATIVE', [DEFECT]
              / 'ABSOLUTE',
              / CHAM_GD = field, [cham_no_DEPL_R, cham_no_TEMP_R,
                                  cham_no_SIEF_R, cham_elnos_SIEF_R]
◊ MODEL = MOD, [model]
◊ UNITE_MALLAGE = 25, [DEFECT]
◊ VIS_A_VIS = _F (
  ♦ GROUP_MA_1 = gma, [1_K8])
♦ LIGN_COUPE = _F (
  ♦ ENTITLE = txt, [KN]
  ♦ / NOM_CMP = lcmp, [1_K8]
    ◊ REFERENCE MARK = / 'TOTAL', [DEFECT]
                      / 'POLAR',
                      / 'LOCAL',
                      ◊ VECT_Y= (Oy1, Oy2, [Oy3]), [1_R]
                      / 'USER'
                      ♦ ANGL_NAUT= (has, B, G), [1_R]
                      / 'CYLINDRICAL'
                      ◊ ORIGINE= (x0, y0, [z0]), [1_R]
                      ◊ AXE_Z = (Oz1, Oz2, [Oz3]), [1_R]
    ◊ / TRAC_NOR = 'YES'
      / TRAC_DIR = 'YES',
      ♦ DIRECTION = (X, there, [Z]), [1_R]
  / INVARIANT = 'YES',
  / ELEM_PRINCIPAUX = 'YES',
  / RESULTANT = lcmp, [1_R])
```

```
◇ OPERATION = | 'EXTRACTION', [DEFECT]
              | 'AVERAGE',
◇ TYPE = / 'GROUP_NO'
          ◆ GROUP_NO = gno, [l_K8]
          / 'GROUP_MA'
          ◆ GRID = my, [grid]
          ◆ GROUP_MA = gma, [group_ma]
          ◇ GROUP_NO_ORIG= gnoA, [group_no]
          ◇ GROUP_NO_EXTR= gnoB, [group_no]
          ◇ VECT_ORIE = (vx, vy, [vz]), [l_R]
          / 'SEGMENT'
          ◆ NB_POINTS = nbpt, [I]
          ◆/COOR_ORIG = (x1, y1, [z1]), [l_R]
            / GROUP_NO_ORIG = gnoA, [group_no]
          ◆/COOR_EXTR = (x2, y2, [z2]), [l_R]
            / GROUP_NO_EXTR = gnoB, [group_no]
          / 'ARC'
          ◆ NB_POINTS = nbpt, [I]
          ◆ COOR_ORIG = (x1, y1, [z1]), [l_R]
          ◆ CENTER = (x0, y0, [z0]), [l_R]
          ◆ ANGLE = Q, [R]
          ◇ DNOR = (xa, there is, [za]), [l_R]
◇ DISTANCE_MAX = distmax, [R]
◇ DISTANCE_ALARME = distala, [R]
) , );
```

## 3 Operands

### 3.1 Operand RESULTAT/CHAM\_GD

◆ / RESULT = resu, [evol\_elas, evol\_noli, mode\_meca, evol\_ther,  
comb\_fourier, mult\_elas, fourier\_elas,  
dyna\_trans]

Name of the concept result of the type `evol` containing the field post-to be treated

/ CHAM\_GD = field, [cham\_no\_DEPL\_R, cham\_no\_TEMP\_R,  
cham\_no\_SIEF\_R, cham\_elno\_SIEF\_R]

Name of the concept of the field post-to be treated. The optional keyword `MODEL` must be well informed as soon as `CHAM_GD` is present.

### 3.2 Operands

**NUME\_ORDRE/NUME\_MODE/LIST\_ORDRE/INST/LIST\_INST/PRECI  
SION/CRITERION**

See documentation [U4.71.00]

### 3.3 Operand NOM\_CHAM

◆ NROM\_CHAM = / 'SIGM\_NOEU', [So mechanical DEFECT]  
/ 'TEMP', [So thermal DEFECT]  
/ field, [K16]

Name of the field of the result `resu` which one wishes to record the values on a line of cut. If this keyword is not indicated, one projects by default the stress field to the nodes calculated starting from displacements for result of a mechanical type and the temperature for result of a thermal type.

#### Note:

*The macro-order treats all types of fields: NODE, ELEM, ELNO.*

*It is disadvised using for the type of field ELNO, because LE result of projection DE field ELNO by PROJ\_CHAMP is sometimes a little diverting. For a node, one recovered its value in one of the meshes which contain it node. More detail in Chapter 3.13 [u4.72.05].*

### 3.4 Operand MODEL

◆ MODEL = model, [model]

Name of the model associated with the concept result `evol_xxx`. The model is necessary during the projection of the field by `PROJ_CHAMP`.

### 3.5 Operand UNITE\_MAILLAGE

◆ UNITE\_MAILLAGE = 25, [DEFECT]

Specify the logical number of unit in which the linear grid of the line of cut is created. This unit is by default 25; one gives to the user the opportunity of modifying it if unit 25 would be already assigned to another use in its study.

### 3.6 Operands VIS\_A\_VIS

◆ VIS\_A\_VIS = \_F (

◆ GROUP\_MA\_1 = gma, [1\_K8])

This keyword factor is used by the operator PROJ\_CHAMP and allows with its operand GROUP\_MA\_1 to restrict intended field to project. The user is invited to consult documentation [U4.72.05] for more information.

## 3.7 Keyword LIGN\_COUPE

◆ LIGN\_COUPE = \_F (

Keyword répétable allowing to define one or more lines of cut.

A line of cut is made up of segments with 2 nodes being able to describe:

- that is to say a straight line,
- that is to say an arc of a circle or a circle,
- that is to say an unspecified broken line.

In the first case, the line of cut is made up of a right segment, defined by its two ends and a number of regular intervals cutting out it.

In the second case, the line of cut is made up of homogeneous right segments, whose union forms an arc of a circle, or typical case a circle.

In the third case, the line of cut is defined starting from groups of nodes or groups of meshes of the grid: the line of cut is then the way defined by the succession of the nodes of the group.

### 3.7.1 Operand ENTITLE

◆ ENTITLE = txt, [KN]

Label of heading in the table allowing to distinguish the various lines from cut. If this keyword is not indicated, the label of heading is worth 'l.coupe (N)' where (N) is the number of occurrence of the line of cut.

### 3.7.2 Operand TYPE

This keyword makes it possible to define the type of line of cut which one wishes to create. It can be identified with SEGMENT, GROUP\_NO, GROUP\_MA or ARC.

#### 3.7.2.1 TYPE=' SEGMENT '

The line of cut is identified with a right segment, defined by its two ends and a number of regular intervals cutting out it.

#### 3.7.2.2 TYPE=' GROUP\_NO '

One defines the line of cut by the data of groups of nodes in the grid supporting the fields: the line of cut is then the way defined by the succession of the nodes of these groups.

#### 3.7.2.3 TYPE=' GROUP\_MA '

The line of cut is built starting from the nodes of a group of meshes made up of meshes of the type SEG. The line of cut is then the way defined by the succession of the nodes Réordonnés of this group. If the line is closed, it should be specified by indicating the nodes origin and end (for example with the keywords GROUP\_NO\_ORIG and GROUP\_NO\_EXTR). These 2 nodes must be identical. To impose the orientation of the line, one can use the keyword VECT\_ORIE.

For more details concerning these keywords, to consult the documentation of the keyword NOEUD\_ORDO order DEFI\_GROUP.

#### 3.7.2.4 TYPE=' ARC '

The line of cut is connected with an arc of a circle or a complete circle. It is defined by the following data:

- a first point corresponding at the origin of the circular line of cut,
- a second point corresponding to the center of the circle,
- an angle (expressed in degree) allowing to determine the end of the line of cut,
- a number of points constituting the line of cut,
- a normal vector with the plan containing the line of cut in 3D only.

### 3.7.3 Operand NB\_POINTS

◆ NB\_POINTS = Nb, [I]

Many points of the line of cut.

### 3.7.4 Operand COOR\_ORIG

◆ COOR\_ORIG = (x1, y1, [z1]), [l\_R]

Coordinates of the first point of the line of cut: 2 realities in the plan, 3 in space. This keyword is used for TYPE=' SEGMENT' or TYPE=' ARC'.

### 3.7.5 Operand GROUP\_NO\_ORIG

◆ GROUP\_NO\_ORIG= gnoA, [group\_no]

Name of the group of node defining the first point of the line of cut. This group should contain one node. This keyword is used for TYPE=' SEGMENT'.

### 3.7.6 Operand COOR\_EXTR

◆ COOR\_EXTR = (x2, y2, [z2]), [l\_R]

Coordinates of the last point of the line of cut: 2 realities in the plan, 3 in space. This keyword is used for TYPE=' SEGMENT'.

### 3.7.7 Operand GROUP\_NO\_EXTR

◆ GROUP\_NO\_EXTR= gnoB, [group\_no]

Name of the group of node defining the last point of the line of cut. This group should contain one node. This keyword is used for TYPE=' SEGMENT'.

### 3.7.8 Operand GROUP\_NO

◆ GROUP\_NO = gno, [grno]

This keyword makes it possible to extract the values on a group from nodes given. In the case of the treatment of fields to the nodes, it is perfectly similar to POST\_RELEVE\_T. This keyword is used only for TYPE=' GROUP\_NO'.

### 3.7.9 Operands GROUP\_MA and GRID

◆ GROUP\_MA = grma, [l\_grma]

This keyword makes it possible to make pass the group of meshes of type SEG used to extract the nodes there in order to reorder them before postprocessing.

◆ GRID = e-mail, [grid]

e-mail is the concept grid containing the group of meshes grma.

These keywords are used for TYPE=' GROUP\_MA'.

## 3.7.10 Operand DNOR

◇ DNOR = (xa, there is, [za]), [1\_R]

The vector to be transmitted to this keyword must be normal with the plan containing the line of circular cut.

In 2D: it is useless (DNOR = vector Z total reference mark)

In 3D: it makes it possible to define the direction of traverses line of cut (direct direction).

This keyword is used louser le TYPE=' ARC' .

## 3.7.11 Operand CENTER

◆ CENTER = (x0, y0, [z0]), [1\_R]

Coordinates of the point corresponding to the center of the circle support of the circular line of cut.

This keyword is used for TYPE=' ARC' .

## 3.7.12 Operand ANGLE

◆ WithNGLE = theta, [R]

It corresponds to the angle of the circle support of the circular line of cut (expressed in degree) which starting from its center, of the point origin and the plan containing the line of cut, the end of the line of cut determines. This keyword is used for TYPE=' ARC' .

## 3.7.13 Operands DISTANCE\_MAX and DISTANCE\_ALARME

◇ DISTANCE\_MAX = distmax, [R]

◇ DISTANCE\_ALARME = distala, [R]

These keyword are useful for the operator PROJ\_CHAMP.

If the distance between a node of the line of cut and the cut grid are higher than distmax , then this node will be ignored (not statement of value on this node).

If the distance between a node of the line of cut and the cut grid are higher than distala , an alarm will be emitted.

The user is invited to consult documentation [U4.72.05] for more information.

## 3.7.14 Operands INVARIANT/RESULTING ELEM\_PRINCIPAUX//OPERATION/ NOM\_CMP/TRAC\_NOR/TRAC\_DIR/DIRECTION/VECT\_Y/LOCATE

See documentation [U4.81.21] .

## 4 Example

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```
resu = STAT_NON_LINE (...);

tab1 = MACR_LIGN_COUPE ( RESULT = resu,
                        LIGN_COUPE = (
                            _F (TYPE= 'SEGMENT',
                                NB_POINTS = 17,
                                COOR_ORIG = (0. , 0. , 0.),
                                COOR_EXTR = (10. , 0. , 0.),
                                ENTITLE = 'ligne1',),
                            _F (TYPE= 'SEGMENT',
                                NB_POINTS = 25,
                                COOR_ORIG = (- 10. , 0. , 0.),
                                COOR_EXTR = (0. , 20. , 0.),
                                ENTITLE = 'ligne2',),
                        )
                    );

IMPR_TABLE (TABLE = tab1)
```

In this example, one records the values of the displacement obtained in the result `resu` at every moment of calculation on two lines of cut.

The table `tab1` contains the sequence numbers, the X-coordinates curvilinear, the coordinates of the points then finally the values of the nodal size (on the nodes of the line) of the treated field, here by default displacement.