

## Operator INTE\_MAIL\_2D

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### 1 Drank

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To define a curve in a 2D mesh. At the points of intersection of the curve thus defined with the mesh could be carried out, using operator `POST_RELEVE_T`, of the statements of values, computations (averages, invariants,...) and the storage of result of these operations in a concept of the type `counts`.

Product concept is of the curved `type`.

## 2 Syntax

```
crb [curve] = INTE_MAIL_2D

( ♦MAILLAGE = my, [mesh]

    ♦/TOUT=' OUI',
    /GROUP_MA =lgrma ,
[l_gr_maille]
    /MAILLE =lmail ,
[l_maille]

    ♦ / I DEFI_SEGMENT=_F (♦ /ORIGINE = (xa, it there a),
[l_R]
        /NOEUD_ORIG = node, [node]
        /GROUP_NO_ORIG = grno, [group_no]
        ♦ /EXTREMITE = (xb, yb), [l_R]
        /NOEUD_EXTR = node, [node]
        /GROUP_NO_EXTR = grno, [group_no]
    ),

    I DEFI_ARC = _F (♦ /CENTRE = (xc, yc), [l_R]
        /NOEUD_CENTRE = node, [node]
        /GROUP_NO_CENTRE = grno, [group_no]
        ♦ /♦ RADIUS =r , [R]
        ♦SECTEUR = (□inf, □sup), [l_R]
        /♦/ORIGINE = (xa, it there a),
[l_R]
        /NOEUD_ORIG = node, [node]
        /GROUP_NO_ORIG =grno,
[group_no]
        ♦ /EXTREMITE = (xb, yb), [l_R]
        /NOEUD_EXTR = node, [node]
        /GROUP_NO_EXTR =grno,
[group_no]
        ♦ accuracy = epsilon , [R]
        /0.001 , [DEFAULT]
        ♦ CRITERE = "RELATIF", [DEFAULT]
        / "ABSOLU",
    ),

    /♦DEFI_CHEMIN=_F ( ♦/MAILLE = mail,
[l_maille]
        /GROUP_MA = grma, [l_gr_maille]
    ),

    ♦ /NOEUD_ORIG =noeud , [node]
        /GROUP_NO_ORIG =grno , [group_no]

    ♦PRECISION =/epsilon ,
[R]
        /0.001 , [DEFAULT]

    ♦INFO =/1 ,
[DEFAULT]
        /2 ,
```

# Code\_Aster

Version  
default

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## 3 Operands

### 3.1 Operand MAILLAGE

◆MAILLAGE = my

my : name of the concept of mesh type on which the curve is located.

### 3.2 Operands TOUT / GROUP\_MA / MESH

apply only for DEFI\_SEGMENT and DEFI\_ARC.

◇/TOUT=' OUI ',

the location is carried out on all the mesh.

/GROUP\_MA =lgrma ,

the location is carried out only on the mesh groups of the list lgrma.

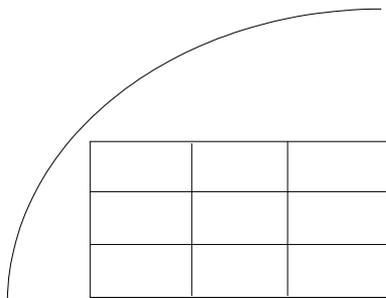
/MAILLE =lmail ,

the location is carried out only on meshes list lmail.

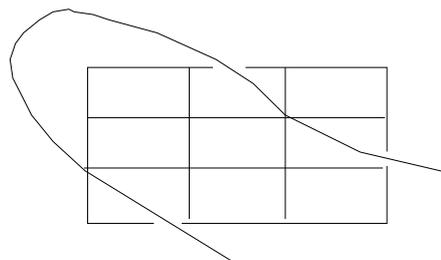
### 3.3 Path: Key words DEFI\_SEGMENT / DEFI\_ARC / DEFI\_CHEMIN

the path can be defined by one or more occurrences of DEFI\_CHEMIN, or one or more occurrences of DEFI\_ARC and DEFI\_SEGMENT sets.

If an occurrence of DEFI\_SEGMENT, DEFI\_ARC or DEFI\_CHEMIN defines a curve which does not cut the mesh, a message d'error fatal is transmitted.



refusé



accepté

#### 3.3.1 Key word DEFI\_SEGMENT

Key word factor whose each occurrence defines a line segment by the data of its points origin and ending (in the form of coordinates or of names of nodes or group\_no). The segment is directed origin towards the end.

## 3.3.2 Key word **DEFI\_ARC**

Key word factor whose each occurrence defines an arc of circle by the data of its center and, either of a radius and an angular sector, or of 2 points origin and end of the arc.

The center of the circle is introduced by one of the 3 keywords:

CENTER = (xc, yc), coordinated center of the circle,  
NOEUD\_CENTRE = node, name of the node centers circle,  
GROUP\_NO\_CENTRE = grno, name of the group\_no containing the only node centers,

the radius of the circle is introduced by the key word:

RADIUS = R with R > the 0

angular sector by the key word:

SECTEUR = ( $\theta_{inf}$ ,  $\theta_{sup}$ ) with ( $\theta_{inf}$ ,  $\theta_{sup}$ ) angles in degrees checking  
 $-180 < \theta_{inf} \leq \theta_{sup} \leq 180$

the point origin of the arc by one of the 3 key keys:

ORIGINE = (xa, ia) coordinates of the node origin,  
there a),  
NOEUD\_ORIG = node, name of the node origin,  
GROUP\_NO\_ORIG = grno, name of the group\_no containing the only node origin.

The point end of the arc by one of the 3 keywords:

ENDING = (xb, yb), coordinated ending node,  
NOEUD\_EXTR = node, name of ending node,  
GROUP\_NO\_EXTR= grno, name of the group\_no containing only ending node.

accuracy = epsilon

Accuracy valid for an occurrence of the key word factor **DEFI\_ARC**. Allows to overload the accuracy valid for all the command [§3.3].

CRITERE = "RELATIF", [DEFAULT]  
/ "ABSOLU",

If Q is the quantity searched with an accuracy  $\epsilon$ , then the interval of search is:

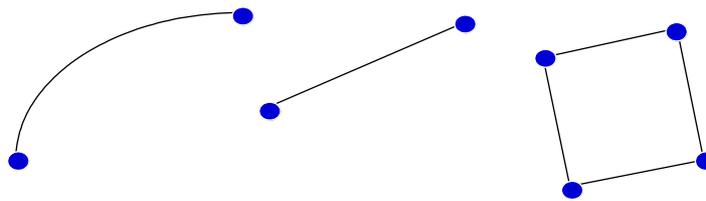
$[q(1-\epsilon), q(1+\epsilon)]$  in "RELATIF"  
 $[q-\epsilon, q+\epsilon]$  in "ABSOLU"

## 3.3.3 Key word **DEFI\_CHEMIN**

Key word factor whose each occurrence admits for argument a list of names of meshes (key word **NETS**) or a list of names of mesh groups (key word **GROUP\_MA**). These meshes being of type **SEG2** or **SEG3**.

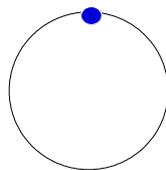
The path (or possibly paths) is made up from the meeting of different meshes. **INTE\_MAIL\_2D** analyzes this group to determine topology. It detects:

- the existence or not of several independent paths:

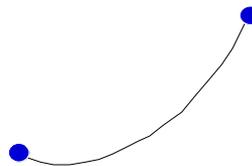


3 chemins

- for each path, one distinguishes the cycles and the open arcs:



cycle



arc ouverts

The paths are directed from the mesh of smaller number for the cycles and from the mesh end of smaller number for the open arcs. This number corresponds to the order of appearance in mesh file.

The user can nevertheless impose the node origin of the path by key word `NOEUD_ORIG` (name of the node origin) or `GROUP_NO_ORIG` (name of the formed group\_no by the only node origin).

## 3.4 Operand accuracy

`◇PRECISION = epsilon`

optional Key word allowing the user to define the threshold in lower part of which 2 points are regarded as confused.

## 3.5 Operand INFO

Makes it possible to obtain printings on the file "MESSAGE".

INFO = 1, not of printings

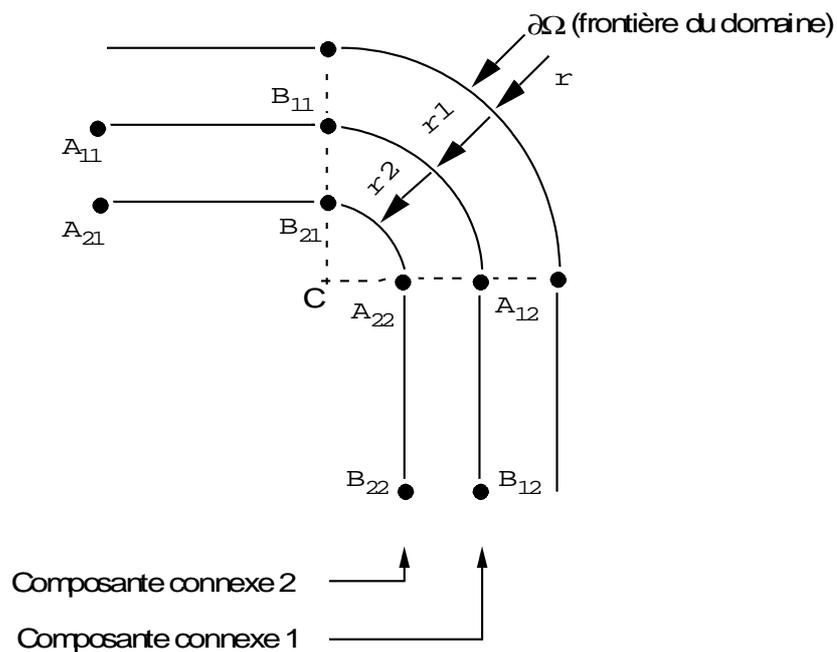
INFO = 2, printing of meshes crossed by the path

## 4 Possibilities and Curved operational limits

### 4.1 obtained like meeting of line segments and/or arcs of circle

#### Example 1

Let us suppose that the border of the  $\square$  field is reduced locally to 2 line segments and an arc of circle and that the user is interested in the behavior of structure in the vicinity of this border. It will be able to then define curves such as A11, B11, A12, B12 or A21, B21, A22, B22.



```
Corner = INTE_MAIL_2D
```

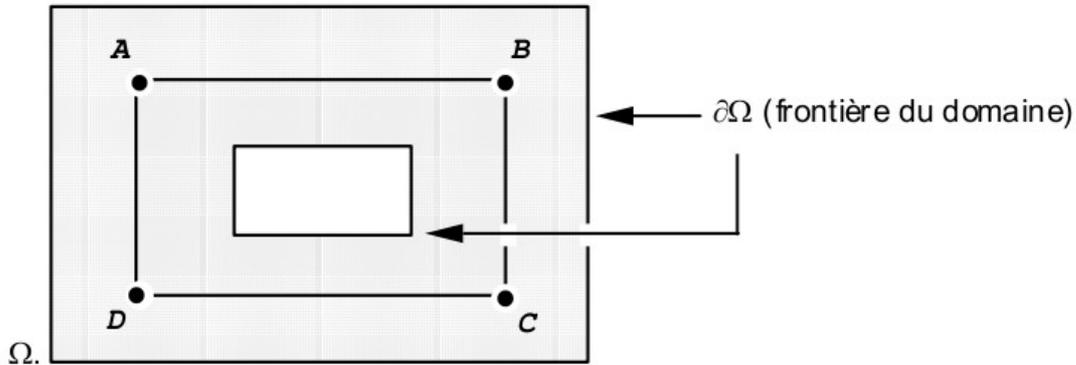
```
( MAILLAGE = name of the mesh,
```

```
  DEFI_SEGMENT = (
    _F ( ORIGIN = (xA11, yA11), ENDING = (xB11, yB11), ),
    _F ( ORIGIN = (xA21, yA21), ENDING = (xB21, yB21), ),
    _F ( ORIGIN = (xA12, yA12), ENDING = (xB12, yB12), ),
    _F ( ORIGIN = (xA22, yA22), ENDING = (xB22, yB22), ), )
```

```
  DEFI_ARC = (
    _F ( CENTER = (xc1, yc1),
        RADIUS = r1, SECTEUR = ( 0. , 90. ), ),
    _F ( CENTER = (xc2, yc2),
        RADIUS = r2, SECTEUR = ( 0. , 90. ), ), )
```

```
)
```

**Example 2** : Study in the vicinity of an interior hole in a field

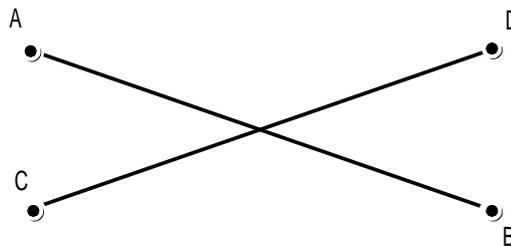


curve ABCD is defined like meeting of 4 line segments.

```
turn = INTE_MAIL_2D
(
  MAILLAGE = carré_percé,
  DEFI_SEGMENT = (
    _F ( ORIGIN = (xA, it there a), ENDING = (xB, yB) ),
    _F ( ORIGIN = (xD, yD), ENDING = (xC, yC) ),
    _F ( ORIGIN = (xA, it there a), ENDING = (xD, yD) ),
    _F ( ORIGIN = (xB, yB), ENDING = (xC, yC) ),
  )
)
```

**Example 3** : an operational limit

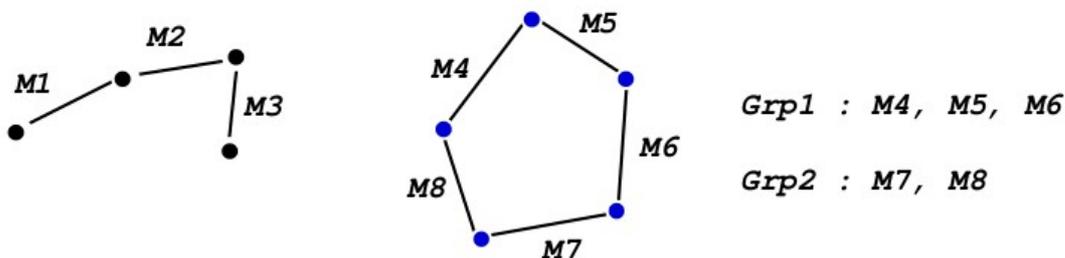
It relates to the possibility of intersection of the segments and/or the arcs into cubes points which are not one of their end.



This case is not the object of any particular processing. The 2 line segments are taken as two pieces perfectly independent of the same concept. Their intersection is ignored. The management of such cases is with the load of the user.

## 4.2 Curves obtained like meeting of meshes 1D of the field

**Example 1**

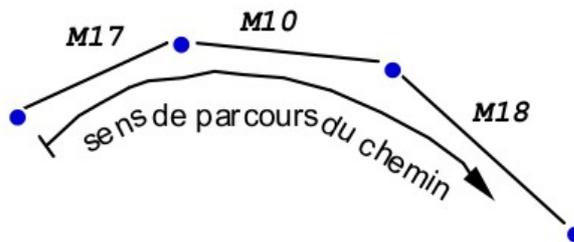


the curve is reduced to the simple path made up of meshes M1, m2, m3 and with the cycle corresponding to the mesh groups Grp1 and Grp2. The simple path and the cycle constitute the two related components of the curve.

The order in which are traversed meshes path depends on classification on meshes.

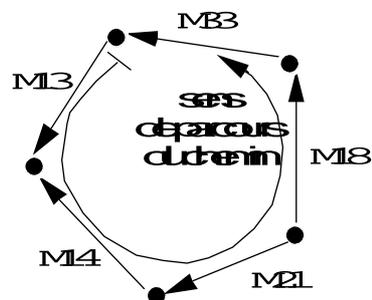
In the case of a path simple (open arc) it is the classification of meshes "the end" which determines the order of path.

For example:



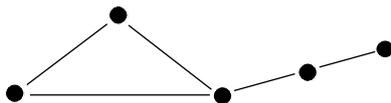
```
Path = INTE_MAIL_2D  
  
  ( MAILLAGE = Maya,  
  
    DEFI_CHEMIN = _F ( MAILLE=      ("M1", "m2", "m3"),  
                      GROUP_MA=    ("Grp1", "Grp2"), )  
  )
```

Dans le cas d'un cycle, le chemin est parcouru en partant de la maille de plus petit numéro et dans le sens de la connectivité de cette maille



**Exemple 2** : une restriction importante  
L'opérateur suppose que les cycles et les chemins simples sont disjoints, ainsi le cas suivant est illicite.

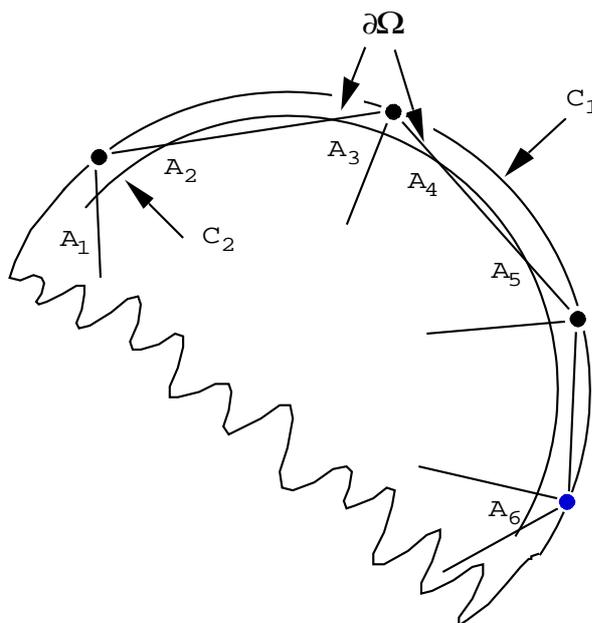
**Ce cas n'est pas détecté mais doit être évité.**



### Example 3 : an operational limit for curved edge

For a field of which part of the border is an arc of circle, it is trying to define an arc of circle, by means of the key word `DEFI_ARC`, which would cut the mesh in the vicinity of the border. Unfortunately, the edge of the mesh is not an arc of a circle but a polygon and the definite path can leave the mesh.

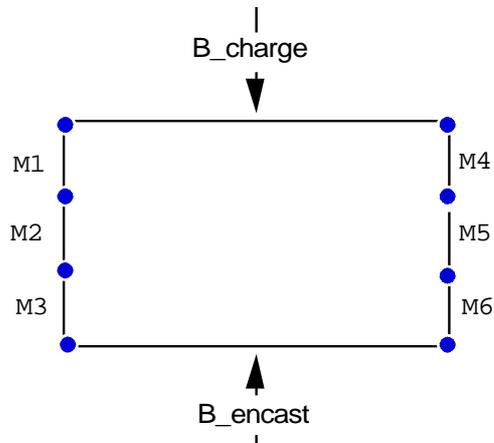
For example:



C1 : ring external  
C2 : ring interior  
 $d\Omega$  : broken line

- the arc of circle C1, which coincides with part of  $\partial\Omega$ , cuts the mesh of  $\Omega$  only in nodes: INTE\_MAIL\_2D will give an empty intersection.
- The arc of circle C2 is strictly included in  $\Omega$  but in the mesh of  $\Omega$  INTE\_MAIL\_2D will locate 2 holes.

**Example 4** : study on the border of a plate



```
Edge = INTE_MAIL_2D  
  
  ( MAILLAGE = plate,  
    DEFI_CHEMIN = _F ( MESH = ("M1", "m2", "m3", "M4", "M5",  
"M6"), ),  
    GROUP_MA = ("B_charge", "B_encast"), )
```

to study the behavior of structure on its embedded edge, it is advised to define another curve as follows:

```
Bord_Enc = INTE_MAIL_2D  
  
  ( MAILLAGE = plate,  
    DEFI_CHEMIN = _F ( GROUP_MA = ("B_encast"), ), )
```