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## Operator MODI\_REPERE

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### 1 Drank

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This operator allows to modify the reference in which fields carried by shells like elements of continuous medium are expressed.

The call to MODI\_REPERE generally produces new result concept:

```
resuout = MODI_REPERE ( RESULTAT = resuin...)
```

the result concept in standard output east in the same way than the concept in entry. For options COQUE\_INTR\_UTIL and COQUE\_UTIL\_INTR, it is possible to use the same result concept as starter and in output. This operation is disadvised.

A product concept by MODI\_REPERE should not be used any more then to do calculations.

It is of more necessary to take care to comply with well the rules of the paragraph [§4].

## 2 Syntax

```

resuout [*] = MODI_REPERE (
    ◇ reuse = resuout,
    ◆ RESULTAT =resuin      ,           /      [evol_elas]
                                   /      [evol_noli]
                                   /      [evol_ther]
                                   /      [mode_flamb]
                                   /      [dyna_trans]
                                   /      [dyna_harmo]
                                   /      [mode_meca]
                                   /      [mult_elas]
                                   /      [base_modale]

    ◇#Sélection      of sequence number:
      /TOUT_ORDRE   =   ' OUI'      ,           [DEFAULT]
      /NUME_ORDRE   =1_nuor          ,           [l_I]
      /LIST_ORDRE   =1_nuor          ,           [listis]
      /NUME_MODE     =1_numo         ,           [l_I]
      /NOEUD_CMP     =1_nomo         ,           [l_K16]
      /NOM_CAS       =nocas          ,           [K16]
      /  ◆ / INST =1_inst            ,           [l_R]
          /FREQ =1_freq              ,           [l_R]
          /LIST_INST =1_inst          ,           [listr8]
          /LIST_FREQ =1_freq          ,           [listr8]
    ◇ / | CRITERE=/                  "RELATIF",      [DEFAULT]
      | PRECISION=/prec              ,           [R]
          /1.0D-6                    ,           [DEFAULT]
    /◆          CRITERE=' ABSOLU',
      ◆ PRECISION=prec              ,           [R]
    ◆ MODI_CHAM = (_F (
      ◆NOM_CHAM=nomch                ,           [K16]
      ◆NOM_CMP=1_cmp                  ,           [l_K8]
      ◆TYPE_CHAM=/                    "VECT_2D",
          / "VECT_3D",
          / "TENS_2D",
          / "TENS_3D",
          / "COQUE_GENE",
      ),)
    ◆REPERE=
      / "UTILISATEUR",
      / "CYLINDRIQUE",
      / "COQUE",
      / "COQUE_INTR_UTIL",
      / "COQUE_UTIL_INTR",
    ◆AFFE=_F (
      if REPERE=' UTILISATEUR':
          /◆ANGL_NAUT = (alpha, beta, gamma) [l_R]
          /◆VECT_X = (vx1, vx2, vx3)
[l_R]
          ◆VECT_Y = (vy1, vy2, vy3)
[l_R]
          siREPERE=' CYLINDRIQUE':
          ◆ORIGINE = (X, there, Z)
[l_R]
          ◆AXE_Z= (oz1 oz2 oz3)
[l_R]
          siREPERE=' COQUE':

```

Warning : The translation process used on this website is a "Machine Translation". It may be imprecise and inaccurate in whole or in part and is provided as a convenience.

```

                                /◆ANGL_REP=      (  $\alpha$ ,  $\beta$  )
[1_R]
                                /◆VECTEUR=      (X, there, Z)
    [1_R]
        ◇GROUP_MA=l_grma      ,      [1_gr_maille]
        ◇GROUP_NO=l_grno      ,      [1_gr_noeud]
        ◇MAILLE=l_maille      ,      [1_maille]
        ◇NOEUD      =l_noeud      ,      [1_noeud]]
        )

    ◇INFO      = 1      ,      [DEFAULT]
              /2      ,

    ◇TITER      =titer      ,      [1_Kn]

)

```

## 3 Operands

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### 3.1 Operand RESULTAT

◆RESULTAT =resuin

Name of data structure result. This argument must imperatively be different from that used for the product concept by the operator, unless using the option `reuse`. Nevertheless, this operation is strongly disadvised.

### 3.2 Selection of the sequence numbers and times

#### 3.2.1 Operands TOUT\_ORDRE/NUME\_ORDRE/LIST\_ORDRE/

◆/TOUT\_ORDRE = "OUI" (default value)

This key word indicates that one applies the change of reference for all the sequence numbers of the result concept

Example: all times for result of `evol_*` type.

/NUME\_ORDRE = l\_numo

the change of reference will be done for the values of sequence number `l_numo` provided.

/TOUT\_INST = "OUI"

This key word indicates that one wants to change the reference for all times.

/LIST\_ORDRE = l\_ord

This key word indicates that one wants to modify the reference with the sequence numbers described in the concept `l_ord` of the `listis` type.

/NUME\_MODE = l\_numo

This key word indicates that one wants to modify the reference of the modes indicated by their numbers of mode in the list `l_numo`.

/NOEUD\_CMP = l\_nomo

This key word indicates that one wants to modify the reference of the static modes indicated by their DDL in the list `l_nomo`.

/NOM\_CAS = nocas

This key word indicates that one wants to modify the reference of result static indicated by the name of his `nocas` loading case.

#### 3.2.2 Operands INST/LIST\_INST/FREQ/LIST\_FREQ

◆/INST = l\_inst

This key word indicates that one wants to modify the reference at times `l_inst`.

/LIST\_INST = li\_inst

This key word indicates that one wants to modify the reference at the times described in the concept `li_inst` of the `listr8` type.

/ FREQ = l\_freq

This key word indicates that one wants to modify the reference with the frequencies `l_freq`.

/ LIST\_FREQ = li\_freq

This key word indicates that one wants to modify the reference with the frequencies described in the concept `li_freq` of the `listr8` type.

### 3.3 Factor key word MODI\_CHAM

This factor key word makes it possible and to define the fields component in calculating. It can moreover be repeated several times. One can treat several fields at the same time.

#### 3.3.1 Operand NOM\_CHAM

Symbolic name of the field to treating.

#### 3.3.2 Operand NOM\_CMP

Names of the components which one wants to treat (see [U2.01.04]). See also the paragraph [§4].

#### 3.3.3 Operand TYPE\_CHAM

This operand **compulsory** makes it possible to specify the type of field to treating. The various types are the following:

/"VECT\_2D" means that one treats a field of vectors with 2 components,  
/"VECT\_3D" means that one treats a field of vectors with 3 components,  
/"TENS\_2D" means that one treats a field of symmetric tensors of order 2,  
/"TENS\_3D" means that one treats a field of symmetric tensors of order 3.  
/"COQUE\_GENE" means that one treats a field of generalized quantities (strains or forces).

This type is valid only for reference "COQUE"

See also the paragraph [§4].

### 3.4 Simple key word LOCATES

This key word makes it possible to select a reference among those quoted below. To define the selected reference it is necessary to use factor key word `the AFFE`.

- locate "UTILISATEUR": for the elements of continuous medium.
- locate "CYLINDRIQUE": for the elements of continuous medium.
- locate "COQUE": a reference user defines on the elements shell.
- locate "COQUE\_UTIL\_INTR": allows to pass from the reference user to the intrinsic reference on the elements shell.
- locate "COQUE\_INTR\_UTIL": allows to pass from the intrinsic reference to the reference user on the elements shell.

**Note: in the case or the user specified that the concept is D-entering (by the word reserved reuse), the possible choices for the key simple coordinate are "COQUE\_UTIL\_INTR" or "COQUE\_INTR\_UTIL" only. The fields where the transformation is relevant are transformed, while the other fields are kept in the state.**

**Definition of the intrinsic reference:** the intrinsic reference is the reference in which the fields for the elements are calculated plates and shell in *Code\_Aster* before being last in the reference user. It is defined in the following way:

that is to say  $AB$  the side uniting the first two tops of the element (in the case of a curved shell,  $B$  is in fact the projection of the top 2 on the tangent level with the shell in  $A$ )

the directed segment  $AB$  provides the axis  $Ox$

the axis  $z$  is colinéaire with the norm with the plane of the shell at the top  $A$ , which is known

the axis  $y$  is built in order to have an orthonormal reference

the intrinsic reference is thus  $(A, x, y, z)$  with  $z = n$  and  $y = z^x$ .

### 3.5 Factor key word AFFE

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This factor key word defines the reference previously selected:

- locate "UTILISATEUR" :
  - either defined by the data of 3 nautical angles (in degrees),  
ANGL\_NAUT = (alpha, beta, gamma)
  - or in 3D by the data of 2 basic vectors with VECT\_X and VECT\_Y from which 3 nautical angles are built such as:

$$\alpha = \begin{cases} 0 & \text{si } VECT_X(1)=0 \\ \arctan(VECT_X(2)/VECT_X(1)) & \text{sinon} \end{cases}$$

beta =

$$\begin{cases} 0 & \text{si } \sqrt{VECT_X(1)^2 + VECT_X(2)^2} = 0 \\ -\arctan(VECT_X(3)/\sqrt{VECT_X(1)^2 + VECT_X(2)^2}) & \text{sinon} \end{cases}$$

$$\gamma = \begin{cases} 0 & \text{si } VECT_Y(2)=0 \\ \arctan(VECT_Y(3)/VECT_Y(2)) & \text{sinon} \end{cases}$$

- locates "CYLINDRIQUE": defined by the data of the origin of the reference and the axis Oz :  
ORIGINE = (x, there, z) coordinates of the origin O of the reference  
AXE\_Z = (oz1, oz2, oz3) coordinated of a vector defining the axis oz  
(axis of the cylinder).

This reference can be defined only once.

- locate "COQUE" : that is to say defined by the data of 2 angles (in degrees):  
ANGL\_REP = (alpha, beta)  
is by the data of a vector with VECTEUR.  
In case ANGL\_REP, the angles are used to define the preceding vector which, project as regards the shell, will give the axis Ox of the new reference. Knowing the norm in any point with the shell, one from of easily deduced the new reference.  
**Note: this reference being defined by element applies only to the cham\_elem. Moreover more only key word NETS and GROUP\_MA are usable. Lastly, it is defined only for the modelizations shells and plates.**

### 3.5.1 Operands GROUP\_MA, GROUP\_NO, NOEUD, MESH

Make it possible to restrict the change of reference to some meshes or some nodes.  
Attention, for the fields by elements, NOEUD and GROUP\_NO are prohibited.

### 3.6 Operand INFO

This operand makes it possible to display structure of the result concept (resuout).

### 3.7 Operand TITER

See [U4.03.01].

## 4 Notes of Definitions

### 4.1 use and precautions of use

a product concept by MODI\_REPERE should not be used any more then to do calculations, Code\_Aster not memorizing the reference in which the fields appear. Only printings or layouts are licit.

According to each type of field, it is necessary to specify well after NOM\_CMP the exact number of components and in the following order:

- in the case of vectors with 2 (or 3) component):  $X, Y, (Z)$ ,
- in the case of a torsor with 6 components: 3 translations  $X, Y, Z$ , and 3 rotations  $RX, RY, RZ$ ,
- in the case of a tensor of order 2 (4 components):  $XX, YY, ZZ, XY$ ,
- in the case of a tensor of order 3 (6 components):  $XX, YY, ZZ, XY, XZ, YZ$ .
- in the case of a generalized quantity (8 components: 2 tensors of order 2, a vector with 2 components):  $XX, YY, XY, XX, YY, XY, X, Y$ .

**Note:**

- When a node  $N$  of the mesh is on the axis  $Oz$  (cylindrical coordinate system), one seeks the average node of the geometrical centers of meshes containing the node  $N$  for the computation of the transition matrix out of cylindrical coordinate system. If this average node is also on the axis  $Oz$ , computation stops in fatal error.
- When all the components of a node are not present in the field at treating, one writes nothing in the field transformed for this node. This meets for example with the elements of the modelization COQUE\_3D for which the nodes located in the middle of the sides do not have a degree of freedom of translation. The field of displacement resulting from MODI\_REPERE is thus not calculated for these nodes mediums of sides.

### 4.2 Cylindrical correspondences

For the statement of the stresses out of cylindrical coordinate system the following correspondences are made (by simplification one notes  $T = \theta$ ):

Stresses out of cartesian coordinate system		Forced out of cylindrical coordinate system
tensor	$X$	$R$
	$Y$	$Z$
	$Z$	$T$
vector	$XX$	$RR$
	$YY$	$ZZ$
	$ZZ$	$TT$
	$XY$	$RZ$
	$XZ$	$RT$
	$YZ$	$ZT$

## 5 Computation

### 5.1 Examples of the stresses out of cylindrical coordinate system

```
RESU1=MODI_REPERE (
  RESULTAT=      RESU,
  NUME_ORDRE=    1,
  MODI_CHAM=     (
    _F (          NOM_CHAM= "SIGM_ELNO",
          NOM_CMP=    ("SIXX", "SIYY", "SIZZ", "SIXY",),
          TYPE_CHAM=  "TENS_2D",),),
  REPERE=        "CYLINDRIQUE",
  AFFE = _F (    ORIGINE=  (0.0, 0.0,0.0,),
                AXE_Z=    (0.0, 0.0,1.0,),
                ),
  )
```

### 5.2 Computation of the stresses and forces generalized on shells in a variable reference defined by user

```
RESU2=MODI_REPERE (
  RESULTAT=      RESU,
  NUME_ORDRE=    1,
  MODI_CHAM=     (
    _F (          NOM_CHAM= "SIGM_ELNO",
          NOM_CMP=    ( "SIXX", "SIYY", "SIZZ",
                        "SIXY", "SIXY", "SIXY",),
          TYPE_CHAM=  "TENS_3D",),
    _F (          NOM_CHAM= "EFGE_ELNO",
          NOM_CMP=    ("NXX", "NYÿ", "NXY",
                        "MXX", "MYÿ", "MXY", "QX", "QY",),
          TYPE_CHAM = "COQUE_GENE",),
    ),
  COORDINATE = "COQUE",
  AFFE = (
    _F (ANGL_REP = (30.0, 30.0,), MAILLE=' M1',),
    _F (ANGL_REP = (45.0, 45.0,), GROUP_MA=' GRMA2',),
  ),
  )
```