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## Operator REST\_SOUS\_STRUC

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### 1 Goal

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To restore in the physical base of the results in generalized coordinates.

This operator allows, starting from results on a frame of reference generalized obtained by methods of modal recombination `tran_gene`, methods of under cyclic structuring `mode_cycl`, of under dynamic structuring `mode_gene` or of under harmonic structuring `harm_gene`, to restore the results in the initial physical system.

The produced concept is a concept of the type:

- `dyna_trans` if the generalized results come from a calculation by modal recombination or following the extrapolation of experimental results of measurement on a digital model (the concept of entry is of type `tran_gene`) or following the restitution of a concept `dyna_trans` on a new grid of visualization,
- `mode_meca` following a calculation by cyclic under-structuring (`mode_cycl`), by dynamic under-structuring (`mode_gene`) or if calculation corresponds to the restitution of a concept `mode_meca` on a new grid of visualization,
- `dyna_harmo` following a calculation by harmonic under-structuring (`harm_gene`),
- `evol_noli` following a non-linear calculation mixed with a modal calculation on its non-linear part

## 2 Syntax

```
resphy      = REST_SOUS_STRUC      [*]
            (
              ♦ / RESULT = resu,      [mode_meca]
                                      [dyna_trans]
                                      [evol_noli]

              / RESU_GENE = tg,      / [tran_gene]
                                      / [mode_cycl]
                                      / [mode_gene]
                                      / [harm_gene]

              ♦ MODE_MECA = mode,      [mode_meca]

              ♦ NUME_DDL = numeddl,    [nume_ddl]

              ♦ / TOUT_ORDRE = 'YES',
                / NUME_ORDRE = num,    [l_I]
                / NUME_MODE = num,    [l_I]
                / TOUT_INST = 'YES',
                / LIST_INST = list,    [listr8]
                / INST = inst,        [l_R]
                / FREQ = freq,        [l_R]
                / LIST_FREQ= list,    [listr8]

              ♦ / TOUT_CHAM = 'YES',
                / NOM_CHAM = (| 'DEPL',
                              | 'QUICKLY',
                              | 'ACCE',      [DEFECT]
                              | 'ACCE_ABSOLU',
                              | 'EFGE_ELNO',
                              | 'SIPO_ELNO',
                              | 'SIGM_ELNO',
                              | 'FORC_NODA',),

              ♦ Interpol = / 'FLAX',
                            / 'NOT',      [DEFECT]

              ♦ CRITERION = / 'ABSOLUTE',
                              / 'RELATIVE',      [DEFECT]

              ♦ PRECISION = / prec,      [R]
                              / 1.E-06,      [DEFECT]

              ♦ / SECTOR = numsec,      [I]
                / SKELETON = squel,    [skeleton]
                / SOUS_STRUC = nom_sstruc, [KN]

              ♦ / GROUP_NO = lgrno,     [l_co]
                / GROUP_MA = lgrma,    [l_co]
```

```

    ◇ CYCLIC= _F (
                                ◇ NB_SECTEUR = NS      [I]
                                ◇ NUME_DIAMETRE = nl     [I]
                                ◇ RESULTAT2 = LMBO       [evol_elas]
                                                                [evol_noli]
                                                                [dyna_trans]
                                                                [evol_char]
                                                                [mode_meca]

    ◇ TITLE = title,          [l_Kn]

                                )

If RESU_GENE of type tran_gene then      [*] = dyna_trans
If RESU_GENE of type mode_cycl then      [*] = mode_meca
If RESU_GENE of type mode_gene then      [*] = mode_meca
If RESU_GENE of type harm_gene then     [*] = dyna_harmo
If RESULT of type mode_meca then         [*] = mode_meca
If RESULT of type evol_noli then         [*] = evol_noli
If RESULT of type dyna_trans then        [*] = dyna_trans
```

## 3 Operands

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### 3.1 Operands RESU\_GENE/RESULT

- / RESU\_GENE = tg
  - / concept of the type `tran_gene` containing for various moments of the vectors generalized of standard displacement, speed and acceleration of the transitory answer calculated by under structuring.
  - / concept of the type `mode_cycl` containing the generalized vectors of the modes calculated by under cyclic structuring.
  - / concept of the type `mode_gene` containing the generalized vectors of the modes calculated by under dynamic structuring.
  - / concept of the type `harm_gene` containing the vectors generalized of standard displacement, speed and acceleration of the harmonic answer of a structure calculated by under structuring.
- / RESULT

This keyword can be used when one initially restores a result resulting from a calculation by dynamic under-structuring on a first skeleton (grid of visualization). One defines then an enriched skeleton in which one amalgamated the nodes with the interfaces of under structures and recovered whole or part of the groups of nodes or meshes of the initial grid. The keyword `result` corresponds then to the restitution of a concept `mode_meca`, `dyna_trans`, `evol_noli` on a new enriched skeleton (cf example with [§4]).

### 3.2 Operand MODE\_MECA

- ◇ MODE\_MECA = mode

Concept of the type `mode_meca` containing a base of clean modes obtained by under - dynamic structuring.

This operand is used in the case of a restitution in the physical system of a transitory computation result carried out on modal basis calculated by dynamic under-structuring. The modal base contained in the concept `mode_meca` was obtained by a precedent REST\_SOUS\_STRUC.

In this case, it is necessary to inform the same support of restitution (keyword SKELETON or SOUS-STRUC) used for the restitution of the modal base.

### 3.3 Operand NUME\_DDL

- ◇ NUME\_DDL = numeddl

Concept of the type `nume_ddl` containing a classification corresponding to a scale model in the case of a calculation with dynamic condensation when the user wishes a restitution on the degrees of freedom belonging to this scale model.

This operand thus makes it possible to obtain following the restitution a concept `mode_meca` who could be used thereafter for a calculation on the model.

### 3.4 Operands TOUT\_ORDRE/NUME\_ORDRE/TOUT\_INST/LIST\_INST/INST

◇ / TOUT\_ORDRE = 'YES'  
To restore on all the modes of the concept `mode_cycl` or `mode_gene`.

/ NUME\_ORDRE = num  
List of entreties containing the numbers of the modes on which the restitution takes place.

/ NUME\_MODE = num  
List of entreties containing the numbers of the modes in the total spectrum on which the restitution takes place.

/ TOUT\_INST = 'YES'  
If one wishes to restore over every moment contained in the generalized result (`tran_gene`).

/ LIST\_INST = list  
List of real crescents of the type `listr8` containing the moments for which one wishes to carry out the restitution.

/ INST = inst  
List of real containing the moments over which the restitution takes place.

For a transitory calculation, one checks that the moments requested by the option `LIST_INST` are well in the field of definition of `tran_gene`.

The results at one unspecified moment can be obtained by linear interpolation between the two moments results of calculation actually contained by `tran_gene`.

## 3.5 Operands **FREQ/LIST\_FREQ**

These operands are used in the case of a restitution of generalized harmonic calculations (`harm_gene`).

/ FREQ = freq  
Frequency to which one wishes to restore harmonic calculation

/ LIST\_FREQ = list  
List of real containing the frequencies for which one wishes to carry out the restitution.

For each frequency indicated, one restores the fields obtained at the frequency of calculation nearest. There is no interpolation.

## 3.6 Operands **TOUT\_CHAM/NOM\_CHAM**

◇ / TOUT\_CHAM = 'YES'  
Allows to restore the fields of reference symbol `DEPL`, `QUICKLY` and `ACCE` contents in the generalized result (`tran_gene`, `harm_gene`).

/ NOM\_CHAM = nomcha  
List of the reference symbols of field which one wishes to restore: 'DEPL','QUICKLY','ACCE'.

## 3.7 Operand Interpol

◇ Interpol =

'FLAX' : an interpolation is authorized between two moments; this interpolation is usable only between two moments of calculation, but can lead to errors if the two moments of filing [U4.53.21] are separated from a very long time with respect to the periods of the studied phenomena.

'NOT' : the restitution must be made stricto sensu.

## 3.8 Operands PRECISION/CRITERION

◇ PRECISION = prec

◇ CRITERION =

When Interpol is worth 'NOT' indicate with which precision the research of the moment to be restored must be done

'ABSOLUTE' : interval of research [Inst - prec, Inst + prec],

'RELATIVE' : interval of research [(1 - prec).Inst, (1 + prec) . Inst]  
Inst being the moment of restitution.

## 3.9 Operand SECTOR

◇ / SECTOR

Number of sector of the cyclic structure on which the result (of type mode\_cycl) will be restored in the physical system in cyclic under-structuring.

## 3.10 Operand SKELETON

/ SKELETON

Name of the grid skeleton of the total structure on which the result will be restored: to see the operator DEFI\_SQUELETTE [U4.24.01].

## 3.11 Operand SOUS\_STRUC

/ SOUS\_STRUC = nom\_sstruc

Name of the substructure on which the result will be restored: to see the operator DEFI\_MODELE\_GENE [U4.65.02].

## 3.12 Operand GROUP\_NO

◇ / GROUP\_NO = lgrno

/ GROUP\_MA = lgrma

After a transitory calculation of dynamics on modal basis, the user can restore fields kinematics on a part only of the nodes or meshes of the grid.

List of the groups of nodes/meshes corresponding to the places where the user wants to restore fields kinematics.

## 3.13 Operand CYCLIC

```
◇ CYCLIC = _F (
    ◇ NB_SECTEUR = NS [I]
    ◇ NUME_DIAMETRE = n1 [I]
    ◇ RESULTAT2 = LMBO [evol_elas]
                                [evol_noli]
                                [dyna_trans]
                                [evol_char]
                                [mode_meca]
)
```

The operator `DEFI_SQUELETTE` [U4.24.01] allows to regenerate the complete grid of a structure with cyclic symmetry starting from the grid of a sector of this structure.

The option `CYCLIC` in `REST_SOUS_STRUC` allows to restore on this new grid skeleton the fields with the nodes calculated on the model of the only sector and taken into account of cyclic symmetry (with `LIAISON_MAIL` or `LIAISON_CYCL` for example).

The action of this option of `REST_SOUS_STRUC` consist:

- 1/ in the static case (only one field with the provided node) to make turn this field to the nodes on grid skeleton
- 2/ in the dynamic case (2 fields with the provided nodes `RESULT` and `RESULTAT2`) to make combination of the fields to the nodes and to make them turn on the new grid.

## 3.14 Operand TITLE

```
◇ TITLE = title
    Title attached to the concept produced by this operator [U4.03.01].
```

## 4 Example: Restitution of one `mode_meca` on an enriched skeleton, use of the keyword `RESULT`

One proposes Ci below an example of use of the keyword `RESULT`. The complete command file corresponds to the case test SDLS106A.

First stage: calculation of the generalized clean modes (obtained by dynamic under-structuring) of the total structure

```
resgen = CALC_MODES (MATR_RIGI = risgen,
                    MATR_MASS = masgen,
                    OPTION = 'PLUS_PETITE',
                    CALC_FREQ = _F (NMAX_FREQ = 6))
% definition of the first grid of visualization of the calculated sizes
squel = DEFI_SQUELETTE (MODELE_GENE = modege,
                       SOUS_STRUC = _F (NAME = 'carrel', ALL = ' OUI'),
                       SOUS_STRUC = _F (NAME = 'carre2', ALL = ' OUI'))
% restitution of mode_gene on this first skeleton:
modglo = REST_SOUS_STRUC (RESU_GENE = resgen,
                         SKELETON = squel,
                         TOUT_ORDRE = 'YES', TOUT_CHAM = 'YES')
% definition of the enriched skeleton in which one amalgamated the nodes with the interfaces of under
structures and recovered whole or part of the groups of nodes or meshes of the initial grid:
squelbis = DEFI_SQUELETTE (MODELE_GENE = modege,
                          SKELETON = squel,
```

```
RECO_GLOBAL =_F (TOUT=' OUI', DIST_REFE = 0.1))  
% restitution of the first mode_meca on the new skeleton:  
modglbis = REST_SOUS_STRUC (SKELETON = squelbis,  
RESULT = modglo)
```