
Operator REST_GENE_PHYS

1 Drank

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

This operator allows to restore in the physical space of the results got on a system in generalized coordinates by methods of modal recombination.

The product concept is a concept of the type:

- `dyna_trans` if the generalized results come from a computation by modal recombination or following the extrapolation of results of experimental measurements on a digital model (the concept of entry is of type `tran_gene`),
- `mode_meca` for the restitution following a modal computation with projection on a modal base (the concept among is of `mode_gene` type),
- `dyna_harmo` for the restitution following a harmonic computation with projection on a modal base, without substructuring (the concept among is of `harm_gene` type).

2 Syntax

```
resphy = REST_GENE_PHYS ( [*]
    ◆RESU_GENE =tg , / [tran_gene]
    / [mode_gene]
    / [harm_gene]

    ◇MODE_MECA =mode , [mode_meca]
    ◇NUMÉRIQUE_DDL =numeddl , [nume_ddl]

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

    ◇/TOUT_CHAM=' OUI',
    /NOM_CHAM = ( | ' DEPL',
    | ' VITE',
    | ' ACCE', [DEFAULT]
    | ' ACCE_ABSOLU',
    | ' EFGE_ELNO',
    | ' SIPO_ELNO',
    | ' SIGM_ELNO',
    | ' FORC_NODA',),

    ◇INTERPOL = "LIN",
    / "NON", [DEFAULT]

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

    ◇PRECISION =/prec , [R]
    /1.E-06 , [DEFAULT]

    ◇/MULT_APPUI = "OUI",
    / "NON", [DEFAULT]
    /CORR_STAT = "OUI",
    / "NON", [DEFAULT]

    ◇/ACCE_MONO_APPUI =gamma, [function]
    /DIRECTION = (dx, Dy, dz), [l_R]

    ◇/NOEUD= lno, [l_co]
    /GROUP_NO = lgrno, [l_co]
    /MAILLE = lma, [l_co]
    / GROUP_MA= lgrma, [l_co]

    ◇TITER=titer , [l_Kn]

    )
```

If RESU_GENE of the tran_gene type then [*] = dyna_trans
If RESU_GENE of the mode_gene type then [*] = mode_meca
If RESU_GENE of the harm_gene type then [*] = dyna_harmo

3 Operands

3.1 Operand RESU_GENE

◆RESU_GENE = tg

- / concept of the tran_gene type containing for various times of the generalized vectors of standard displacement, velocity and acceleration. If the results come from the extrapolation of results of measurement on a digital model (command PROJ_MESU_MODAL), the generalized vectors are of standard displacement, strain and stress. In this case, the base of recombination is of mode_meca type.
- / concept of the mode_gene type containing the generalized vectors of the modes calculated following a projection on modal base.
- / concept of the harm_gene type containing the vectors generalized of standard displacement, velocity and acceleration of the harmonic response D" a computed structure after a projection on a modal base

3.2 Operand MODE_MECA

◇MODE_MECA = Concept

mode of the mode_meca type containing a base of eigen modes obtained by under - dynamic structuring.

This operand is used in the case of a restitution in the physical system of result of transient computation carried out on modal base calculated by dynamic substructuring. The modal base contained in the concept mode_meca was obtained by the command REST_SOUS_STRUC [U4.63.32]. It is thus about a double restitution, after having made a double projection (cf example with [§4]).

3.3 Operand NUME_DDL

◇NUMÉRIQUE_DDL = numedd1

Concept of the nume_ddl type containing a classification corresponding to a model reduced in the case of a computation with dynamic condensation when the user wishes a restitution on the ddls pertaining to this small-scale model.

This operand thus makes it possible to obtain following the restitution a concept mode_meca which could be used thereafter for a computation on the model reduced (see benchmark SDNV107A for example).

3.4 Operands

**TOUT_ORDRE/NUMÉRIQUE_ORDRE/NUMÉRIQUE_MODE/TOUT_INST/LI
ST_INST/INST**

◇/TOUT_ORDRE = "OUI"

to restore modes of the concept mode_gene on all the.

/NUME_ORDRE = num

List of integers containing the sequence numbers of the modes on which the restitution takes place.

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.

```
/NUME_MODE = num
```

List of integers containing the numbers of the modes in the total spectrum on which the restitution takes place.

```
/TOUT_INST = "OUI"
```

If one wishes to restore on all the urgent contents as a result generalized (`tran_gene`).

```
/LIST_INST = list
```

Lists increasing realities of `listr8 type` containing times for which one wishes to carry out the restitution.

```
/INST = inst
```

List of realities containing times over which the restitution takes place.

For a transient computation, it is checked that the times required by option `LIST_INST` are well in the field of definition of the `tran_gene`.

The results at one unspecified time can be obtained by linear interpolation between the two times results of computation actually contained by the `tran_gene`.

3.5 Operands `FREQ/LIST_FREQ`

These operands are used in the case of a restitution on the basis of generalized harmonic computation physical base (`harm_gene`).

```
/FREQ = freq
```

Frequency to which one wishes to restore harmonic computation

```
/LIST_FREQ = list
```

Lists realities containing the frequencies for which one wishes to carry out the restitution.

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

3.6 Operands `TOUT_CHAM/NOM_CHAM`

```
◇/TOUT_CHAM = "OUI"
```

Makes it possible to restore the fields of symbolic name `DEPL`, `QUICKLY` and `ACCE` contained as a result generalized (`tran_gene`, `harm_gene`).

```
/NOM_CHAM = nomcha
```

List of symbolic names of field which one wishes to restore: "DEPL", "QUICKLY", "ACCE" and possibly if they were calculated, "ACCE_ABSOLU", "EFGE_ELNO", "SIPO_ELNO", "SIGM_ELNO" or "FORC_NODA".

The restitution of fields "EFGE_ELNO", "SIPO_ELNO", "SIGM_ELNO" and "FORC_NODA" is possible in multi - bearings.

3.7 Operand `INTERPOL`

```
◇INTERPOL =
```

"LIN": an interpolation is authorized between two times; this interpolation is usable only between two times of computation, but can lead to errors if two times of archiving [U4.53.21] are separated from a very long time with respect to the periods of the studied phenomena.

“NON” : the restitution must be made stricto sensu.

3.8 Operands accuracy/CRITERE

◇PRECISION = prec

◇CRITERE =

When INTERPOL is worth "NON" indicates with which accuracy the search of time to be restored must be made

"ABSOLU" : interval of search [Inst - prec, Inst + prec],

"RELATIF" : interval of search [(1 - prec). Inst, (1 + prec) . Inst]
Inst being the time of restitution.

3.9 Operand MULT_APPUI

After the transient computation of the generalized seismic response of a structure, the user must indicate "OUI" under key word MULT_APPUI to restore displacements (and/or velocities and/or accelerations) absolute. If it does not specify anything, the operator restores the relative quantities.

3.10 Operands ACCE_MONO_APPUI and DIRECTION

After the computation of the generalized seismic response of an excited mono structure, the user indicates the name of the imposed accelerogram (key word ACCE_MONO_APPUI) **and** the direction of the seisme (key word DIRECTION) to restore absolute accelerations (accelerations only). If it does not specify anything, the operator restores the relative quantities.

Note:

The accelerogram imposed under ACCE_MONO_APPUI must be the same one as that imposed under key word FONC_MULT of the command DYNA_TRAN_MODAL.

3.11 Operand CORR_STAT

After the transient computation of the generalized seismic response of a structure, provided that the user asked "for CORR_STAT" = "OUI" in DYNA_TRAN_MODAL, it can then restore displacements (and/or velocities and/or accelerations) with correction by the static modes of the truncation of modal base. The user must indicate "OUI" under key word CORR_STAT. If it does not specify anything, the operator restores the quantities without static correction.

3.12 Operand NOEUD/GROUP_NO

◇/NOEUD = lno
/GROUP_NO = lgrno
/MAILLE = lma
/GROUP_MA = lgrma

After a computation of transient dynamics on modal base, the user can restore kinematical fields on a part only of the nodes or meshes of the mesh.

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

3.13 Operand TITER

◇TITER = title

Titres attached to the product concept by this operator [U4.03.01].

4 Example: Restitution of result of transient computation carried out on modal base calculated by dynamic substructuring: double restitution

Modal computation on one modele generalized: $(\bar{\mathbf{K}} - \bar{\mathbf{M}} \omega^2) \eta = 0$

with $\bar{\mathbf{K}} = \begin{pmatrix} \bar{\mathbf{K}}_1 & & \\ & \bar{\mathbf{K}}_2 & \\ & & \ddots \end{pmatrix}$ and $\bar{\mathbf{M}} = \begin{pmatrix} \bar{\mathbf{M}}_1 & & \\ & \bar{\mathbf{M}}_2 & \\ & & \ddots \end{pmatrix}$ equations of connection $\mathbf{L} \eta = \mathbf{0}$

```
modgene = MODE_ITER_SIMULT      ( MATR_RIGI =  $\bar{\mathbf{K}}$  ,
                                MATR_MASS =  $\bar{\mathbf{M}}$ 
                                )
```

One obtains a generalized modal base: the eigen modes of total structure are linear combinations of the eigen modes of substructures: it is on this generalized modal base Φ that one projects the generalized assembled matrixes (double projection).

$$\begin{aligned} \bar{\bar{\mathbf{K}}} &= \Phi^T \bar{\mathbf{K}} \Phi && \text{opérateur PROJ_MATR_BASE} \\ \bar{\bar{\mathbf{M}}} &= \Phi^T \bar{\mathbf{M}} \Phi \\ \bar{\bar{\mathbf{C}}} &= \Phi^T \bar{\mathbf{C}} \Phi \\ \bar{\bar{\mathbf{F}}}_{ext} &= \Phi^T \bar{\mathbf{F}}_{ext} && \text{opérateur PROJ_VECT_BASE} \end{aligned}$$

Transient computation on the modal base Φ obtained by dynamic substructuring.

```
trangen = DYNA_TRAN_MODAL      ( MASS_GENE =  $\bar{\bar{\mathbf{M}}}$  ,
                                RIGI_GENE =  $\bar{\bar{\mathbf{K}}}$  ,
                                AMOR_GENE =  $\bar{\bar{\mathbf{C}}}$  ,
                                EXCIT = _F (VECT_GENE =  $\bar{\bar{\mathbf{F}}}_{ext}$ ) )
```

Restitution of modal base Φ in the initial physical system:

```
modmeca = REST_SOUS_STRUC      ( RESU_GENE = modgene,
                                SQUELETTE = squel )
```

Restitution of transient computation in the initial physical system:

```
tran = REST_GENE_PHYS          ( RESU_GENE = trangen,
                                MODE_MECA = modmeca )
```