Structure of data sd_resultat

Contents

1 Introduction

The results of a calculation by finite elements are fields of scalars, vectors or tensors, but also of the parameters attached to these fields. For example, the modal analysis of a structure results in calculating the clean vectors (fields of displacement) and the associated Eigen frequencies.

When calculation is not reduced to the resolution of only one linear system, the operators produce a set of fields and of parameters which are gathered in the “made up” structure of data Result described in this document and which is also called to be more precise sd_resultat.

2 Typing of one sd_resultat

The results (fields and parameters) likely to be stored in one sd_resultat are rather variable. For example, the results of a transitory calculation dynamic can be fields speed or of acceleration, which is not the case for a quasi-static calculation, the results of a thermal calculation can be fields of temperatures or heat flow.

To distinguish all the possible situations them sd_resultat are typified. One will speak for example about sd_resultat type dyna_tran for the results of a transitory dynamic calculation, evol_noli for a nonlinear quasi-static calculation, evol_ther for a thermal calculation. sd_resultat are create by a single routine rscrsd [D6.05.01] whose source is relatively explicit.

All them sd_resultat some are their types are accessible to the programming starting from the same routines [D6.05.01].

3 Structure of sd_resultat

3.1 Parameters and variables of access

Information (fields and parameters) of one sd_resultat are indexed by an entirety. This index is called sequence number or NUME_ORDRE. This index does not vary inevitably 1 with n. The sequence numbers can be negative or worthless; they can not be consecutive. For one RESULT of transitory type for example the sequence number 0 corresponds at the initial state, the sequence number 1 corresponds to the first moment of calculation. With it NUME_ORDRE corresponds one or more parameters which also make it possible to reach information. For example, the moment of an evolutionary calculation or the frequency or the sequence number of a clean mode. These parameters of a a little particular kind are called variable access. The other parameters (generalized mass of a mode, for example) are simply called parameters without another distinction.

A parameter (variable of access or other) can be of the whole, real, complex type or character.

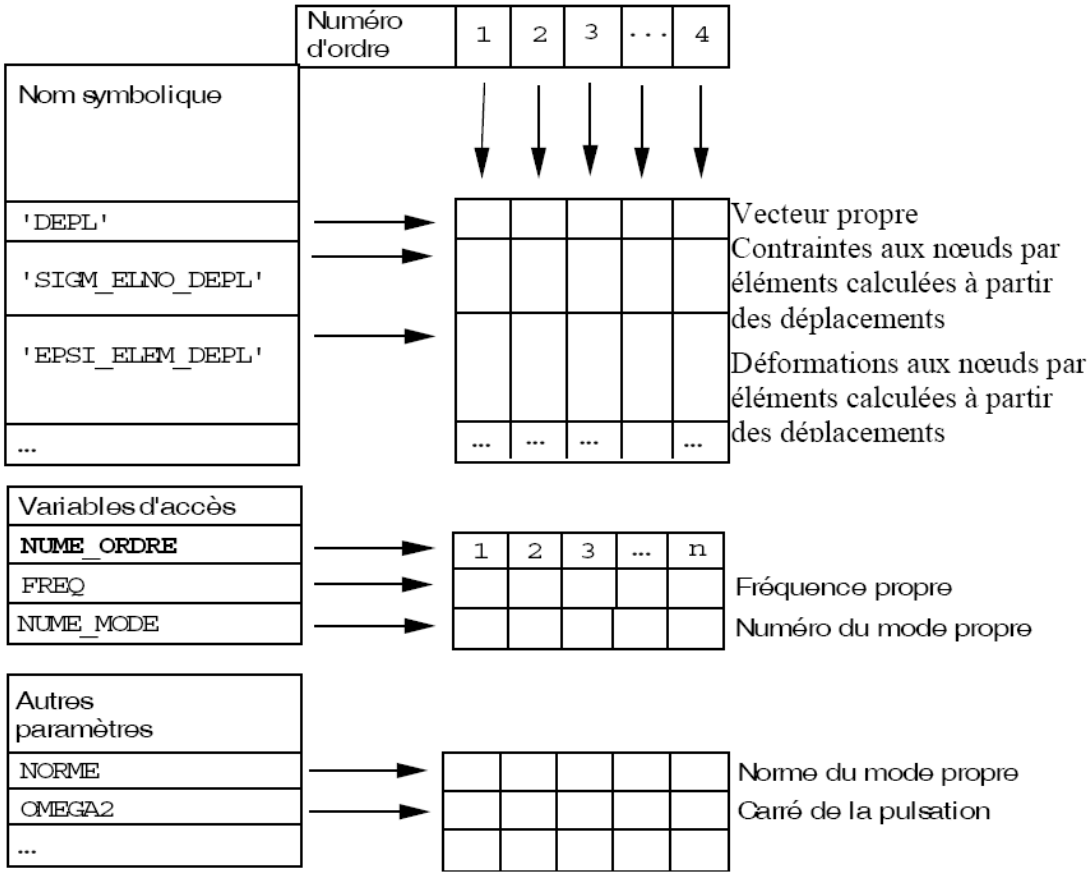
3.2 Reference symbol of the fields

With one NUME_ORDRE given several fields can correspond which one distinguishes by what one calls a reference symbol, for example, DEPL for the fields of displacements, SIGM_ELNO for the constraints by elements with the nodes calculated starting from the field of displacement. These fields are of type cham_no, cham_elem or map.

To simplify the reference symbols retained for the various types of sd_resultat are names of sizes or names of options of calculation.

3.3 Schematic representation

Schematically one `sd_resultat` thus presents itself in the following form (example of sd_resultat type `mode_meca`).



In the first two-dimensional board (reference symbol and sequence number), one finds field names ($K19$ stored in a vector of $K24$).

In the 2ème and 3ème tables, one finds the value (scalar) variables of access (or parameters).

4 (under) typing of sd_resultat

Concepts sd_resultat are typified.

Various concepts sd_resultat are as follows (this list nonrestrictive, could be supplemented as developments of Aster; it is not, however not desirable that it lengthens too much):

EVOL_ELAS	Result resulting from a quasi-static calculation with evolution with time
EVOL_NOLI	Result resulting from a quasi-static or dynamic calculation non-linear
EVOL_THER	Result resulting from a transitory thermal calculation
DYNA_TRANS	Result resulting from a transitory linear dynamic calculation in physical space
DYNA_HARMO	Result resulting from a harmonic dynamic calculation in physical space
ACOU_HARMO	Result resulting from a harmonic acoustic calculation in physical space
MODE_MECA	Result resulting from a calculation of dynamic or static modes, or from a regrouping of both
MODE_ACOU	Result resulting from a calculation of research from eigenvalues and mechanical clean vectors starting from acoustic sizes
MODE_FLAMB	Result resulting from a calculation of research of the modes of buckling
MODE_GENE	Result resulting from a calculation of research from eigenvalues and mechanical clean vectors starting from generalized sizes

Concepts DYNA_TRANS, DYNA_HARMO, ACOU_HARMO, MODE_MECA, MODE_GENE, MODE_ACOU, MODE_FLAMB resulting from a dynamic calculation, are also typified like sd_resu_dyna [D4.07.02].

5 Tree structure

```
"sd_resultat" (K19)   :: == record

   (O)      '.DESC' OJB   S   NR   K16
            '.TACH' OJB   XC  V   K24
            '.NOVA' OJB   S   NR   K16
            '.TAVA' OJB   XC  V   K8
            '.ORDR' OJB   S   V   I
```

6 Contents of the objects JEVEUX basic

6.1 '.DESC'

This object is a pointer of name containing the reference symbols of these fields.

6.2 '.TACH'

Contains the names of the fields contained in RESULT. This object is a collection of vectors constant length pointed by .DESC.

6.3 '.NOVA'

This object is a pointer of name containing the names of the variables of access and the parameters of calculation.

6.4 '.TAVA'

Described the variables of access and the parameters of calculation. This object is a collection of vectors length equal to 4 pointed by .NOVA. For a given name, one finds:

1. the name of the suffix ofOJB where the value is stored (K5),
2. characters associated with the row with the parameter allowing to find its value when one associates a sequence number to him,
3. the full number of different parameters contained inOJB,
4. it is indicated if it is a variable of access or a parameter.

See example below

6.5 '.ORDR'

This object is a vector of entireties.

It contains the sequence numbers stored in the SD.

That is to say for example: .ORDR = (0,10,20,30)

This SD has 4 sequence numbers: 0,10,20,30 associates with the 4 numbers of storage 1,2,3,4.

7 Rule of construction of the names of the fields

The name of the structures of data of the fields contained in .TACH is composed to leave:

- of the first 8 characters of the name of the concept RESULT "made up": resu
- characters associated with the number in the pointer with the reference symbol with the result (K3) : nusymb
- characters (K6) associated with the sequence number: nuordr (limitation with 10^6 pas de time) what gives:

```
K8      K1      K3     K1     K6          = K19
resu//'. ' //nusymb// '. ' //nuordr
```

Example:

That is to say 'moderesu' a name of concept RESULT "made up":

- the clean vector of the mode of sequence number 1 is one cham_no of name 'moderesu.001.00001'
- the deformation with the nodes by element of the mode of sequence number 9 is one cham_elem of name 'moderesu.003.00009'

8 Access rule to the values of the variables of access and the parameters

The value of a variable of access or a parameter of name nosymb and of sequence number nuordr of a concept RESULT "composed" of name resu is in OJB of name:

```
K19   K5      = K24
resu//nosuff
```

with the index nmax* (irang-1) +ivar

where:

irang is the number of storage of the sequence number nuordr.

- the name of the suffix nosuff, the number nmax variables, and the index ivar are respectively in the first, second and third elements of the vector of the object nosymb collection of name:

```
K19    K5         = K24
resu//'.TAVA'
```

Example:

That is to say 'moderesu' is a name of concept RESULT "composed", generalized stiffness RIGI_GENE mode of sequence number 11 (arranged with index 7 of the object .ORDR) will be in OJB vector:
'moderesu .PARA'

with the index $27\times(7-1)+5$

".PARA", "27" and "5" were found in OJB of name 'moderesu .TAVA' opposite the name RIGI_GENE.

9 Reference symbols, variables of access and parameters of sd_resultat

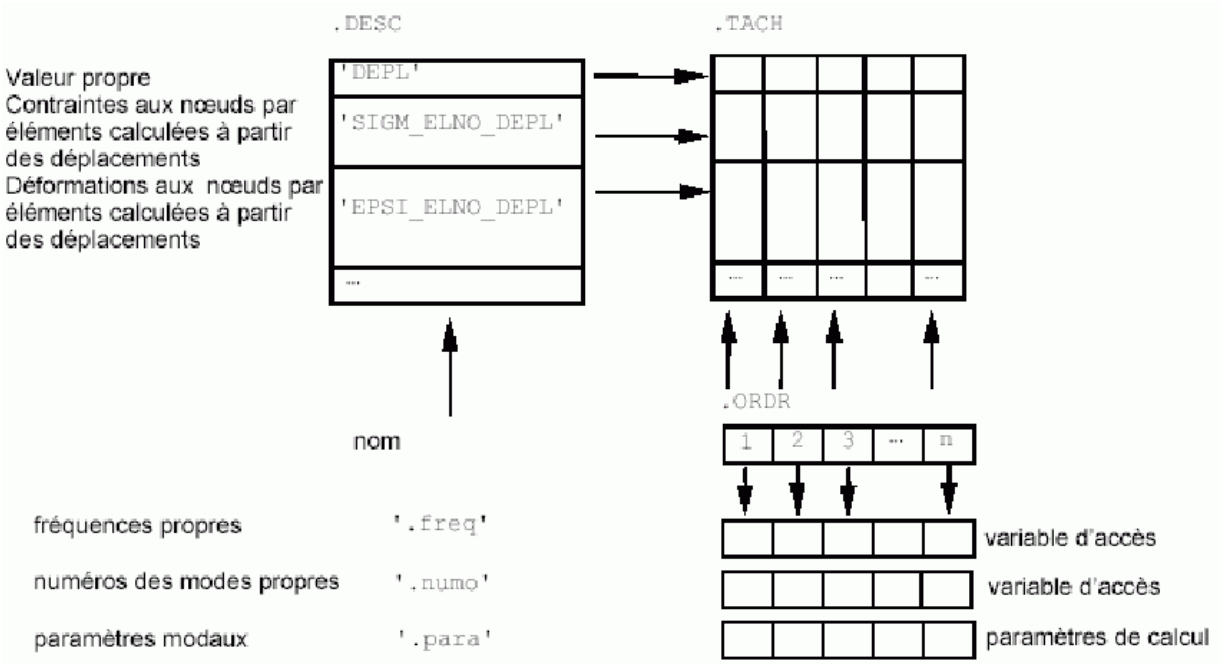
One gives here as an indication some parameter and field names stored in one EVOL_ELAS.

```
  * Reference symbols of the fields:
   'DEPL'              'SIEF_ELGA'   'SIEF_ELGA_DPGE'
   'EPSI_ELNO'    'EPSI_ELNO_DPGE'   'DEGE_ELNO'
   …

  * Variable of access:
   'INST'

  * Parameters:
   'EFFORT_N'          'MOMENT_MFY'       'MOMENT_MFZ'
…
```

10 Example of one sd_resultat of type MODE_MECA



.NOVA

NUME_MODE
FREQ
NORME
OMEGA2
...
MASSE_GENE
RIGI_GENE
...
MASS_GENE_DZ

.TAVA

'.NUMO'	'1'	'1'	'ACCES'
'.FREQ'	'1'	'1'	'ACCES'
'.PARA'	'1'	'1'	'PARA'
'.PARA'	'1'	'27'	'PARA'
...			
'.PARA'	'4'	'27'	'PARA'
'.PARA'	'5'	'27'	'PARA'
...		'27'	'PARA'
'.PARA'	'27'	'27'	'PARA'