Structure of data sd_proj_mesu

Summary:

The structure of data sd_proj_mesu is attached to the structures of data resulting from PROJ_MESU_MODAL or MACR_ELEM_STAT (if keywords PROJ_MESU and MODE_MESURE are well informed).

It is used by DEPL_INTERNE for the calculation of the field at the points of measurement (sensors) starting from the computed field with the nodes of the super-mesh produced by MACR_ELEM_STAT.

Contents

1 General information

The structure of data sd_proj_mesu is attached to the structures of data resulting from PROJ_MESU_MODAL or with the structure of data resulting from MACR_ELEM_STAT (if keywords PROJ_MESU and MODE_MESURE are well informed).

It is used for the creation of a super-mesh resulting from measurement.
This super-mesh is obtained while launching successively PROJ_MESU_MODAL and MACR_ELEM_STAT .
DEPL_INTERNE also uses for the calculation of information at the points of measurement (sensors) starting from the information calculated with the nodes of the super-mesh.

2 The operators who use this structure of data

Two operators can create one sd_proj_mesu : the operator PROJ_MESU_MODAL and the operator MACR_ELEM_STAT .

In PROJ_MESU_MODAL , sd_proj_mesu contains information on the points of measurement, the direction sensitive of the sensors and the reduction of the base of projection to the ddls sensors.

If keywords PROJ_MESU and MODE_MESURE are well informed in the order MACR_ELEM_STAT , the operator MACR_ELEM_STAT makes use of a structure of data sd_proj_mesu created by PROJ_MESU_MODAL and stores in a news sd_proj_mesu information concerning the external ddls. It contains the reduction of the base of projection to the external ddls, the clean modes identified and the condensation of the clean modes identified with the external ddls.

These structures of data can then be used by DEPL_INTERNE for the calculation of displacements to the nodes sensors starting from displacements with the external nodes (nodes of the super-mesh).

3 Tree structure of the Structure of Data

```
sd_proj_mesu (K18):: = record

     ♦       '.PJMNO'              :   OJB  S   V   I
     ♦       '.PJMRG'              :   OJB  S   V   K8
     ♦       '.PJMBP'              :   OJB  S   V   R
     ♦       '.PJMRF'              :   OJB  S   V   K16

     / # if PROJ_MESU_MODAL:
       ♦       '.PJMOR'            :   OJB  S   V   R

     / # if MACR_ELEM_STAT:
       ♦       '.PJMMM'            :   OJB  S   V   R or C
       ♦       '.PJMIG'            :   OJB  S   V   R
```

4 Contents of the objects JEVEUX

4.1 Object .PJMNO

In PROJ_MESU_MODAL , this object contains the list of the numbers of the nodes where the sensors are located. A sensor measures the component of the field in a point following a given direction. Several sensors can be localised with only one node.

PJMNO (1) : number of the node associated with the sensor number 1
PJMNO (2) : number of the node associated with the sensor number 2
…

The working length (LONUTI) of this object is equal to the number of sensors (nbcapt).

If keywords PROJ_MESU and MODE_MESURE are well informed in MACR_ELEM_STAT, sd_proj_mesu produced by MACR_ELEM_STAT the list of the numbers of the external nodes contains. And the working length (LONUTI) is equal to the external number of ddl (nddle) macronutrient.

4.2 Object .PJMRG

In PROJ_MESU_MODAL , this object contains the name of the sensitive component of the sensor: 'DX', 'DY', 'DZ', 'D1', 'D2', 'D3',…

'D1', 'D2', 'D3' are the directions defined during the reading of the data measured by LIRE_RESU on the dataset 58 (U7.02.01).

In MACR_ELEM_STAT , it contains the name of the component of the external ddl.

The length of this object is identical to the length of. PJMNO .

PJMRG (1) : name of the component associated with sensor 1
(or name of the component of the external ddl 1)
PJMRG (2) : name of the component associated with sensor 2
(or name of the component of the external ddl 2)
…

4.3 Object .PJMBP

This object contains the reduction of the base of projection to the ddls specified by the couple. PJMNO and. PJMRG.

If PROJ_MESU_MODAL :

LONUTI = nbcapt*nbmode
The reduced base is obtained by the product: $L_{capt}\,\Phi_{proj}$

If MACR_ELEM_STAT :

LONUTI = nddle*nbmode
The reduced base is obtained by the product: $L_{ext}\,\Phi_{proj}$

With:
L_{capt} : indicate the matrix of localization of the ddls sensors
L_{ext} : indicate the matrix of localization of the external ddls

Φ_{proj} : indicate the base of projection (nddl, nbmode)
nddl : number of ddls of model "the support"
nbmode : many basic vectors of the base of projection

PJMBP (1) : projection of the first vector of the base on the component PJMRG (1) node PJMNO (1)
PJMBP (2) : projection of the first vector of the base on the component PJMRG (2) node PJMNO (2)
…
PJMBP (LONUTI) : projection of the first vector of the base on the component PJMRG (LONUTI) node PJMNO (LONUTI)
PJMBP (LONUTI+1) : projection of 2nd vector of the base on the component PJMRG (1) node PJMNO (1)
…
PJMBP (LONUTI*nbmode) : projection of nbmode-ième vector of the base on component PJMRG (LONUTI) node PJMNO (LONUTI)

4.4 Object .PJMRF

This object contains the names of the concepts used:

PJMRF (1) : name of the model "measures"
PJMRF (2) : name of the measured field ('DEPL','QUICKLY','ACCE','SIEF_*','EPSI_*')
PJMRF (3) : name of the base of projection
PJMRF (4) : name of the concept which contains the identified clean modes (argument of the keyword MODE_MESURE of MACR_ELEM_STAT)
PJMRF (5) : name of the concept created by PROJ_MESU_MODAL, used for the calculation of super-mesh (argument of the keyword PROJ_MESU of MACR_ELEM_STAT).

Note:
PJMRF (4) and PJMRF (5) are not well informed if calculation PROJ_MESU_MODAL.

4.5 Object .PJMOR

This object is created only during a calculation with PROJ_MESU_MODAL .

It indicates the significant direction of the sensor.

The length of this object is equal to three times the length of. PJMNO .

PJMOR (1) : projection according to DX significant direction of the sensor number 1
PJMOR (2) : projection according to DY significant direction of the sensor number 1
PJMOR (3) : projection according to DZ significant direction of the sensor number 1
PJMOR (4) : projection according to DX significant direction of the sensor number 2
PJMOR (5) : projection according to DY significant direction of the sensor number 2
PJMOR (6) : projection according to DZ significant direction of the sensor number 2
…

4.6 Object .PJMMM

This object is created only by MACR_ELEM_STAT . It contains them nbmoid identified clean modes arranged according to the couple.PJMNO and.PJMRG sd_proj_mesu data by PJMRF (5) .

The length of the vector is nbcapt*nbmoid

PJMMM (1)	component of the first following identified mode significant direction of sensor 1
PJMMM (2)	component of the first following identified mode significant direction of sensor 2
...	
PJMMM (nbcapt)	component of the first following identified mode significant direction of the sensor nbcapt
PJMMM (nbcapt+1)	component of the 2nd following identified mode significant direction of sensor 1
...	
PJMMM (nbcapt*nbmoid)	component of nbmoid- ième following identified mode significant direction of the sensor nbcapt

4.7 Object .PJMIG

This object is created only by MACR_ELEM_STAT .

The length of the vector is nbmoid*nddle

It contains the generalized reverse of the matrix With, defined by the following relation:

$$A = L_{ext}\Phi_{proj}\left[\Phi_{proj}^{T}L_{capt}^{T}L_{capt}\Phi_{proj}\right]^{-1}\Phi_{proj}^{T}L_{capt}^{T}\Phi_{id}$$

Where:

L_{ext}	: indicate the matrix of localization of the external ddls
Φ_{proj}	: indicate the base of projection (nddl, nbmode)
L_{capt}	: indicate the matrix of localization of the ddls sensors
Φ_{id}	: indicate the matrix of the identified clean modes (nbcapt, nbmoid)

One can interpret this matrix A as being condensation with the external ddls of the identified clean modes.