Data format sd_proj_mesu

Summarized:

The data structure sd_proj_mesu is attached to data structures resulting from PROJ_MESU_MODAL or MACR_ELEM_STAT (if key words PROJ_MESU and MODE_MESURE are indicated).

It is used by DEPL_INTERNE for the computation 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 data structure sd_proj_mesu are attached to data structures resulting from PROJ_MESU_MODAL or data structure resulting from MACR_ELEM_STAT (if key words PROJ_MESU and MODE_MESURE are indicated).

It is used for the creation of a super-mesh resulting from measurement.
This super-mesh is obtained while launching PROJ_MESU_MODAL and MACR_ELEM_STAT successively.
DEPL_INTERNE also uses it for the computation 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 data structure

Two operators can create a sd_proj_mesu : the operator PROJ_MESU_MODAL and 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 projection base to the ddls sensors.

If key words PROJ_MESU and MODE_MESURE are indicated in command MACR_ELEM_STAT , operator MACR_ELEM_STAT makes use of a data structure 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 projection base to the external ddls, the eigen modes identified and the condensation of the eigen modes identified with the external ddls.

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

3 Tree structure of Data format

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the 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
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4 Contained JEVEUX objects

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) with this object is equal to the number of sensors (nbcapt).

If key words PROJ_MESU and MODE_MESURE are indicated in MACR_ELEM_STAT, the sd_proj_mesu produced by MACR_ELEM_STAT contains the list of the numbers of the external nodes. And the working length (LONUTI) is equal to the external number of d.o.f. (nddle) of the macro-element.

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 d.o.f.

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 d.o.f. 1)
PJMRG (2) : name of the component associated with sensor 2
(or name with the component with the external d.o.f. 2)
…

4.3 Object .PJMBP

This object contains the reduction of projection base to the ddls specified by 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 projection base (nddl, nbmode)
nddl : number of ddls of model "the support"
nbmode : many basic vectors of projection base

PJMBP (1) : projection of the first vector of the base on component PJMRG (1) of node PJMNO (1)
PJMBP (2) : projection of the first vector of the base on component PJMRG (2) of node PJMNO (2)
...
PJMBP (LONUTI) : projection of the first vector of the base on component PJMRG (LONUTI) of node PJMNO (LONUTI)
PJMBP (LONUTI+1) : projection of the 2nd vector of the base on component PJMRG (1) of node PJMNO (1)
...
PJMBP (LONUTI*nbmode) : projection of the nbmode-ième vector of the base on component PJMRG (LONUTI) of 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 field measured ("DEPL", "QUICKLY", "ACCE", "SIEF_*", "EPSI_*")
PJMRF (3) : name of projection base
PJMRF (4) : name of the concept which contains identified eigen modes (argument of key word MODE_MESURE of MACR_ELEM_STAT)
PJMRF (5) : name of the concept created by PROJ_MESU_MODAL, used for the computation of the super-mesh (argument of key word PROJ_MESU of MACR_ELEM_STAT).

Note:
PJMRF (4) and PJMRF (5) are not indicated if computation PROJ_MESU_MODAL.

4.5 Object .PJMOR

This object is created only during a computation 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 of the significant direction of the sensor number 1
PJMOR (2) : projection following DY significant direction of the sensor number 1
PJMOR (3) : projection according to DZ of the significant direction of the sensor number 1
PJMOR (4) : projection according to DX of the significant direction of the sensor number 2
PJMOR (5) : projection following DY significant direction of the sensor number 2
PJMOR (6) : projection according to DZ of the significant direction of the sensor number 2
...

4.6 Object .PJMMM

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

The length of the vector is nbcapt*nbmoid

PJMMM (1) component first identified mode following the significant direction of sensor 1
PJMMM (2) component of the first identified mode following the significant direction of the sensor 2
...
PJMMM (nbcapt) component of the first identified mode following the significant direction of the sensor nbcapt
PJMMM (nbcapt+1) component of the 2nd identified mode following the significant direction of sensor 1
...
PJMMM (nbcapt*nbmoid) component of the nbmoid-ième mode identified suivantla 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 A, 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 projection base (nddl, nbmode)
L_{capt} : indicate the matrix of localization of the ddls sensors
ϕ_{id} : indicate the matrix of the identified eigen modes (nbcapt, nbmoid)

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