Operator `DEFI_SQUELETTE`

1 Goal

To define the grid of visualization of the results of a dynamic under-structuring.

In the case of the cyclic dynamic under-structuring, the grid is created by using whole or part of the meshs (grid of visualization) of the structure sector then by repeating it in a cyclic way to reconstitute the total structure.

In the case of the general dynamic under-structuring, the grid is created by using whole or part of the meshs (grid of visualization) of the various substructures then by associating them so as to reconstitute the total structure.

The meshs used (called meshs of visualization) are not necessarily support of a finite element. This makes it possible to use meshs of visualization of reduced number, different from the meshs of calculation, and representing coarsely the form of the structure (skeleton).

One can also create a skeleton starting from another skeleton which one will amalgamate certain nodes of the interfaces according to a criterion of proximity.

Restriction: The meshs of visualization must be defined starting from nodes supporting of the degrees of freedom of calculation (there is no interpolation of the results).

Warning:

The use of the operand `TOUT=' OUI'` can lead to big problems of performance. To always privilege the call by specifying the groups of meshs implied in the skeleton, particularly when the grids of under structures constitute only one small portion of the complete grid.

This operator creates a structure of data of the type `skeleton`.

2 Syntax

```
skeleton [skeleton] =  DEFI_SQUELETTE

1. cyclic Under-structuring

          ♦/CYCLIC = _F (♦/MODE_CYCL = mode_cycl           [mode_cycl]

                          / GRID = e-mail                       [grid]

                        ♦ NB_SECTEUR = nb_sect                    [RN]

          ♦ SECTOR = _F ( ◊ / GROUP_MA = grma,             [l_gr_maille]
                            / ALL = 'YES',
                        )

2. classical Under-structuring

          ♦/MODELE_GENE = mogene,                         [modele_gene]

          ♦ SOUS_STRUC = _F ( ♦ NAME = nom_sstruc,
          [KN]
                            ◊ / GROUP_MA= grma,            [l_gr_maille]
                              / ALL  = 'YES',
                          ),
          ♦ NOM_GROUP_MA = _F ( ♦ NAME = 'named',
          [KN]
                              ♦ SOUS_STRUC = nomsst,                [KN]
                              ♦ GROUP_MA =grma,            [l_gr_maille]
                            ),

3. Definition by an existing skeleton

          ♦ / SKELETON = skeleton,                            [skeleton]

          ◊ RECO_GLOBAL= _F (/ALL = 'YES',                      [defect]
                            / ♦ GROUP_NO_1 = grno1,           [group_no]
                              ♦ SOUS_STRUC_1 = nom_sstru1,          [KN]

                              ♦ GROUP_NO_2 = grno2,           [group_no]
                              ♦ SOUS_STRUC_2 = nom_sstru2,          [KN]

                              ◊ PRECISION =/prec,                    [R]
                                           / 1.D-3,             [defect]

                              ◊ CRITERION =/'RELATIVE',
          [defect]
                                          / 'ABSOLUTE',

                              ◊ DIST_REFE = dist_refe,               [R]

          ◊ NOM_GROUP_MA = _F ( ♦ NAME = 'named',
          [KN]
                              ♦ SOUS_STRUC = nomsst,                [KN]
                              ♦ GROUP_MA = grma,           [l_gr_maille]
                                  )
```

```
◊ EXCLUSIVE =/‘YES’
             /‘NOT’                                   [defect]
◊ TITLE = ‘title                                      [KN]

)
```

3 Operands

3.1 cyclic Under-structuring (CYCLIC keyword factor)

3.1.1 Operand MODE_CYCL

♦ MODE_CYCL = mocy

Concept mode_cycl resulting from a calculation in cyclic under-structuring.

3.1.2 Operand MAILLAGE/NB_SECTEUR

♦ GRID = e-mail

Concept maillage_sdaster used to define the skeleton. It is accompanied by the keyword NB_SECTEUR, entirety which gives the number of repetitions of this grid to obtain the complete structure of the skeleton.

3.1.3 Keyword SECTOR

♦ SECTOR

Keyword factor for the creation of a skeleton starting from a result of the type mode_cycl product by MODE_ITER_CYCL [U4.52.05]. Allows to define on the basic sector the list of the meshs of visualization which will be repeated in a cyclic way.

3.1.3.1 Operands ALL / GROUP_MA

◊ / ALL

All the meshs of the grid of the basic sector will be meshs of visualization.

◊ / GROUP_MA = grma

List of the groups of meshs of visualization of the basic sector.

3.2 classical Under-structuring

3.2.1 Operand MODELE_GENE

♦ MODELE_GENE = mogene

Name of the concept modele_gene resulting from DEFI_MODELE_GENE [U4.65.02] defining the total structure on which one wishes to define the skeleton.

3.2.2 Keyword SOUS_STRUC

♦ SOUS_STRUC

Keyword factor for the creation of a skeleton following a calculation by classical dynamic under-structuring.

Allows to define on each substructure of the model generalized the list of the meshs of visualization.

3.2.2.1 Operand NAME

◊ NAME = nom_struc

Name of the substructure. It must be identical to the one of the names of the substructures defining the model generalized (see DEFI_MODELE_GENE [U4.65.02]).

3.2.2.2 Operands ALL / GROUP_MA

◊ / ALL

All the meshs of the grid of the substructure will be meshs of visualization.

◊ / GROUP_MA = grma

List of the groups of meshs of visualization of the substructure.

3.3 Keywords SKELETON and RECO_GLOBAL

The keyword SKELETON an initial concept of standard skeleton defines where one will amalgamate the nodes of the interfaces by the keyword RECO_GLOBAL, that is to say all these nodes (ALL = 'YES'), that is to say selectively a group of nodes grno1 (operand GROUP_NO_1) substructure nom_sstru1 (operand SOUS_STRUC_1) with a group of nodes grno2 (operand GROUP_NO_2) substructure nom_sstru2 (operand SOUS_STRUC_2).
These substructures must belong to the concept of the type modele_gene informed by the operand MODELE_GENE.
The skeleton modified by fusion will be the result of the operator DEFI_SQUELETTE.

3.3.1 Operands DIST_REFE / CRITERION / PRECISION

Fusion will be done according to a criterion of proximity is absolute (compared to dist_ref) that is to say relative (compared to dist_ref*prec).

3.4 Keyword NOM_GROUP_MA

If one modifies an initial concept of standard skeleton (entered by the keyword SKELETON) by a fusion of the nodes of the interfaces (by means of the keyword RECO_GLOBAL), one can then recover groups of meshs (entered by the operand GROUP_MA) in the substructure nomsst (entry by the operand SOUS_STRUC) in their naming new of group of meshs (operand NAME) in the skeleton result.

3.5 Keyword EXCLUSIVE

In the case of a calculation by classical under-structuring, only. While putting EXCLUSIF=' OUI', one removes the groups of meshs resulting from the initial grids in the final skeleton.

4 Example

The command file which follows calculates, by two methods of under-structuring, the modes of inflection of a plate embedded in its center:

- cyclic method,
- classical method.

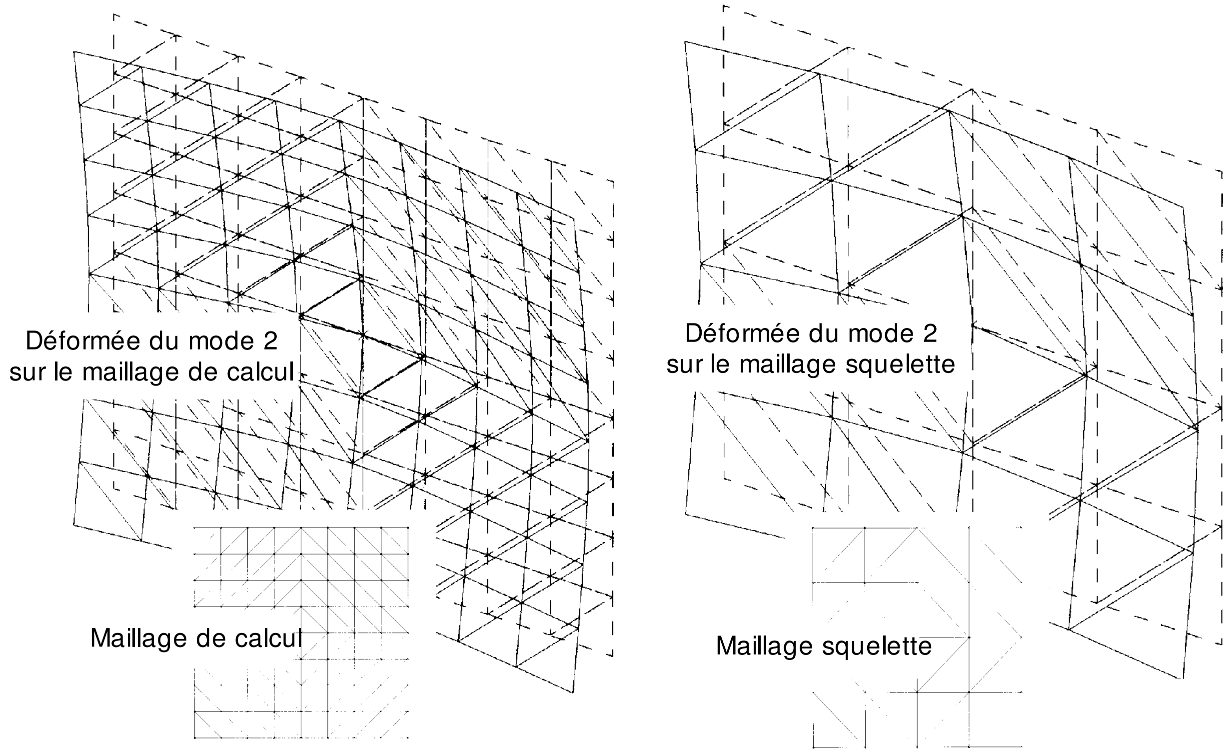
Then by the order DEFI_SQUELETTE, there is creation of a grid of visualization (grid **skeleton**). After having expressed the results in physical space, grid of visualization and results are versed in a file RESULT with format IDEAS.

4.1 Command file

```
#
#  CALCULATION BY CYCLIC SOUS-STRUCTURATION
#
#  CALCULATION OF THE CYCLIC CLEAN MODES
#
mod_cy  = MODE_ITER_CYCL (BASE_MODALE= bamo,
                          NB_MODE = 5,     NB_SECTEUR = 4,
                          CONNECTION = _F (RIGHT = ' DROITE', LEFT = '
GAUCHE'),
                          CALCULATION  = _F (TOUT_DIAM  = ' OUI', NMAX_FREQ
= 2),
                          INFORMATION       = 1)
#
#  CREATION OF THE GRID OF CALCULATION
#
squel1  = DEFI_SQUELETTE (MODE_CYCL= mod_cy,
                          SECTOR  = _F (GROUP_MA= 'CALCULATION'))
#
#  CREATION OF THE GRID OF VISUALIZATION
#
squel2  = DEFI_SQUELETTE (MODE_CYCL= mod_cy,
                          SECTOR  = _F (GROUP_MA= 'VISUAL'))
#
#  RESTITUTION OF THE RESULTS ON THE GRIDS SKELETONS
#
modgl1  = REST_SOUS_STRUC (RESU_GENE= mod_cy, SQUELETTE= squel1)
modgl2  = REST_SOUS_STRUC (RESU_GENE= mod_cy, SQUELETTE= squel2)
#
…

#  CALCULATION BY CLASSICAL SOUS-STRUCTURATION
#
#  CALCULATION OF THE MACRONUTRIENT
#
macele   = MACR_ELEM_DYNA (BASE_MODALE= bamo)
#
#  CALCULATION OF THE MODEL GENERALIZES
#
modege   = DEFI_MODELE_GENE (
             SOUS_STRUC=_F (NOM=' CARRE1',
                          MACR_ELEM_DYNA= macele),
             SOUS_STRUC=_F (NOM=' CARRE2',
                          MACR_ELEM_DYNA= macele,
                          ANGL_NAUT= (90. , 0. , 0.)),
             SOUS_STRUC= (NOM=' CARRE3',
                         MACR_ELEM_DYNA= macele,
                         ANGL_NAUT= (180. , 0. , 0.)),
             SOUS_STRUC= (NOM=' CARRE4',
                         MACR_ELEM_DYNA= macele,
                         ANGL_NAUT= (270. , 0. , 0.)),
             LIAISON=_F (SOUS_STRUC_1=' CARRE1',
                        SOUS_STRUC_2=' CARRE2',
```

```
                        INTERFACE_1 = ' GAUCHE',
                        INTERFACE_2 = ' DROITE'),
             LIAISON=_F (SOUS_STRUC_1=' CARRE2',
                        SOUS_STRUC_2=' CARRE3',
                        INTERFACE_1 = ' GAUCHE',
                        INTERFACE_2 = ' DROITE'),
             LIAISON=_F (SOUS_STRUC_1=' CARRE3',
                        SOUS_STRUC_2=' CARRE4',
                        INTERFACE_1 = ' GAUCHE',
                        INTERFACE_2 = ' DROITE'),
             LIAISON=_F (SOUS_STRUC_1=' CARRE4',
                        SOUS_STRUC_2=' CARRE1',
                        INTERFACE_1 = ' GAUCHE',
                        INTERFACE_2=' DROITE'))
#
…

#  CREATION OF THE GRID OF VISUALIZATION

squel    = DEFI_SQUELETTE (MODELE_GENE=MODEGE
                     SOUS_STRUC=_F (NAME = ' CARRE1',
                                   GROUP_MA= 'VISUAL'),
                     SOUS_STRUC=_F (NAME = ' CARRE2',
                                   GROUP_MA= 'VISUAL'),
                     SOUS_STRUC=_F (NAME = ' CARRE3',
                                   GROUP_MA= 'VISUAL'),
                     SOUS_STRUC=_F (NAME = ' CARRE4',
                                   GROUP_MA= 'VISUAL'))
#
#  RESTITUTION OF THE RESULTS ON THE GRID SKELETON
#
modglo   = REST_SOUS_STRUC (RESU_GENE= resgen,
                            SQUELETTE= squel)
#
```

4.2 Graphic results



One presents the grids of calculation above and **skeleton** plate embedded with respectively the modal deformations of the second mode.