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 meshes (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 meshes (grid of visualization) of the various substructures then by associating them so as to reconstitute the total structure.

The meshes used (called meshes of visualization) are not necessarily support of a finite element. This makes it possible to use meshes of visualization of reduced number, different from the meshes 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 meshes 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 meshes 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, [R]
        ◇ 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]
        )
```

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◊ EXCLUSIVE =/'YES'
   /'NOT'
◊ TITLE = ‘title  
  )
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 meshes of visualization which will be repeated in a cyclic way.

3.1.3.1 Operands ALL / GROUP_MA

◊ / ALL

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

◊ / GROUP_MA = grma

List of the groups of meshes 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 meshes 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 meshes of the grid of the substructure will be meshes of visualization.

◊ / GROUP_MA = grma

List of the groups of meshes 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 meshes (entered by the operand **GROUP_MA**) in the substructure nomsst (entry by the operand **SOUS_STRUC**) in their naming new of group of meshes (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 meshes 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

```plaintext
# # CALCULATION BY CYCLIC SOUS-STRUCTURATION
# # CALCULATION OF THE CYCLIC CLEAN MODES
mod_cy = MODE_ITER_CYCL (BASE_MODELE= 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_MODELE= 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',
```

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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)
#
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4.2 Graphic results

Déformée du mode 2 sur le maillage de calcul

Déformée du mode 2 sur le maillage squelette

Maillage de calcul

Maillage squelette

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