

Operator ASSE_ELEM_SSD

1 Goal

This operator aims to facilitate the task of the user for the assembly of dynamic macronutrients. It connects the following orders: `DEFI_MODELE_GENE`, `NUME_DDL_GENE` and `ASSE_MATR_GENE`. It produces a concept of the type `modele_gene`, and possibly a concept of the type `nume_ddl_gene` and of the concepts of the type `matr_asse_gene_r`.

This operator limits himself to the creation of the real generalized matrices.

The generalized matrices obtained are usable directly to calculate the clean modes of the generalized model.

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2 Syntax

```
ASSE_ELEM_SSD (

    ♦ RESU_ASSE_SSD = _F (
        ♦ MODEL = model, [modele_gene]
        ♦ NUME_DDL_GENE = nugene, [nume_ddl_gene]
        ♦ RIGI_GENE = rigene, [matr_asse_gene_r]
        ♦ MASS_GENE = magene, [matr_asse_gene_r]
    ),

    ♦ SOUS_STRUC = _F (
        ♦ NAME = nom_ssti, [KN]
        ♦ MACR_ELEM_DYNA = maceli, [macr_elem_dyna]
        ◊ ANGL_NAUT = angln, [l_R]
        TRANS ◊ = trans, [l_R]
    ),

    ♦ CONNECTION = _F (
        ♦ SOUS_STRUC_1 = nom_sst1, [KN]
        ♦ INTERFACE_1 = nom_int1, [KN]
        ♦ SOUS_STRUC_2 = nom_sst2, [KN]
        ♦ INTERFACE_2 = nom_int2, [KN]
        ◊ GROUP_MA_MAIT_1 = lgma1, [l_gr_maille]
        ◊ MAILLE_MAIT_1 = lma1, [l_maille]
        ◊ GROUP_MA_MAIT_2 = lgma2, [l_gr_maille]
        ◊ MAILLE_MAIT_2 = lma2, [l_maille]
        ◊ OPTION =/'CLASSICAL', [DEFECT]
            / 'REDUCED',
    ),

    ◊ VERIF = F (
        to see keyword factor VERIF of DEFI_MODELE_GENE [U4.65.02]
    ),

    ◊ METHOD =/'CLASSICAL', [DEFECT]
        / 'ELIMINATES',

    ◊ STORAGE =/'LIGN_CIEL', [DEFECT]
        / 'FULL',

    ◊ INFORMATION =/1, [DEFECT]
        / 2,

),
```

3 Course of calculation

This operator connects the following operations:

- definition of the generalized model (`DEFI_MODELE_GENE`),
- classification of the degrees of freedom of the generalized model (`NUME_DDL_GENE`),
- assembly of the generalized matrices (`ASSE_MATR_GENE`),

It is limited to the creation of the real generalized matrices.

For his implementation, the user can take as a starting point the modelings “E” and “F” of the case test sds106. These modelings correspond respectively to modelings “B” and “D” of the same case test.

3.1 Keyword `RESU_ASSE_SSD`

This keyword factor defines the concepts of exit.

3.1.1 Operand `MODEL`

♦ `MODEL = model`

`model` : generalized model which contains the elements constituting the total structure (assembled substructures).

3.1.2 Operand `NUME_DDL_GENE`

♦ `NUME_DDL_GENE = nugene`

`nugene` : classification of the degrees of freedom of the total structure.

3.1.3 Operand `RIGI_GENE`

♦ `RIGI_GENE = rigene`

`rigene` : matrix of rigidity generalized of the total structure.

3.1.4 Operand `MASS_GENE`

♦ `MASS_GENE = magene`

`magene` : matrix of mass generalized of the total structure.

3.2 Keyword `SOUS_STRUC`

Each occurrence of this keyword factor makes it possible to define the characteristics of a substructure.

The description of the operands associated with this keyword is the same one as that of the keyword `SOUS_STRUC` of the operator `DEFI_MODELE_GENE` [U4.65.02].

Note:

By default, one considers that the substructure undergoes neither a translation nor a rotation: $TRANS = (0. , 0. , 0.)$ and $ANGL_NAUT = (0. , 0. , 0.)$.

3.3 Keyword `CONNECTION`

Each occurrence of this keyword factor makes it possible to define the connection between two substructures. The description of the operands associated with this keyword is the same one as that of the keyword CONNECTION of the operator DEFI_MODELE_GENE [U4.65.02].

Among the operands of this keyword, the operand OPTION allows to choose the type of mode (static modes or modes of interface) which one adds besides the normal modes.

◇ OPTION

/ 'CLASSICAL' : to each ddl of the interface a static mode of connection corresponds

/ 'REDUCED' : use of the modes of interface (calculated beforehand with CREA_ELEM_SSD for example)

3.4 Keyword VERIF

This keyword makes it possible to check the coherence of the generalized model. The description of the operands associated with this keyword is the same one as that of the keyword VERIF of the operator DEFI_MODELE_GENE [U4.65.02].

3.5 Operand METHOD

This operand makes it possible to choose the way of numbering the degrees of freedom of the generalized model. Two choices are possible.

◇ METHOD

/ 'CLASSICAL' : Construit a classification of the generalized degrees of freedom allowing the taking into account of the equations of connections between substructures by the method of the double multipliers of Lagrange.

/ 'ELIMINATES' : Construit a classification of the generalized degrees of freedom allowing the taking into account of the equations of connections by the method of elimination of the constraints on the variables.

3.6 Operand STORAGE

This operand makes it possible to choose the mode of storage of or the assembled matrices.

◇ STORAGE

/ 'LIGN_CIEL' : mode of storage of type line of sky

/ 'FULL' : one stores all the elements of the higher triangular part of the matrix.

3.7 Operand INFORMATION

This operand makes it possible more or less to print information on the generalized model creates in the file 'MESSAGE'.

4 Example of use

This example is extracted from the case test sds106e

```
ASSE_ELEM_SSD (
  RESU_ASSE_SSD = _F (
    MODEL = CO ('MODEGE'),
    NUME_DDL_GENE = CO ('NUMEGE'),
    RIGI_GENE = CO ('RIGGEN'),
    MASS_GENE = CO ('MASGEN'),
  ),
  SOUS_STRUC = (
    _F (NAME = 'CARRE1',
      MACR_ELEM_DYNA = MACEL1, ),
    _F (NAME = 'CARRE2',
      MACR_ELEM_DYNA = MACEL2,
      TRANS = (0. , 0.5, 0.),
      ANGL_NAUT = (- 90. , 0. , 0.), ),
  ),
  CONNECTION = (
    _F (SOUS_STRUC_1 = 'CARRE1',
      INTERFACE_1 = 'LEFT',
      GROUP_MA_MAIT_1 = 'CALCULATION',
      OPTION = 'REDUCED',
      SOUS_STRUC_2 = 'CARRE2',
      INTERFACE_2 = 'BLOCKS', ),
  ),
  VERIF = _F (STOP_ERREUR = 'YES',
    PRECISION = 1.E-6,
    CRITERION = 'RELATIVE'),
  METHOD = 'ELIMINATES',
),
```