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.
1 Goal

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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 0 = 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]  
    ♦ GROUP_MA_MAIT_2 = lgma2, [l_gr_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,  
  ),  

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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 sdls106. 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_STRUCT

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_STRUCT 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

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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 \texttt{CONNECTION} of the operator \textit{DEFI\_MODELE\_GENE} [U4.65.02].

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

\begin{itemize}
  \item \texttt{OPTION} / \texttt{\textquotesingle CLASSICAL\textquotesingle} : to each ddl of the interface a static mode of connection corresponds
  \item \texttt{OPTION} / \texttt{\textquotesingle REDUCED\textquotesingle} : use of the modes of interface (calculated beforehand with \textit{CREA\_ELEM\_SSD} for example)
\end{itemize}

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 \texttt{VERIF} of the operator \textit{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.

\begin{itemize}
  \item \texttt{METHOD} / \texttt{\textquotesingle CLASSICAL\textquotesingle} : 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.
  \item \texttt{METHOD} / \texttt{\textquotesingle ELIMINATES\textquotesingle} : 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.
\end{itemize}

3.6 **Operand STORAGE**

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

\begin{itemize}
  \item \texttt{STORAGE} / \texttt{\textquotesingle LIGN\_CIEL\textquotesingle} : mode of storage of type line of sky
  \item \texttt{STORAGE} / \texttt{\textquotesingle FULL\textquotesingle} : one stores all the elements of the higher triangular part of the matrix.
\end{itemize}

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 sdls106e

```plaintext
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', 
),
```

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