
Operator CREA_ELEM_SSD

1 Drank

This operator aims to facilitate the task of the user for the creation of a dynamic macro-element. CREA_ELEM_SSD calculates the basic vectors of projection, defines the interfaces and creates the dynamic macro-element.

It produces a concept of the `macr_elem_dyna` type.

The dynamic macro-element created is ready to be assembled with other dynamic macro-element in order to obtain one model generalized. The creation of this model generalized can be made with operator ASSE_ELEM_SSD.

This operator does not have the role to be able to create all the possible macro-elements. He makes it possible to create the real standard macro-elements which correspond in the majority of the cases. The basic vectors of these macro-elements are of type CLASSIQUE or many basic vectors of RITZ with modes of interface.

For particular projection bases, the user is invited to manually create them using the standard operators.

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2 Syntax

```

macel [macr_elem_dyna] = CREA_ELEM_SSD (

    model ♦          MODELE=,                [model]
    ◇ NUME_DDL=      nu,                    [nume_ddl]
    ♦ CHAM_MATER=    chmat,                [cham_mater]
    ◇ CARA_ELEM=     carele,                [cara_elem]

    ◇ CHARGE=        chg,                    / [char_meca]
                                           / [char_ther]
                                           / [char_acou]

    ♦ INTERFACE=    _F (
        ♦ NOM =      "nintf",                [kN]
        ♦ TYPE =     "MNEAL",
                    /"CRAIGB",
                    /"CB_HARMO",
        /◇ NOEUD =    noeu,                    [l_noeud]
        / ◇ GROUP_NO = gnoeu,                [l_gr_noeud]
        ◇ FREQ =     1.                      [DEFAULT]
                    /ifreq,                [R]
    ),

    ♦ BASE_MODAL=   _F (
        ♦ TYPE =     "CLASSIQUE",
                    /"RITZ",
        If TYPE == "RITZ":
            ◇ TYPE_MODE = "INTERFACE"        [DEFAULT]
                    /"STATIC"
        If TYPE_MODE == "INTERFACE":
            ◇ NMAX_MODE_INTF = 10            [DEFAULT]
                    /nmint,                [I]
    ),

    ◇ CALC_FREQ = F (
        ◇ STOP_ERREUR = "OUI"                [DEFAULT]
                    /"NON"
        ◇ OPTION =    "PLUS_PETITE"          [DEFAULT]
                    /"TAPE"
                    /"CENTER"
                    /"SANS"

        One chooses OPTION = "SANS" if one does not want to use
        normal modes.
        If not, to see key word factor CALC_FREQ of CALC_MODAL [U4.52.10]
        for the computation options of normal modes.
    ),

    ◇ SOLVEUR=      _F (see U4.50.01)
    ◇ INFO=         /1,                [DEFAULT]
                    /2,

),

```

3 Course of computation

This operator makes it possible and to create easily a real dynamic macro-element (without damping) by informing only the mechanical characteristics of the model interfaces associated with substructure.

It connects the following operations:

- creation of the stiffness matrixes and mass of the substructure,
- computation of the normal modes of the substructure,
- definition of the interfaces associated with substructure,
- computation of the static modes or the modes of interface,
- definition of projection base,
- computation of the dynamic macro-element.

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

3.1 Operand MODELS

◆ MODELS = model

model : the model which contains the elements substructure constituting.

3.2 Operand NUME_DDL

◇ NUME_DDL = nu

nu : classification of the degrees of freedom assigned to substructure.

Note:

This classification is necessary if one wants to calculate the response of assembled structure due to a loading applied to substructure for example. One needs classification in order to be able of the substructure to assemble the elementary vector according to the classification of the degrees of freedom.

One writes then: NUME_DDL = CO ("numerical"), where numerical the classification indicates which one wishes given to the degrees of freedom of the substructure.

3.3 Operand CHAM_MATER

◆ CHAM_MATER = chmat

chmat : name of the material field where the characteristics of the materials are defined.

3.4 Operand CARA_ELEM

◇ CARA_ELEM = carele

carele : elementary characteristics of the beam elements, shell or of the discrete elements if substructure contains some.

3.5 Operand CHARGE

◇ CHARGE = chg

chg : loading applied to substructure.

3.6 Key word INTERFACES

the key word factor `INTERFACE` makes it possible to define the interfaces associated with substructure. The key words associated with this key word factor are identical to the key word factor `INTERFACES` of operator `DEFI_INTERF_DYNA` [U4.64.01]. One seizes also here the value of the frequency used for the computation of the harmonic constrained modes. The value by default, for this frequency is equal to 1.

The rule of overload is observed. If the value of the frequency differs between the various interfaces then one informs the user using an alarm which specifies the value of the frequency actually taken into account.

3.7 Key word BASE_MODAL

the key word factor `BASE_MODAL` makes it possible to specify base type on which substructure is projected.

3.7.1 Operand TYPE

This operand defines the type of projection base.

```
◆ TYPE = "CLASSIQUE"  
        /"RITZ"
```

a base of the type `CLASSIQUE` consists of normal modes and constrained modes or attach modes according to the type of the interface. The computation normal modes is done according to the indications provided in the key word factor `CALC_FREQ`.

3.7.2 Operand TYPE_MODE

```
◇ TYPE_MODE = "INTERFACE" [DEFAULT]  
              /"STATIC"
```

the option `TYPE = "RITZ"` makes it possible to specify the type of modes to be added to the normal modes. The user can choose modes of the `STATIC` type (static statements with the degrees of freedom of the nodes of interface) or of type `INTERFACES` (modes of interface). For the cas particulier where one does not wish to use normal modes, one chooses `OPTION = "SANS"` in key word `CALC_FREQ`.

3.7.3 Operand NMAX_MODE_INTF

```
◇ NMAX_MODE_INTF = 10 [DEFAULT]  
                  /nmintf
```

`NMAX_MODE_INTF` corresponds to the number of modes of interface to take into account. One considers here the `nmintf` first modes of interface (`nmintf > 0`).

3.8 Key word CALC_FREQ

This factor key word makes it possible to choose the frequential contents of the normal modes. The operands associated with this key word factor are identical to those defined for `CALC_MODAL` [U4.52.10]. A characteristic for the option `BANDE`, operand `FREQ` makes it possible to seize a list of frequency and one carries out modal computations on the various intervals of the list. One chooses `OPTION = "SANS"` if one does not wish to calculate normal modes.

Key word `STOP_ERREUR` makes it possible to indicate to the operator if it must stop ("OUI") or continue ("NON") if one of the criteria of quality control of the calculated modes is not checked. This

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key word is equivalent to the key word STOP_ERREUR of factor key word the VERI_MODE of CALC_MODAL.

Note:

In order to not overload the command, this key word factor does not make it possible to seize parameters COEF_DIM_ESPACE, NMAX_ITER_SHIFT, PREC_SHIFT, SEUIL_FREQ and STOP_FREQ_VIDE. On the other hand, the user can seize the dimension of subspace (DIM_SOUS_ESPACE) where necessary. The values chosen for the computation of the normal modes are the values by default of these parameters in CALC_MODAL.

3.9 Key word solver

optional Key word, to see [U4.50.01].

3.10 Operand INFO

This operand makes it possible more or less to print information on the macro-element creates in the file "MESSAGE".

4 Example of use

This example is extracted from the case test sdis106e

```
MACEL1 = CREA_ELEM_SSD (
    MODELS = MODELE1,
    CHARGE = CHARGE_1,
    CHAM_MATER = CHAMAT1,
    CARA_ELEM = PARAM1,
    INTERFACE = _F (NOM = "GAUCHE",
                    TYPE = "CRAIGB",
                    GROUP_NO = "GAUCHE"),
    BASE_MODAL = _F (TYPE = "RITZ",
                    NMAX_MODE_INTF = 20, ),
    CALC_FREQ = _F (NMAX_FREQ = 6, ),
)
```