Code_Aster

Titre : Opérateur CALC_VECT_ELEM
Responsable : Jacques PELLET

Version default

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Clé : U4.61.02 Révision : 951

Operator `CALC_VECT_ELEM`

1 Drank

Compute a set of vectors elementary which one will be able to assemble with `ASSE_VECTEUR`.

The possible computation options are:

"CHAR_MECA" , "CHAR_THER" , "CHAR_ACOU" , "FORC_NODA".

Product a data structure of the vect_elem_* `type`.

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2   Syntax

```
vel [vect_elem_*]        = CALC_VECT_ELEM

     (  ♦/OPTION      =  ' CHAR_MECA',

          ♦  | ◊CHAM_MATER  = chmat  ,          [cham_mater]
               ◊CARA_ELEM   =carac        ,          [cara_elem]
               ♦CHARGE   = lchar  ,           [l_char_meca]
               ◊INST=/tps                  ,              [R]
                        /0.0          ,          [DEFAULT]
               ◊MODE_FOURIER=/nh              ,          [I]
                              /0 ,         [DEFAULT]

               #cas    of a model containing of
               the #sous  - structures:

               |  ♦  MODELS = Mo,                  [model]
                  ♦SOUS_STRUC    = _F (
                     ♦CAS_CHARGE    = nocas,       [K8]
                     ♦/TOUT      = "OUI',
                        /SUPER_MAILLE = lmail, [l_maille]   )

          /♦OPTION      = "CHAR_THER",
             ◊CARA_ELEM    = carac,                  [cara_elem]
             ♦CHARGE   =lchar        ,                [l_char_ther]

          /♦OPTION      = "CHAR_ACOU",
             ♦CHAM_MATER   = chmat ,           [cham_mater]
             ♦CHARGE   =lchar        ,                [l_char_acou]

          /♦OPTION      = ' FORC_NODA',
             ♦SIEF_ELGA    =chsig        ,           [cham_elem
(SIEF_R)]

             ◊CARA_ELEM    =carac        ,                 [cara_elem]
             ◊MODELE      =mo        ,                  [model]

     )


        If              OPTION'CHAR_THER'alors      [*]    □      TEMP_R
                   "                              CHAR_MECA'DEPL_R
                   "                              CHAR_ACOU'PRES_R
                   "                              FORC_NODA'DEPL_R
```

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3   General information

This command is used to calculate a set of elementary vectors (corresponding with a selected option). The concept created of vect_elem_* `type` could be then assembled by the operator `ASSE_VECTEUR` [U4.42.03] to give a second member of the cham_no `type`.

The options available are:

"CHAR_MECA"   to obtain the second member of a mechanical problem,
"CHAR_THER"   to obtain the second member of a thermal problem,
"CHAR_ACOU"   to obtain the second member of an acoustic problem,

and "FORC_NODA" for the computation of the nodal forces equivalent to a stress field.

This last option is calculated by the formula:

$$\int_\Omega \sigma . \varepsilon(\upsilon) d\Omega$$

σ : tenseur de contraintes
υ : fonction test

4   Operands

4.1   Operand CHARGE

♦CHARGE   = lchar

the list of the loads `lchar` must be coherent with the selected option:

- "mechanical" loads for the option "CHAR_MECA",
- "thermal" loads for the option "CHAR_THER",
- "acoustic" loads for the option "CHAR_ACOU".

This argument is compulsory (except for L" option "FORC_NODA").

It allows D" to reach all the data concerning the "loading" of the system. It is necessary that all the loads of the list S" lean on the same model.

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4.2 Operand INST

◊INST = tps

the parameter tps (time of computation) is used as soon as the loading depends on time. In particular when there exists a loading of thermal expansion (AFFE_MATERIAU/AFFE_VARC/TEMP).

4.3 Operand CHAM_MATER

◊CHAM_MATER

Name of the material field where the characteristics of material of the elements are defined. This argument is necessary into thermomechanical for the loadings gravity, rotation, thermal expansion and in acoustics.

4.4 Operand CARA_ELEM

◊CARA_ELEM = carac

This concept of the cara_elem type is necessary if there exists in the model structural elements (beam, plate, shell or discrete elements).

4.5 Operand MODE_FOURIER

◊MODE_FOURIER = nh

positive or null Entier indicating the harmonic of FOURIER on whom one calculates the elementary vector for a model 2D axisymmetric. By default, nh = 0.

nh intervenes only for one loading where there exists thermal thermal expansion.

4.6 Operand SIEF_ELGA

♦SIEF_ELGA = chsig

Name of a stress field to Gauss points, allowing the computation of the nodal forces. The model used is that which made it possible to calculate chsig.

Note:

*For data-processing reasons, if the stress field chsig were calculated on **under - together** of meshes of the model, it is necessary to give the name of this model by the key word MODELS = Mo .*

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4.7   Operands necessary to computations with static substructuring

♦MODELE   = Mo

This key word is compulsory to find substructures affected by the loading: Mo is the name of the model which carries substructures.

♦SOUS_STRUC

This key word factor makes it possible to specify which are the loadings to be used for under - structures. In its absence, the loadings on under structures are null.

These loadings are added to the loadings "finite elements" which can be applied to the rest of the model.

♦CAS_CHARGE   = nocas

nocas is the name of the loading case to be used. See operator MACR_ELEM_STAT [U4.62.01].

♦/TOUT   = "OUI'

This key word makes it possible to affect the loading nocas to all under structures of the model.

/SUPER_MAILLE = l_mail

This key word factor makes it possible to assign the loading nocas only to some under - structures.

5   Mechanical

- Loading examples at the moment T = 12. of a structure affected by a thermal evolution:

```
vel =CALC_VECT_ELEM      (OPTION = "CHAR_MECA",
    CHAM_MATER = chmat, CHARGE = ch_force, INST = 12. ,)
```

- Computation of the nodal forces (postprocessing) for a model 3D:

```
vel =CALC_VECT_ELEM      (OPTION = "FORC_NODA",
    SIEF_ELGA = chsig,  )
```

- Computation of the second member for a problem of linear thermal steady:

```
vel =CALC_VECT_ELEM      (OPTION = "CHAR_THER", CHARGE = ch_ther)
```

- Computation of the mechanical loading of a structure containing of static substructures:

```
vel =CALC_VECT_ELEM      (OPTION = "CHAR_MECA",
    CHARGE = ch_meca,
    MODELS = Mo, SOUS_STRUC= _F (CAS_CHARGE = "ch_f1", TOUT= "OUI'))
```