Code_Aster

Titre : Opérateur AFFE_MATERIAU
Responsable : PELLET Jacques

Version 12

Date : 06/12/2017 *Page : 1/12*
Clé : U4.43.03 *Révision :*
a2bedca17dd6

Operator `AFFE_MATERIAU`

1 Goal

To assign materials to geometrical zones of a grid or a model.

To define the variables of order (temperature, space, hydration, drying, corrosion,…) for digital calculations.

Product a structure of data of the type `cham_mater`.

Code_Aster

Titre : Opérateur AFFE_MATERIAU
Responsable : PELLET Jacques

Version 12

Date : 06/12/2017 Page : 2/12
Clé : U4.43.03   Révision   :
*   a2bedca17dd6*

2   Syntax

```
chm [cham_mater] = AFFE_MATERIAU

(   ♦  |  GRID = my ,                 /         [grid]
                                    /          [skeleton]
        |  MODEL  = Mo ,                        [model]

    # assignment of the name of material  :
    ♦  AFFE = (_F (
                 ♦ /   ALL     = 'YES' ,
                   /  | GROUP_MA = lgma  ,     [l_gr_maille]
                      | MESH   =   lma   ,     [l_maille]

                 ♦  MATER =  /  chechmate ,          [to
subdue]
                            /  l_mat,        [l_mater]
              ),),

    # assignment of the variables of orders:
    ♦  AFFE_VARC =  (_F (
                 ◊ /   ALL     = 'YES' ,      [DEFECT]
                   /  |  MESH   = lma,        [l_maille]
                      |  GROUP_MA =  lgma,    [l_gr_maille]

                 ♦  NOM_VARC =    /   'TEMP',
                                  /   'GEOM',
                                  /   'CORR',
                                  /   'EPSA',
                                  /   'HYDR',
                                  /   'IRRA',
                                  /   'M_ACIER',
                                  /   'M_ZIRC',
                                  /   'NEUT1',
                                  /   'NEUT2',
                                  /   'PTOT',
                                  /   'DIVU',
                                  /   'SECH',

                 ◊  CHAM_GD  =  chvarc          [field]
                 ◊  EVOL     =  evovarc         [evol_sdaster]
                     ◊  NOM_CHAM = nosymb,      [TXM]
                     ◊  FONC_INST = finst,      [function]
                   ◊  PROL_DROITE =/'EXCLUDED', [DEFECT]
                                  / 'CONSTANT',
                                  / 'LINEAR',
                   ◊  PROL_GAUCHE =/'EXCLUDED', [DEFECT]
                                  / 'CONSTANT',
                                  / 'LINEAR',
                   # If NOM_VARC = 'TEMP' (or 'SECH'):
                     ♦  VALE_REF = vref,         [R]

                   # "hidden" keywords:
                   VARC_TEMP = _F (...),
                   VARC_GEOM = _F (...),
                   VARC_HYDR = _F (...),
                   VARC_SECH = _F (...),
```

Code_Aster

Titre : Opérateur AFFE_MATERIAU
Responsable : PELLET Jacques

Version 12

Date : 06/12/2017 Page : 3/12
Clé : U4.43.03   *Révision :*
a2bedca17dd6

```
                           …
            ),),


       # assignment of the "behavior" of the multifibre beams  :
    ◊   AFFE_COMPOR =  (_F (
                  ♦  /   ALL    = 'YES' ,       [DEFECT]
                     /  |  GROUP_MA =   lgma   ,   [l_gr_maille]
                        |  MESH   =  lma    ,   [l_maille]

                  ♦  COMPOR =     compor ,       [compor]
            ),),

    ◊   INFORMATION =                 /  1     ,       [DEFECT]
                                 /  2

   )
```

Code_Aster

Version 12

Titre : Opérateur AFFE_MATERIAU
Responsable : PELLET Jacques

Date : 06/12/2017 Page : 4/12
Clé : U4.43.03   Révision :
a2bedca17dd6

3   General information

This order is used to affect the material characteristics on the finite elements of the model (even if in fact the meshs of the grid are really affected). These material characteristics are defined in the materials which one affects on the meshs (keyword MATER). Each material contains a certain number of parameters (Young modulus, density,…). These parameters can be related to certain variables. We will call these variables of order".

Currently, the variables of order used are:
- the temperature,
- space,
- the hydration,
- drying,
- metallurgical phases,
- irradiation,
- corrosion,
- …

All these variables of order must be affected with the order AFFE_MATERIAU (keyword AFFE_VARC).

In the case of model for multifibre beams, it is also necessary to affect in this order the "behaviors" defined with the order DEFI_COMPOR/MULTI_FIBRE [U4.43.06].

4   Operands

4.1   **GRID**

GRID = my,

Name of the grid (or the skeleton) which one wants to affect by material characteristics.

Note:

The operation of assignment is the same one for the meshs of a skeleton as for the meshs of a grid. In the continuation of the document, one will always say grid to simplify.

When one affects materials on the meshs of a skeleton, it is that one wants to calculate constraints (for example) on the meshs of postprocessing (coarser).

4.2   **MODEL**

MODEL = Mo,

Name of the model.
If this argument is used, it is checked that the meshs affected in the order are part of the model well.

4.3   Keyword factor **AFFE**

The keyword factor AFFE allows to affect various materials on "pieces" of the grid.

4.3.1   Notice concerning calculations of breaking process

In general, the material characteristics must be known on the finite elements modelling the "matter": "voluminal" elements (or of structure). The finite elements of "skin" are there to apply boundary conditions and do not have to know the material properties of the subjacent matter. An exception exists for the calculation of the option CALC_K_G operators CALC_G_XXXX. For these calculations, the finite elements modelling the lips of the crack must be affected by same material as the "voluminal" elements subjacent.

Code_Aster

Version 12

Titre : Opérateur AFFE_MATERIAU
Responsable : PELLET Jacques

Date : 06/12/2017 Page : 5/12
Clé : U4.43.03   Révision   :
a2bedca17dd6

4.3.2   Operands `TOUT=' OUI'`, `GROUP_MA`, `MESH`

The keyword `ALL`, `GROUP_MA` and `MESH` allow to indicate the whole of the meshs which will be affected.

If a mesh appears explicitly (or implicitly) in several occurrences of the keyword factor `AFFE`, the rule of overload is observed: it is the last assignment which precedes [U2.01.08].

4.3.3   Operand `MATER`

♦   MATER = chechmate,

Name of the material which one wants to affect.

In the case general, each mesh is affected only by one material. Sometimes, it is necessary to indicate a material list when the nonlinear mechanical behavior is obtained by the order `DEFI_COMPOR` [U4.43.06].

4.4   Keyword `AFFE_VARC`

This keyword factor makes it possible to affect fields of **variables of order** on the meshs of the grid. This keyword can be repeated. It is necessary to use several occurrences of `AFFE_VARC` to be able to affect several different variables of order. But one can also use several occurrences for only one variable. For example, on a mixed model (3D + beams), one can affect like temperature:
  1 `evol_ther` calculated on the elements 3D
  1 field of temperature (constant in time) on the elements of beam.

A variable of order is a scalar (real) which can influence the material behavior via the parameters which are functions (for example a parameter of `DEFI_MATERIAU/ELAS_FO`). A variable of order is a known field **front** calculation. This field can be variable in time.

The variables of order were introduced above all for mechanical calculations. The variable of the most usual order for mechanical calculations is the temperature.

For thermal calculations, it is possible to use one (or several) variable of order, but that relates to only some very rare parameters:
```
SECH_NAPPE        / FUNCTION
THER_FO           / LAMBDA
THER_FO           / RHO_CP
THER_COQUE_FO     / COND_LMM, COND_TMM,…
```

4.4.1   Operand `NOM_VARC`

♦   NOM_VARC = nomvarc,

Name of the variable of order which one wants to affect (`TEMP, GEOM, IRRA, CORR, HYDR, SECH,…`).

Code_Aster

Titre : Opérateur AFFE_MATERIAU
Responsable : PELLET Jacques

Version 12

Date : 06/12/2017 Page : 6/12
Clé : U4.43.03 Révision :
a2bedca17dd6

Significance and role of the various variables:

TEMP	temperature
GEOM	directions of space
CORR	corrosion of steels
EPSA	unelastic deformation
HYDR	hydration of the concrete
IRRA	Irradiation
M_ACIER	metallurgical phases of steel
M_ZIRC	metallurgical phases of the zircaloy
NEUT1	"neutral" variable 1: the material coefficients of materials according to a parameter "user allows to vary" (see example 3 below)
NEUT2	"neutral" variable 2 (like NEUT1)
SECH	drying of the concrete
PTOT	Total pressure of fluid in THM (chained resolution)
DIVU	Voluminal deformation in THM (chained resolution)

Certain variables of order are scalars. Others are "vectors" including several scalar components. One gives in the table below the name of the components of the variables of orders

TEMP	TEMP, TEMP_MIL, TEMP_SUP, TEMP_INF
GEOM	X, Y, Z
CORR	CORR
EPSA	EPSAXX, EPSAYY, EPSAZZ, EPSAXY, EPSAXZ, EPSAYZ
HYDR	HYDR
IRRA	IRRA
M_ACIER	FERRITE, PEARLITE, PBAINITE, PMARTENS, TAUSTE, TRANSF, TACIER
M_ZIRC	ALPHPUR, ALPHBETA, TZIRC, TIME
NEUT1	NEUT1
NEUT2	NEUT2
SECH	SECH
PTOT	PTOT
DIVU	DIVU

The variable of order IRRA corresponds to a fluence, i.e. the intégale in the time of a neutron flux. It is used by several laws of behavior, in specific units:
*   it must be expressed in DPA (displacement per atom) for the law IRRAD3M (cf [R5.03.23]);
*   it must be expressed in $10^{20} n/cm^2$ for the laws VISC_IRRA_LOG, GRAN_IRRA_LOG, LEMAITRE_IRRA (cf [R5.03.09]).

4.4.2 Operands **TOUT=' OUI', GROUP_MA, MESH**
These keywords make it possible to indicate the meshs of the zone to be affected.

4.4.3 Operand **CHAM_GD**

This keyword makes it possible to associate with the variable of order nomvarc the field chvarc. This field is a field of realities (not functions). It is thus independent of time and will be used throughout transitory calculations.
If the values of the variable of order are dependent on time, the keyword should be used EVOL (see below). Cham_elem ELGA are authorized only if they result from the operator PROJ_CHAMP/ METHOD = 'SOUS_POINT', to assign the values to the under-points of Gauss of the elements under-points.

4.4.4 Operands **EVOL, NOM_CHAM, FONC_INST, PROL_DROITE, PROL_GAUCHE**

Code_Aster **Version 12**

Titre : Opérateur AFFE_MATERIAU
Responsable : PELLET Jacques

Date : 06/12/2017 Page : 7/12
Clé : U4.43.03   Révision   :
a2bedca17dd6

These keywords make it possible to associate with the variable of order `nomvarc` the transient `evovarc`. The keyword `NOM_CHAM` allows to indicate the reference symbol of the fields of `SD_résultat` to use. By default, the code chooses:

NOM_VARC	NOM_CHAM
TEMP	'TEMP'
GEOM	'GEOM'
CORR	'CORR'
EPSA	'EPSA_ELNO'
HYDR	'HYDR_ELNO'
IRRA	'IRRA'
M_ACIER	'META_ELNO'
M_ZIRC	'META_ELNO'
NEUT1	'NEUT'
NEUT2	'NEUT'
SECH	'TEMP'
PTOT	'DEPL'
DIVU	'EPSI'

The fields are real fields (neither complexes, nor functions).
`Cham_elem ELGA` are authorized only if they result from the operator `PROJ_CHAMP/ METHOD = 'SOUS_POINT'`, to assign the values to the under-points of Gauss of the elements under-points.

The keyword `FONC_INST = finst` allows to define a function (time) which is used as correspondence between the "time" of the evolution `evovarc` (`t_evo`) and the "time" of later calculation (`t_calc`). The function can be a simple "translation" (to take account owing to the fact that the beginning of the moments of mechanical calculation is different from the moment of the beginning of thermal calculation, but one can make more complicated, for example to impose a mechanical loading (thermal dilation) "cyclic" by calculating one cycle of temperature. One will be able to consult the case test `zzzz223a` to illustrate the use of this keyword.

Caution: The function `finst` is that which transforms `t_calc` in `t_evo` : `t_evo = finst (t_calc)`

Keywords `PROL_GAUCHE` and `PROL_DROITE` allow to specify if one can use the transient `evovarc` before the moment "min" of the transient (`PROL_GAUCHE`) and/or after the moment "max" of the transient (`PROL_DROITE`).
The value `'EXCLUDED'` an error will cause if one seeks to use the transient apart from his field.
The value `'CONSTANT'` prolong the transient by the values at the moment "min" (or "max").
The value `'LINEAR'` prolong the transient linearly with to leave the 2 first (or the last) points of the transient.

4.4.5 Operand **VALE_REF**

This keyword makes it possible to define a value of "reference" for the variable of order `nomvarc` when this one needs a value of reference.
Currently, only two variables of order require a value of reference: `'TEMP'` and `'SECH'`. For these two variables, the keyword `VALE_REF` is obligatory. For the other variables, this keyword is prohibited.
For variable of order `'TEMP'` in the case of the hulls, the temperature of reference is supposed to be the same one for the 3 components. This is why it is returned only once.

♦ `VALE_REF = Tref` (or `c0`)   [R]

4.4.5.1 Temperature of reference (T_{ref}) :

The temperature of reference T_{ref} introduced behind the keyword `VALE_REF` is the temperature for which there is no thermal deformation (cf [R4.08.01]).

Code_Aster

Titre : Opérateur AFFE_MATERIAU
Responsable : PELLET Jacques

Version 12

Date : 06/12/2017 Page : 8/12
Clé : U4.43.03 Révision :
a2bedca17dd6

If the thermal dilation coefficient α (whose value is introduced into the order `DEFI_MATERIAU` [U4.43.01]) does not depend on the temperature: $\varepsilon^{th}(T) = \alpha(T - T_{ref})$.

If the thermal dilation coefficient depends on the temperature the mathematical expression allowing the calculation of the thermal deformation differs according to the specification from the thermal dilation coefficient in the order `DEFI_MATERIAU` :

- values of the thermal dilation coefficient (introduced into `DEFI_MATERIAU`) were determined by tests of dilatometry carried out at the temperature T_{ref}.
  In this case, the keyword `TEMP_DEF_ALPHA` does not have to be specified in the order `DEFI_MATERIAU` and the thermal deformation is calculated by the expression:

  $$\varepsilon^{th}(T) = \alpha(T)(T - T_{ref}) \text{ and } \varepsilon^{th}(T_{ref}) = 0$$

  where $\alpha(T)$ is well informed under the keyword `ALPHA` (or `ALPHA_*`) in `DEFI_MATERIAU`.

- the values of the thermal dilation coefficient are determined by tests of dilatometry which took place at a temperature T_{def} different from the temperature of reference T_{ref}.
  It is then necessary to carry out a change of reference mark in the calculation of the thermal deformation [R4.08.01].

  $$\varepsilon^{th}(T) = \varepsilon_m^{th}(T) - \varepsilon_m^{th}(T_{ref})$$

  where ε_m^{th} is the thermal deformation measured (definite compared to the temperature T_{def}),

  ε^{th} is the thermal deformation calculated (definite compared to the temperature T_{ref}).

  The temperature T_{def} is well informed under the keyword `TEMP_DEF_ALPHA` in `DEFI_MATERIAU`, and values of the dilation coefficient (definite compared to the temperature T_{def}) are well informed under the keyword `ALPHA` or (`ALPHA_*`) in `DEFI_MATERIAU`.

NoticeS :

- *In a modeling THM, the temperature is not a variable of order. However, the dilation coefficient can be a function of the temperature. To be able to transform the curve `alpha (T)` (`TEMP_DEF_ALPHA` - > `TEMP_REF`), a temperature of reference is necessary. This is why, as opposed to what known as syntax, it is possible to inform `NOM_VARC=' TEMP'` + `VALE_REF` without informing the keywords `CHAM_GD` or `EVOL` . But this use must be held with modelings THM.*
- *It is not possible to use a formula nor a tablecloth for `ALPHA` , because them modifications to be taken into account described above. The parameter `ALPHA` can depend ONLY on the temperature and provided that it is a function. The user, if it wishes to use a formula, owes initially the tabuler using the order `CALC_FONC_INTERP` .*

4.4.5.2 Drying of reference (c_0) :

c_0 represent the water content initial of the concrete. The user must provide this number when he does a mechanical calculation (`MECA_STATIQUE` or `STAT_NON_LINE`) with a loading of type drying.

c0 must be given in the same units as "drying" (`AFFE_MATERIAU/AFFE_VARC= _F (NOM_VARC=' SECH'…`) for example in L/m^3). This unit must be coherent with the parameter `DEFI_MATERIAU/ELAS_FO/K_DESSIC`.

Code_Aster

Titre : Opérateur AFFE_MATERIAU
Responsable : PELLET Jacques

Version 12

Date : 06/12/2017 *Page : 9/12*
Clé : U4.43.03 *Révision* :
a2bedca17dd6

With this water content initial, the withdrawal of desiccation is null since:
EPS_rd = K_DESSIC(C0 - C).

4.4.6 Keywords "hidden" for the assignment of the variables of order

We saw how the user can affect fields (isolated or coming from sd_resultat) like variable of order for its later calculations.
But the variables of order are named scalars and the associated fields have also named components. The problem is to associate each variable of order with a component of the field.

There exists as much of keyword factor "hidden" than of variables of order allowing these associations. These keywords "are hidden" because they have values by default (see the table below). One should use them only when one wishes to do something of a little "special". For example:

- to use the variables NEUT_1 or NEUT_2,
- to make pass a field of temperature for a field of corrosion,
- …

Let us explain these keywords factors on two examples:

The user carried out a "thermal" calculation whose solution is actually an evolution evo1 whose fields contain drying. In this evol_ther, fields called TEMP carry a component called also TEMP.

The user who wishes to use such fields as variable of order SECH will be able to write:
CHMAT=AFFE_MATERIAU (…
        VAR_SECH=_F (NOM_VARC=' SECH', GRANDEUR=' TEMP_R',
                                          CMP_VARC=' SECH', CMP_GD='
TEMP'))

What one can translate by: "the fields which I wish to affect like variable of order 'SECH'are size TEMP_R and the component to be used is 'TEMP'.

When a variable of order is a "vector" having several scalar components, for example the variable M_ACIER who has 7 components ('PFERRITE',…,'TACIER'). The user can write:

CHMAT=AFFE_MATERIAU (…
        VAR_M_ACIER=_F (NOM_VARC=' M_ACIER', GRANDEUR=' VARI_R',
                CMP_VARC= ('PFERRITE', 'PEARLITE',…, 'TACIER'),
                CMP_GD= ('V1', 'V2',…, 'V7")))

What wants to say: "the fields which I wish to affect like variable of order 'M_ACIER'are size VARI_R and the correspondence of the components to be used is: ('PFERRITE', 'V1'), ('TACIER', 'V7').

The hidden keywords have like values by default:

NOM_VARC	SIZE	CMP_VARC	CMP_GD
TEMP	TEMP_R	TEMP	TEMP
GEOM	GEOM_R	X	X
		Y	Y
		Z	Z
SECH	TEMP_R	SECH	TEMP

Code_Aster

Titre : Opérateur AFFE_MATERIAU
Responsable : PELLET Jacques

Version 12

Date : 06/12/2017 Page : 10/12
Clé : U4.43.03   Révision   :
a2bedca17dd6

HYDR	HYDR_R	HYDR	HYDR
CORR	CORR_R	CORR	CORR
IRRA	IRRA_R	IRRA	IRRA
NEUT1	NEUT_R	NEUT1	X1
NEUT2	NEUT_R	NEUT2	X1
EPSA	EPSI_R	EPSAXX	EPXX
		EPSAYY	EPYY
		EPSAZZ	EPZZ
		EPSAXY	EPXY
		EPSAXZ	EPXZ
		EPSAXZ	EPXZ
M_ACIER	VARI_R	PFERRITE	V1
		PEARLITE	V2
		PBAINITE	V3
		PMARTENS	V4
		TAUSTE	V5
		TRANSF	V6
		TACIER	V7
M_ZIRC	VARI_R	ALPHPUR	V1
		ALPHBETA	V2
		TZIRC	V3
		TIME	V4
PTOT	DEPL_R	PTOT	PTOT
DIVU	EPSI_R	DIVU	DIVU

4.5 Keyword factor AFFE_COMPOR

This keyword factor makes it possible to affect the "behavior multifibre" of the multifibre elements of beams.

The keyword ALL, GROUP_MA and MESH allow to indicate the whole of the meshs which will be affected.

Behind the keyword COMPOR, the user will indicate the name of a concept of the type compor coming from the order DEFI_COMPOR/MULTIFIBRE.

4.5.1 Operand MATER

♦ MATER = chechmate,

Name of the material which one wants to affect.

In the case general, each mesh is affected only by one material. Sometimes, it is necessary to indicate a material list when the nonlinear mechanical behavior is obtained by the order DEFI_COMPOR [U4.43.06].

5 Examples

Code_Aster   **Version 12**

Titre : Opérateur AFFE_MATERIAU   *Date : 06/12/2017 Page : 11/12*
Responsable : PELLET Jacques   *Clé : U4.43.03   Révision   :*
                                                      a2bedca17dd6

Example 1: Mechanics without thermal dilation

```
chmat = AFFE_MATERIAU  (  GRID = my,
        AFFE = (
          _F (ALL = 'YES' ,                MATER = steel),
          _F (MAILLE= ('ma1', 'ma2', 'ma3'),  MATER = aluminum,),),
                     )
```

On the whole of the grid (except the meshs: `ma1`, `ma2`, `ma3`) the material of name is affected `steel`. On the meshs `ma1`, `ma2`, `ma3` the material is affected `aluminum`.

Example 2: Mechanics with thermal dilation

Assignment on all the grid of material `CHECHMATE` whose certain parameters are functions of the temperature. Moreover the thermal dilation coefficient is defined for this material. The temporal evolution of the temperature is given via the structure of data result `EVOTH` (of type `evol_ther`). The temperature of reference (that for which dilation is worthless) is worth 20 degrees.

```
CHMAT = AFFE_MATERIAU (GRID = MY,
    AFFE = _F (TOUT=' OUI', MATER = CHECHMATE,),
    AFFE_VARC=_F (NOM_VARC=' TEMP', EVOL =EVOTH, VALE_REF=20. ),
    )
```

Example 3: Mechanics with thermal dilation + complex modeling

In the preceding example, the thermal evolution (`EVOTH`) applies to all the elements of the model. But it can happen that this situation is unrealistic for certain complex modelings. Several times the keyword should then be repeated `AFFE_VARC/NOM_VARC=' TEMP'` to affect different thermal evolutions on various parts of the model.

In the following example, the model is a model 3D in which are plunged steel reinforcements. A thermal calculation was carried out as a preliminary without taking account of the reinforcements. One got a result which one called `EVOTH3D`. The temperature of the nodes of the elements of the reinforcement is then unknown. So in addition, one is able to evaluate the temperature of the reinforcements (measurements,…) and that this temperature is stored in the field (`TEMP_ARM`), one can then do the mechanical calculation of thermal dilation with the material field according to:

```
CHMAT = AFFE_MATERIAU (GRID = MY,
  AFFE = _F (…),
  AFFE_VARC= (
    _F (NOM_VARC=' TEMP', GROUP_MA=' VOLUM', EVOL =EVOTH3D, VALE_REF=20. ),
      _F (NOM_VARC=' TEMP', GROUP_MA=' ARMA', CHAM_GD =TEMP_ARM,
VALE_REF=20. ),
  ))
```

Example 4: Mechanics with influence of the irradiation

Assignment on all the grid of material `CHECHMATE` whose certain parameters are functions of the irradiation. The temporal evolution of the irradiation is given via the SD result `EVOL = FLUENC`.

```
CHMAT = AFFE_MATERIAU (GRID = MY,
    AFFE = _F (TOUT=' OUI', MATER = CHECHMATE,),
    AFFE_VARC=_F (NOM_VARC=' IRRA', EVOL =FLUENC,),
    )
```

Example 5: Mechanical calculation with a field of imposed modulus Young

Code_Aster   **Version 12**

Titre : Opérateur AFFE_MATERIAU   *Date : 06/12/2017 Page : 12/12*
Responsable : PELLET Jacques   *Clé : U4.43.03   Révision   :*
                                                      a2bedca17dd6

In this example (resulting from the case test ssnv130c), one wants to illustrate the possibility of using a field of modulus Young whom one supposes known (CHYOUNG). For example, this field is read in a file (LIRE_CHAMP) or it is the result of a calculation.

The "trick" consists in defining a material for which the Young modulus (keyword ELAS/E) "identity" of the variable is the function 'NEUT1' and the field is affected CHYOUNG like variable of order 'NEUT1'.

```
CHYOUNG=…
NU_F=DEFI_CONSTANTE (VALE=0.3)
E_F = DEFI_FONCTION (NOM_PARA=' NEUT1', VALE= (- 1.E-9, - 1.E-9,
1.E+9,1.E+9))
MA=DEFI_MATERIAU (ELAS_FO=_F (E=E_F, NU=NU_F,),);

CM=AFFE_MATERIAU (MAILLAGE=M,
                  AFFE=_F (TOUT= 'YES', MATER= MY),
                  AFFE_VARC=_F (NOM_VARC=' NEUT1', CHAM_GD=CHYOUNG),
                  )
```