

## Order DEFI\_SOL\_EQUI

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### 1 Goal

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To characterize the variation of the mechanical characteristics of horizons soil laminated during an earthquake starting from their level of shearing strain.

For that, one determines by an iterative procedure for each one of these soil horizons of the readjusted linear characteristics equivalent starting from the curves of reduction of the modulus of rigidity and hysteretic increase in damping according to the shearing strain. This procedure is generally based on a model of column of laminated ground with two different types of modeling:

- 2D in plane deformations with a grid by horizontal layers, subjected to an acceleration of training with condition of periodicity between the left face and the right face and condition absorbing at the base. This modeling also allows the taking into account simplified of the water pressures by the method of Byrne.
- 3D with a grid by layers horizontal and subjected to an acceleration of training according to 3 directions X, Y and Z, with stiffnesses of penalization on the side edges to ensure the same dynamic behavior in the two horizontal directions and a condition absorbing the base.

The order DEFI\_SOL\_EQUI allows to produce a table containing of the necessary information to the description of a file of ground for software MISS3D.

## 2 Syntax

```

tabsol [table] = DEFI_SOL_EQUI (

    ◇ LIEU_SIGNAL          =/ 'LEVELLING' ,                [DEFECT]
                                / 'CHAMP_LIBRE' ,
    ◇ GRID                  = my,                            [grid]
    ◆ GROUP_MA_COL         = gmco,                          [grma]
    ◆ GROUP_MA_SUBSTR      = gmdr,                          [grma]
    ◇ CORR_AMOR            =/ 'NOT' ,                       [DEFECT]
                                / 'YES' ,
    ◇ COEF_VARI_MATE       = /coevm,                        [R]
                                /1.0,                        [DEFECT]
    ◇ COEF_AMPL_ACCE       = /coeaa,                        [R]
                                /1.0,                        [DEFECT]
    ◇ COEF_GAMMA           = /coega,                        [R]
                                /0.65,                       [DEFECT]
    ◇ NMAX_ITER            = /nmaxi,                        [I]
                                /10,                         [DEFECT]
    ◇ RESI_RELA            = /resir,                        [R]
                                /0.05,                       [DEFECT]
    ◇ FREQ_COUP            = freqc,                         [R]
    ◇ SURFING              =/ 'NOT' ,                       [DEFECT]
                                / 'YES' ,

    # If SURF=' NON'
    {
        ◆ NIVE_COUCH_ENFO   = ncoue,                        [I]
        ◇ NB_RECEPTEUR      = /2,                          [DEFECT]
                                /4,
    } # End If SURF=' NON'

    ◇ LIST_FREQ            = lfreqc,                        [listR8]
    ◇ LIST_FREQ_SPEC_OSCI = lfreqs,                        [listR8]
    ◇ LIST_EPSI            = L epsi,
[listR8]

    ◇ SEPARATOR            = /separ,                        [KN]
                                /'',                          [DEFECT]
    ◇ UNITE_RESU_TRAN      = /uretr,                        [Links (Out)]
                                /40,                          [DEFECT]
    ◇ UNITE_RESU_SPEC      = /uresp,                        [Links (Out)]
                                /55,                          [DEFECT]
    ◇ UNITE_TABLE_RESU     = utres,                          [ Links (Out)]

]

/ ◆ TABLE_MATER_ELAS = tmela,                            [table]
  ◆ TABLE_GEQUI_GMAX   = tggma,                          [table]
  ◆ TABLE_AMOR_EQUI    = tameq,                          [table]

# If TABLE_MATER_ELAS
{
    ◇ MATERIAL = _F (
        ◆ GAMMA          = lgamma,                        [l_R]
        ◆ G_GMAX         = lggma,                         [l_R]
        ◆ D              = lisd,                          [l_R]
    ),
    ◇ SLEEP = _F (
        ◆ THICK          = thick,                         [R]
        ◆ E              = Young,                         [R]
        ◆ NAKED          = naked,                         [R]
        ◆ RHO            = rho,                           [R]
    )
}

```

```

        ♦ AMOR_HYST          = beta,                [R]
        ♦ NUME_MATE          = numat,              [I]
        ♦ N1                 = n1,                [R]
        ♦ GROUP_MA           = gmaco,             [grma]
    ),
} # Fin Si TABLE_MATER_ELAS

◇ LOADING =/ 'MONO_APPUI',                          [DEFECT]
           / 'ONDE_PLANE',

# If LOADING = ' MONO_APPUI '
{
    ◇ FONC_SIGNAL          = foncs,                [function]
    ◇ FONC_SIGNAL_X       = foncs,                [function]
    # If FONC_SIGNAL_X
    {
        ◇ FONC_SIGNAL_Y   = foncs,                [function]
        ◇ FONC_SIGNAL_Z   = foncs,                [function]
    } # End If FONC_SIGNAL_X
    ◇ DSP                  = foncs,                [function]
# If ' DSP '
{
    ♦ DURATION             = T                    [R]
    ♦ UNITE_RESU_DSP       =/ ur_dsp ,            [I]
} # End If DSP `
    ◇ NOM_CMP              =/ 'DX',                [DEFECT]
                               / 'DY',
    ◇ TOUT_CHAM            =/ 'NOT',                [DEFECT]
                               / ' YES ',
    ◇ GROUP_MA_DROITE     = gmdr,                  [grma]
    ◇ GROUP_MA_GAUCHE     = gmga,                  [grma]
    ◇ GROUP_MA_LINE       = gmga,                  [grma]
    ◇ CORRECTION           =/ 'WITHOUT' ,          [ DEFECT]
                               / 'BYRNE' ,

    # If BYRNE
    {
        ◇ COEF_KSI         =/0.666666667          [DEFECT]
                               /coef_ksi ,        [R]
    } # End If BYRNE
} # End If LOADING = ' MONO_APPUI '

# If LOADING = ' ONDE_PLANE '
{
    ◇ FONC_SIGNAL          = foncs,                [function]
    ◇ FONC_SIGNAL_X       = foncs,                [function]
    ◇ FONC_SIGNAL_Y       = foncs,                [function]
    ◇ FONC_SIGNAL_Z       = foncs,                [function]
    ◇ TOUT_CHAM           =/ 'YES',                [DEFECT]
                               / ' NOT ',
    ◇ CONNECTION           =/ 'PERIODIC',          [DEFECT]
                               / 'WITHOUT',
    ◇ TOUT_CHAM           =/ 'YES',                [DEFECT]
                               / ' NOT ',
    ◇ LENGTH_CARA         = lcar has,              [R]
    ◇ FARMHOUSE_PEN With  = mpen has,
}

[R]
    ♦ / ♦ FONC_SIGNAL     = foncs,                [function]

```

```
        / ♦ UNITE_TRAN_INIT      = utrin,           [ Links (In)
]
        ♦ GROUP_MA_DROITE      = gmdr,           [grma]
        ♦ GROUP_MA_GAUCHE     = gmga,           [grma]
        ♦ GROUP_MA_LINE       = gmga,           [grma]
        ♦ NOM_CMP              =/ 'DX' ,         [DEFECT]
                                / 'DY' ,
        ♦ CORRECTION           =/ 'WITHOUT' ,    [ DEFECT ]
                                / 'BYRNE' ,

        # If BYRNE
        {
        ♦ COEF_KSI              =/0.666666667    [DEFECT]
                                /coef_ksi ,      [R]
        } # End If BYRNE
    } # End If LOADING = ' ONDE_PLANE '

    ♦ INFORMATION =      / 1,
[DEFECT]

        / 2,
    ♦ TITLE =      title,           [l_Kn]
)

```

## 3 Operands

### 3.1 Operand LOADING

◇ LOADING = / 'MONO\_APPUI', [DEFECT]  
/ 'ONDE\_PLANE',

Indicate the nature of the loading of imposition of the movement :

LOADING = 'MONO\_APPUI' : loading in the form of acceleration of training mono-support imposed on the column of ground.

LOADING = 'ONDE\_PLANE' : loading in the form of a wave planes vertical propagation of speed imposed on the column of ground, shearing if horizontal movement of request, pressure if vertical movement of request.

### 3.2 Operand FONC\_SIGNAL

◆ FONC\_SIGNAL = foncs

Allows to define a temporal function defining the signal of acceleration for a modeling 1D – 1 component:of training if loading mono-support or loading by wave planes vertical propagation, imposed on the model of column representative of the stratification of ground. ON characterizes starting from this model variation of the mechanical characteristics of horizons soil laminated according to their level of shearing strain.

**Notice 1 :**

*It is necessary that the initial moment of the signal is null and that the step of time  $dt$  that is to say constant. If one uses a number of steps of time which is a power of two, then final time will necessarily be worth  $(2^N - 1)dt$ .*

**Notice 2 :**

*In the case of a loading plane wave, this option is alternate with the data of a table of the transitory evolutions of accelerations, possibly speeds and displacements obtained by a former call with DEFI\_SOL\_EQUI. It tte table is provided E by the keyword UNITE\_TRAN\_INIT.*

### 3.3 Operands FONC\_SIGNAL\_X/FONC\_SIGNAL\_Y/FONC\_SIGNAL\_Z

◆ FONC\_SIGNAL\_X = foncs

◆ FONC\_SIGNAL\_Y = foncs

◆ FONC\_SIGNAL\_Z = foncs

Allows to define functionS temporalS defining the signal of acceleration for a modeling 1D – 3 components:of training if loading mono-support or loading by wave planes vertical propagation, imposed on the model of column representative of the stratification of ground.

**Notice 1 :**

*It is necessary that the initial moment of the signal is null and that the step of time  $dt$  that is to say constant. If one uses a number of steps of time which is a power of two, then final time will necessarily be worth  $(2^N - 1)dt$ .*

### 3.4 Operand DSP

◇ DSP = dsp [FUNCTION]

The operand p ermet to define a function of spectral concentration (DSP) imposed on the model of column representative of the stratification of ground. This keyword is compatible only with one loading mono-support.

If the keyword DSP is present, then one calls on the tools of the RVT ( *Random Theory Vibration* ) for (die) the convolution and the calculation of the degraded profiles of ground. The DSP equivalent to a spectrum (SRO) is obtained as a preliminary by CALC\_FONCTION/SPEC\_OSCI. This approach,

which nécess I you not of passage in temporal field for the calculation of answers maximum and spectra of answer, is also called E transfer of the spectra.

## 3.5 Operand LIEU\_SIGNAL

◇ LIEU\_SIGNAL = / 'LEVELLING', [DEFECT]  
/ 'CHAMP\_LIBRE',

Indicate the place of imposition of the signal compared to the column of ground:

LIEU\_SIGNAL = 'LEVELLING' : signal imposed on the base of the column (with the levelling rock).

LIEU\_SIGNAL = 'CHAMP\_LIBRE' : signal imposed at the top of the column (in free field).

## 3.6 Operand DURATION

◇ DURATION = T [R]

This keyword is to be informed only in the presence of the keyword DSP .  
Cf. [U4.32.04] for the significance of this keyword.

## 3.7 Operand NOM\_CMP

◇ NOM\_CMP = / 'DX', [DEFECT]  
/ 'DY',

Indicate the direction of the signal imposed on the column of ground:

NOM\_CMP = 'DX' : horizontal imposed signal. It is the current case where one determines the variation of the mechanical characteristics of the horizons soil laminated during the earthquake starting from their level of shearing strain.

NOM\_CMP = 'DY' : vertical imposed signal. In this case, the mechanical characteristics of the horizons soil laminated do not vary during the earthquake. The interest is only to provide as a result the transitory evolutions and the spectra of accelerations obtained to the bottom of each soil horizon.

## 3.8 Operand FREQ\_COUP

◇ FREQ\_COUP = freqc

Cut-off frequency allowing to filter the entry signal. By default, one takes a maximum value corresponding to half of the reverse of the step of time of the entry signal.

## 3.9 Operand GRID

◇ GRID = my

If standard modeling 1D – 1 component, permet to define the name of the concept of the total surface grid of the column representative of the stratification of ground. It will be affected there a model of plane deformations ('D\_PLAN'). If the operand is not indicated, one will fill starting from the names of groups of meshes informed in the operands GROUP\_MA\* contents of a file grid to the format 'ASTER' printed in the file RESULT.

If standard modeling 1D – 3 components, makes it possible to define the name of the concept of the voluminal grid of the column representative of the stratification of the ground, to which a modeling 3D will be affected.

## 3.10 Operand GROUP\_MA\_COL

◆ GROUP\_MA\_COL = gmco

Allows to define in the preceding grid (if there exists) the name of the surface group of meshes including the whole of the column representative of the stratification of ground. If modeling 1D – 1 component and that LE preceding grid does not exist, this group will be created in the file grid with the format 'ASTER' filled by the operator.

## 3.11 Operands GROUP\_MA\_DROITE/GROUP\_MA\_GAUCHE

- ◆ GROUP\_MA\_DROITE = gm<sub>da</sub>
- ◆ GROUP\_MA\_GAUCHE = gm<sub>ga</sub>

Only for one simulation 1D – 1 component, permettent to define respectively in the preceding grid (if there exists) the names of the linear groups of meshes to which will be affected a relation of periodicity between the flat rim and the left edge of the column representative of the stratification of ground. If the preceding grid does not exist, these groups will be created in the file grid with the format 'ASTER' filled by the operator.

## 3.12 Operands GROUP\_MA\_LINE

- ◆ GROUP\_MA\_LINE = gm<sub>da</sub>

Only for one simulation 1D – 3 components, makes it possible to define the name of the linear group of the meshes encircling the column of ground, to which will be affected stiffnesses of penalization in order to ensure the same dynamic behavior in the two horizontal directions.

## 3.13 Operand GROUP\_MA\_SUBSTR

- ◆ GROUP\_MA\_SUBSTR = gm<sub>dr</sub>

For a modeling 1D – 1 component, permet to define in the preceding grid (if there exists) the linear name of the groups of meshes to which a modeling of absorbing border will be affected. If the preceding grid does not exist, this group will be created in the file grid with the format 'ASTER' filled by the operator.

For a modeling 1D – 3 components, makes it possible to define in the preceding grid the name of the surface group of mesh to which a modeling Fr will be affectedOabsorbing ntière.

## 3.14 Operand CORRECTION

- ◇ CORRECTION = / 'WITHOUT', [DEFECT]  
/ 'BYRNE',

For a modeling 1D – 1 component, makes it possible to activate the taking into account of the water pressures in a way simplified by the model of Byrne. In this case, the evaluation of the degraded value of the modulus of rigidity is corrected by a factor depend on the rise of calculated effective water pressure.

## 3.15 Operand COEF\_KSI

- ◇ COEF\_KSI = / 0.666666667 [ DEFECT ]  
/coef\_ksi , [R]

Parameter allowing to define the value of coefficient of weighting which makes it possible to modulate the impact of  $r_{umax}$  on the effective deformation for a modeling 1D – 1 component with the model of Byrne.

## 3.16 Operand SURFING

```
◇ SURFING = / 'NOT', [DEFECT]
           / 'YES',
```

Indicate if one wants or not to have certain layers of the ground modelled in the column above an inserted foundation, which one finds in the table of ground usable by MISS3D:

```
SURFING = 'YES' : shallow foundation compared to the soil horizons.
SURFING = 'NOT' : depression of the foundation in the ground.
```

## 3.17 Operand NIVE\_COUCH\_ENFO

```
◇ NIVE_COUCH_ENFO = ncoue
```

If SURFING = 'NOT', this keyword becomes obligatory: it then gives the number of soil horizons above the inserted foundation.

## 3.18 Operand NB\_RECEPTEUR

```
◇ NB_RECEPTEUR = / 2, [DEFECT]
                 / 4,
```

This keyword has direction only if SURFING = 'NOT': it makes it possible to define the number of receivers per layer of element inserted in the laminated ground: also corresponds to the number of underlayers generated for each layer of element inserted in the table of ground produced.

## 3.19 Keyword MATERIAL

```
◆ MATERIAL = _F (
```

Keyword factor répétable allowing the description of the characteristics of families of materials nonlinear, material per material, defined by curves of reduction of the modulus of rigidity and hysteretic increase in damping according to the shearing strain. These materials are constitutive of groups of layers of the laminated ground. Each group is generally associated with a geological zone (clay, rock...).

### 3.19.1 Operand GAMMA

```
◆ GAMMA = lgamma
```

Allows to define the list of real increasing ordinate of the X-coordinates of the shearing strain for each family of nonlinear material defined in the column.

### 3.19.2 Operands G\_GMAX/D

```
◆ G_GMAX = lggma,
◆ D = lisd,
```

Allow respectively to define the lists of actual values of reduction of the modulus of rigidity and increase in internal damping  $D$ , hysteretic half of damping, according to the shearing strain for each nonlinear material running. Each term of these lists corresponds to a value of the list indicated by the operand GAMMA. All these lists must thus have the same cardinal for same material.

#### Notice 1 :

*It is necessary to define a nonlinear material for the last soil horizon corresponding to the substratum which will have for the operand G\_GMAX constant values of 1 (not of reduction) and for the operand D constant values of the hysteretic half-value of the damping of the substratum.*

#### Notice 2 :

*The functions thus created are prolonged on the left and on the right with the option 'CONSTANT' and interpolated with an option ('LOG', 'FLAX').*

#### Notice 3 :

If the lists of the X-coordinates of the shearing strain of the families of nonlinear material are different between elles, one will use like lists common reference in order to define by interpolation the description of the characteristics of nonlinear materials, material by material, the list of nonlinear material for the last soil horizon corresponding to the substratum. One can however force the data of the list of common reference by the operand `LIST_EPSI`

## 3.20 Operand `LIST_EPSI`

◇ `LIST_EPSI = lepsi`

F allows order the data of the list of common reference of the X-coordinates of the shearing strain for interpolation of the characteristics of the families of nonlinear material.

## 3.21 Keyword `SLEEP`

◆ `SLEEP = _F (`

Keyword factor répétable allowing the geometrical description of the layers of a laminated ground, that of the characteristics of materials constitutive of these layers, the assignment sleeps by layer of previously definite nonlinear materials by the keyword `MATERIAL`.

### 3.21.1 Operands `EPAIS/E/NU/RHO/AMOR_HYST/N1`

Allow respectively to define the actual values of the thickness, Young modulus, Poisson's ratio, density and initial damping hysteretic of each layer, for recall twice the value of internal damping `D` (to be informed in absolute and not expressed as a percentage). For modeling with the model of Byrne, the user must also provide the value  $(NR_1)_{60}$  SPT of the layer. This value is used to obtain the parameters of the model of Byrne via the following expression:

$$C_1 = \frac{8,7}{(N_1)_{60}^{1,25}}$$
$$C_2 = \frac{0,4}{C_1}$$

#### Notice 1 :

A treatment special is made so that the value  $NR_i=0$  provides the same result as for a modeling `CORRECTION = 'WITHOUT'` (cf case test `zzzz412e`).

### 3.21.2 Operand `NUME_MATE`

◆ `NUME_MATE = numat`

Number of nonlinear material in the order of description of the occurrences of the keyword `MATERIAL` to assign to the current layer.

### 3.21.3 Operand `GROUP_MA`

◆ `GROUP_MA = gmaco`

Allows to define the name of the surface group of meshes of the current layer. The last occurrence corresponds to a layer of substratum. If this one is not with a grid in the model of the column, then one names to him of the linear group of meshes of the substratum already indicated by the keyword `GROUP_MA_SUBSTR`. If the operand `GRID` is not informed, this group will be created in the file grid with the format 'ASTER' filled by the operator.

## 3.22 Operand `COEF_VARI_MATE`

◇ `COEF_VARI_MATE = / 1.0, [DEFECT]  
/ coevm`

Give a factor of total amplification of the Young moduli defined initially in the keyword `SLEEP`. In addition to the unit value by default, one also generally uses in the studies of dimensioning the values of 1.5 and 0.67.

## 3.23 Operand `COEF_AMPL_ACCE`

◇ `COEF_AMPL_ACCE = / 1.0, [DEFECT]`  
`/ coeaa`

Give a factor of amplification of the signal of acceleration defined initially by the operand `FONC_SIGNAL`.

## 3.24 Operand `COEF_GAMMA`

◇ `COEF_GAMMA = / 0.65, [DEFECT]`  
`/ coega`

Give a factor, lower than 1, used to calculate the effective deformation starting from the maximum deformation obtained in each soil horizon during the signal. The value obtained will give the level from which one will determine the variation of the characteristics of nonlinear material constitutive of the layer, by reading on the curves given by the operands `D` and `G_GAMMA` keyword `MATERIAL`.

## 3.25 Operand `CORR_AMOR`

◇ `CORR_AMOR = / 'NOT', [DEFECT]`  
`/ 'YES',`

Indicate if one wants or not to correct the hysteretic data of the damping given by material by introducing a new formulation of the modulus of  $G^*$  rigidity which corrects the module real  $G$  by the formulation of `LYSMER`, namely that  $G^*$  is written:

$$G^* = G[(1 - 2\xi^2) + 2\xi j\sqrt{1 - \xi^2}]$$

This formulation makes it possible to obtain the equality between the actual value of  $G$  and the complex module of  $G^*$ . This is done by adding the keyword `CORR_AMOR` equal to 'YES'.

## 3.26 Operand `LIST_FREQ`

Allows the user to introduce a list of frequencies of calculation of the harmonic evolution launched by the operator. By defect, the operator imposes one of them limited by the cut-off frequency (operand `FREQ_COUP`).

## 3.27 Operand `LIST_FREQ_SPEC_OSCI`

Makes it possible to the user to introduce a list of frequencies different from that used by default into the calculation of the spectra of answer from oscillator (or SRO) by the option `SPEC_OSCI` of `CALC_FONCTION`.

## 3.28 Operands `NMAX_ITER/RESI_RELA`

Give `N` parameters of the iterative process of variation of the characteristics of the materials constituents of the layers. Respectively the maximum number of iterations and the criterion of stop on the relative maximum variation between two successive iterations of the Young modulus on the unit of soil horizons. "Iteration" has here the direction "of stage of calculation". It is necessary some at least to calculate possible degradations and to establish the criterion of stop compared to the initial state. Thus `NMAX_ITER` is equal to or higher than 1.

### 3.29 Operands TABLE\_GEQUI\_GMAX/TABLE\_AMOR\_EQUI

Represent an alternative to the description of the characteristics of nonlinear materials, material by material, defined by the keyword factor MATERIAL. One can then give directly tables of values results of an initial definition by this keyword. For example, one will be able respectively to read the contents of these tables produced by a first master key of DEFI\_SOL\_EQUI in the case test SDNX100E :

- the table indicated by TABLE\_GEQUI\_GMAX will contain following information on the variation of the reduction of the modulus of rigidity by material:

EPSI	GG1	GG2	GG3	GG4
1.00000E-06	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00
3.00000E-06	1.00000E+00	9.90000E-01	9.80000E-01	1.00000E+00
1.00000E-05	9.90000E-01	9.60000E-01	9.30000E-01	1.00000E+00
3.00000E-05	9.60000E-01	8.90000E-01	8.30000E-01	1.00000E+00
1.00000E-04	8.40000E-01	7.50000E-01	6.40000E-01	1.00000E+00
3.00000E-04	6.60000E-01	5.40000E-01	4.30000E-01	1.00000E+00
1.00000E-03	3.70000E-01	3.00000E-01	2.20000E-01	1.00000E+00
3.00000E-03	1.90000E-01	1.50000E-01	1.10000E-01	1.00000E+00
1.00000E-02	8.00000E-02	7.00000E-02	5.00000E-02	1.00000E+00

- the table indicated by TABLE\_AMOR\_EQUI will contain following information on the variation of the hysteretic increase in damping by material:

EPSI	DG1	DG2	DG3	DG4
1.00000E-06	2.50000E-02	2.50000E-02	2.50000E-02	1.00000E-02
3.00000E-06	2.50000E-02	2.50000E-02	2.50000E-02	1.00000E-02
1.00000E-05	2.50000E-02	2.50000E-02	2.50000E-02	1.00000E-02
3.00000E-05	2.50000E-02	2.50000E-02	3.00000E-02	1.00000E-02
1.00000E-04	2.50000E-02	3.00000E-02	4.00000E-02	1.00000E-02
3.00000E-04	3.00000E-02	4.00000E-02	5.00000E-02	1.00000E-02
1.00000E-03	4.00000E-02	5.00000E-02	7.00000E-02	1.00000E-02
3.00000E-03	5.00000E-02	7.00000E-02	1.00000E-01	1.00000E-02
1.00000E-02	7.00000E-02	1.00000E-01	1.35000E-01	1.00000E-02

It is specified that the values of damping must be given in absolute and not expressed as a percentage.

### 3.30 Operand TABLE\_MATER\_ELAS

Represent an alternative to the geometrical description of the horizons soil laminated and that of the characteristics of materials constitutive of these layers, defined by the keyword factor SLEEP. As for the keyword factor SLEEP, if the operand GRID is not well informed, the groups given in the table indicated by the operand TABLE\_MATER\_ELAS will be created in the file grid with the format 'ASTER' filled by the operator. One can then give directly by the operand TABLE\_MATER\_ELAS a table of values results of an initial definition by the keyword factor SLEEP. For example, one will be able to read the contents of this table produced by a first master key of DEFI\_SOL\_EQUI in the case test SDNX100E :

- the table indicated by TABLE\_MATER\_ELAS will contain following information on the geometrical description of the horizons soil laminated and that of the initial characteristics of materials constitutive of these layers, sleeps by layer:

Y	M	RHO	E <sub>max</sub>	NU	AH	GDgam	
1.	90000E+00	COUCH1A	2.65000E+03	2.67000E+08	4.90000E-01	5.00000E-02	1
3.	80000E+00	COUCH1B	2.65000E+03	2.67000E+08	4.90000E-01	5.00000E-02	1
5.	70000E+00	COUCH1C	2.65000E+03	2.67000E+08	4.90000E-01	5.00000E-02	1
7.	60000E+00	COUCH1D	2.65000E+03	2.67000E+08	4.90000E-01	5.00000E-02	1
9.	50000E+00	COUCH2A	2.65000E+03	3.35000E+08	4.90000E-01	5.00000E-02	1
1.	14000E+01	COUCH2B	2.65000E+03	3.35000E+08	4.90000E-01	5.00000E-02	1
1.	33000E+01	COUCH2C	2.65000E+03	3.35000E+08	4.90000E-01	5.00000E-02	1
1.	52000E+01	COUCH2D	2.65000E+03	3.35000E+08	4.90000E-01	5.00000E-02	1
1.	93250E+01	COUCH3A	2.71000E+03	9.21000E+08	4.70000E-01	5.00000E-02	2
2.	34500E+01	COUCH3B	2.71000E+03	9.21000E+08	4.70000E-01	5.00000E-02	2
2.	75750E+01	COUCH3C	2.71000E+03	9.21000E+08	4.70000E-01	5.00000E-02	2
3.	17000E+01	COUCH3D	2.71000E+03	9.21000E+08	4.70000E-01	5.00000E-02	2
3.	58250E+01	COUCH3E	2.71000E+03	9.21000E+08	4.70000E-01	5.00000E-02	2
3.	99500E+01	COUCH3F	2.71000E+03	9.21000E+08	4.70000E-01	5.00000E-02	2
4.	40750E+01	COUCH3G	2.71000E+03	9.21000E+08	4.70000E-01	5.00000E-02	2
4.	82000E+01	COUCH3H	2.71000E+03	9.21000E+08	4.70000E-01	5.00000E-02	2
5.	24500E+01	COUCH4A	2.71000E+03	1.39000E+09	4.70000E-01	5.00000E-02	2
5.	67000E+01	COUCH4B	2.71000E+03	1.39000E+09	4.70000E-01	5.00000E-02	2
6.	09500E+01	COUCH4C	2.71000E+03	1.39000E+09	4.70000E-01	5.00000E-02	2
6.	52000E+01	COUCH4D	2.71000E+03	1.39000E+09	4.70000E-01	5.00000E-02	2
6.	94500E+01	COUCH4E	2.71000E+03	1.39000E+09	4.70000E-01	5.00000E-02	2
7.	37000E+01	COUCH4F	2.71000E+03	1.39000E+09	4.70000E-01	5.00000E-02	2
7.	79500E+01	COUCH4G	2.71000E+03	1.39000E+09	4.70000E-01	5.00000E-02	2
8.	22000E+01	COUCH4H	2.71000E+03	1.39000E+09	4.70000E-01	5.00000E-02	2
8.	64500E+01	COUCH5A	2.71000E+03	1.96000E+09	4.70000E-01	5.00000E-02	2
9.	07000E+01	COUCH5B	2.71000E+03	1.96000E+09	4.70000E-01	5.00000E-02	2
9.	49500E+01	COUCH5C	2.71000E+03	1.96000E+09	4.70000E-01	5.00000E-02	2
9.	92000E+01	COUCH5D	2.71000E+03	1.96000E+09	4.70000E-01	5.00000E-02	2
1.	03450E+02	COUCH5E	2.71000E+03	1.96000E+09	4.70000E-01	5.00000E-02	2
1.	07700E+02	COUCH5F	2.71000E+03	1.96000E+09	4.70000E-01	5.00000E-02	2
1.	11950E+02	COUCH5G	2.71000E+03	1.96000E+09	4.70000E-01	5.00000E-02	2
1.	16200E+02	COUCH5H	2.71000E+03	1.96000E+09	4.70000E-01	5.00000E-02	2
1.	21700E+02	COUCH6	2.71000E+03	3.02000E+09	4.50000E-01	5.00000E-02	3
1.	27200E+02	COUCH7	2.71000E+03	5.95000E+09	4.50000E-01	5.00000E-02	3
1.	37200E+02	COUCH8	2.71000E+03	4.23000E+10	2.50000E-01	2.00000E-02	4

**Notice :**

The names of the columns given on the first line correspond to the names of the parameters of access of the table. They must be preserved such as they are.

### 3.31 Operand UNITE\_TABLE\_RESU

Provides the unit of writing of the table containing the result of the iterative process of DEFI\_SOL\_EQUI, of which evolution during iterations of calculation of the characteristics of materials constitutive of the laminated layers of ground. One also prints, once convergence reached, the variation with the depth, that is to say layer by layer, the top to the bottom, of maximum accelerations and deformations in the course of time.

### 3.32 Operand SEPARATOR

Allows to define the separating character (white by default) allowing to space the columns of the results constituting the table entered by the operand UNITE\_TABLE\_RESU containing the result of the iterative process of DEFI\_SOL\_EQUI. This operand plays the same part as in the operators LIRE\_TABLE or IMPR\_TABLE.

### 3.33 Operand UNITE\_RESU\_TRAN

Provides the unit of writing to the format 'TABLE' transitory evolutions of accelerations, then deformations and then of the stresses shear, obtained in the end of the iterative process of DEFI\_SOL\_EQUI. These evolutions are printed, column by column, successively: in free field, with the levelling rock, then with the bottom of each horizon soil laminated, top downwards.

### 3.34 Operand UNITE\_RESU\_SPEC

Provides the unit of writing to the format 'TABLE' frequential evolutions of the spectra of answer (SRO) in acceleration obtainedES in the end of the iterative process of DEFI\_SOL\_EQUI. These evolutions are printed, column by column, successively: in free field, with the levelling rock, then with the bottom of each horizon soil laminated, top downwards.

### 3.35 Operand UNITE\_RESU\_DSP

Provides the unit of writing to the format 'TABLE' spectral concentrations (DSP) in acceleration obtainedES in the end of the iterative process of DEFI\_SOL\_EQUI. These evolutions are printed, column by column, successively: in free field, with the levelling rock, then with the bottom of each horizon soil laminated, top downwards.

### 3.36 Operand TOUT\_CHAM

Indicate, if one prints or not in the file given by UNITE\_RESU\_\* transitory evolutions of the fields 'QUICKLY' and 'DEPL' as well as the fields of nodal force 'FORC\_NODA' in each level of the column of laminated ground. That is necessary in particular for a further development by the operator DEFI\_CHAR\_SOL [U4.84.32].

**Notice :**

*It is strongly advised in successive calls to DEFI\_SOL\_EQUI to distinguish the numbers from logical unit from UNITE\_RESU\_\* because by using the same numbers, one is likely to create shifts of number of table to reading, especially when the option was used TOUT\_CHAM=' OUI ' .*

### 3.37 Operand CONNECTION

◇ CONNECTION = / 'PERIODIC',  
/ 'WITHOUT',

Indicate, in the case of a loading plane wave, if the relation of periodicity between the flat rim and the left edge of the column representative of the stratification of ground is active. If standard modeling 1D – 3 components, to put imperatively CONNECTION = ' PERIODIQUE' .

### 3.38 Operand LONG\_CARA

Indicate, in the case of a loading plane wave, the value characteristic length defined in DEFI\_MATERIAU keyword ELAS allowing to calculate of rigidity added on the absorbing border constituted by edgeS right and left of the column of ground.

### 3.39 Operand UNITE\_TRAN\_INIT

In the case of a loading plane wave and of a modeling 1D – 1 component, Fournit the unit of writing to the format 'TABLE' transitory evolutions in each level of the column of laminated ground obtained at the time of a former call with DEFI\_SOL\_EQUI. At the time of this former call, Lbe evolutions are created using the keyword UNITE\_RESU\_TRAN.

### 3.40 Operand FARMHOUSE\_PENWith

Indicate, in the case of a loading plane wave and of a data of entry signals by UNITE\_TRAN\_INIT, Lvalue of mass penalized has affected in each point of the edges column of ground in order to impose the evolutions of accelerations in these points.

### 3.41 Operand TITLE

◇ TITLE = title

Allows the user to define a title for the table of ground.

## 3.42 Operand INFORMATION

◇ INFORMATION =

Indicate a level of impression for information in the file "MESSAGE":

INFORMATION = 1 : no impression

INFORMATION = 2 : impression of the table of ground