Code_Aster

Titre : Opérateur GENE_ACCE_SEISME
Responsable : ZENTNER Irmela

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Operator GENE_ACCE_SEISME

1 Goal

This operator allows to generate artificial seismic accélérogrammes for transitory dynamic calculations. He makes it possible to generate two types of signals:

1. Nonstationary seismic signals according to the model of spectral concentration of power (DSP) of evolutionary Kanai-Tajimi, option DSP ;
2. Seismic signals compatible with a spectrum of answer of oscillator (SRO) target, option SPEC_MEDIAN, SPEC_MOYENNE, SPEC_UNIQUE or SPEC_FRACTILE.

In both cases, one must associate with it a function of modulation which determines the temporal evolution of the seismic signals by the keyword factor MODULATION. If one does not wish to apply temporal modulation, it is necessary to choose a "constant" modulation on the time interval. It is advisable to consult documentation [R4.05.05] for a detailed description of modelings and parameters to be informed.

Product a concept of the type table_fonction .

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2   Syntax

```
acce   [table_fonction] = GENE_ACCE_SEISME

                   ♦   DUREE_PHASE_FORTE  =  TSM          [R]
                   ♦   GRAVITY        =    G             [R]
                   ♦   PAS_INST       =    dt            [R]
                   ◊   FREQ_FILTRE    =    FF            [R]
                   ◊   FREQ_CORNER    =    FC            [R]
                   ◊   FREQ_FILTRE_ZPA =   FZ            [R]
                   ◊   NB_TIRAGE      =    Nbt           [I]
                   ◊   NB_POIN        =    nb_poin       [I]
                   ◊   INIT_ALEA      =    nor           [I]
                   ◊   FREQ_PENTE     =    FP            [R]
                   ◊   COEF_CORR      =    rho           [R]

                   ◊   MATR_COHE   =      _F (
                   /  ♦   GRID      =    e-mail        maillage_sdaster
                      ♦   GROUP_NO_INTERF =  gni        grno
                      ♦   TYPE    =   / 'MITA_LUCO'
                                       / 'ABRAHAMSON'
                                       / 'ABRA_ROCHER'
                                       / 'ABRA_SOLMOYEN'
                   so STANDARD = MITA_LUCO
                      ♦   VITE_ONDE    =  vite_onde,       [R]
                      ◊   PARA_ALPHA   =/0.1            [DEFECT]
                                        / alpha,          [R]


                   ◊   PHASE      =      _F (
                   /  ♦   GRID      =    e-mail        maillage_sdaster
                      ♦   GROUP_NO_INTERF =  gni        grno
                      ♦   VITE_ONDE    =    vite_onde        [R]
                      ♦   DIRECTION    =    to dir           [R]
                      ◊   COOR_REFE    =    crefe          [R]

                                )
```
if SPEC_FRACTILE and if well informed COEF_CORR
```
                   ◊   RATIO_HV       =   ratio          [R]


                /  ♦   DSP       =      _F (
                   /  ♦   AMOR_REDUIT  =  amo          [R]
                      ♦   FREQ_FOND    =  f0           [R])


                /  ♦   SPEC_MEDIANE         =      _F (
                   /  ♦   SPEC_OSCI = spec_cible    [fonction_sdaster]
                      ♦   AMOR_REDUIT =  amo                [R]
                      ◊   NB_ITER    =    nbiter           [I]
                      ◊   FREQ_PAS   =    fpas             [R]
                      ◊   ERRE_MAX   =    (cmax, emax)        [R]
                      ◊   ERRE_ZPA   =    (czpa, ezpa)        [R]
                      ◊   ERRE_RMS   =    (crms, erms)        [R]
                      ◊   METHOD     =   / 'HARMO'         [DEFECT]
                                        = / 'NIGAM'         [TXM]   ))
```

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```
        /   ♦   SPEC_MOYENNE        =       _F (
            /   ♦   SPEC_OSCI = spec_cible   [fonction_sdaster]
                ♦   AMOR_REDUIT  =   amo            [R]
                ◊   NB_ITER      =   nbiter         [I]
                ◊   FREQ_PAS     =   fpas           [R]
                ◊   ERRE_MAX     =   (cmax, emax)       [R]
                ◊   ERRE_ZPA     =   (czpa, ezpa)     [R]
                ◊   ERRE_RMS     =   (crms, erms)     [R]
                ◊   METHOD       =   /'HARMO'         [DEFECT]
                                 =   /'NIGAM'         [TXM]  ))


        /   ♦   SPEC_UNIQUE         =       _F (
            /   ♦   SPEC_OSCI =   spec_cible   [fonction_sdaster]
                ♦   AMOR_REDUIT  =   amo            [R]
                ◊   NB_ITER      =   nbiter         [I]
                ◊   FREQ_PAS     =   fpas           [R]
                ◊   ERRE_MAX     =   (cmax, emax)       [R]
                ◊   ERRE_ZPA     =   (czpa, ezpa)     [R]
                ◊   ERRE_RMS     =   (crms, erms)     [R]
                ◊   METHOD       =   /'HARMO'         [DEFECT]
                                 =   /'NIGAM'         [TXM]  ) )


        /   ♦   SPEC_FRACTILE       =       _F (
            /   ♦   SPEC_OSCI    =   spec_med  [fonction_sdaster]
                ♦   SPEC_1_SIGMA =   spec_sig  [fonction_sdaster]
                ♦   AMOR_REDUIT  =   amo            [R]
                ◊   FREQ_PAS     =   fpas           [R] )


    ♦   MODULATION   =       _F (
            ♦   TYPE     =   /'JENNINGS_HOUSNER'  [TXM]
                             /'GAMMA'
                             / 'CONSTANT'

            % if  TYPE = GAMMA
            ♦   INST_INIT       = t_ini     [R])

            % if DSP
                ◊   INT_ARIAS       =   arias      [R]
                ◊   ACCE_MAX        =   pga        [R]
                ◊   ECART_TYPE      =   etc.          [R]

        ◊   INFORMATION          =   /  1           [DEFECT]
                                     /  2
        ◊   TITLE                =   title         [l_Kn]


    )   ;
```

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3   Operands

3.1   Keyword DUREE_PHAS_FORT

♦ DUREE_PHAS_FORT = TSM   [R]

Duration of the strong phase of the signal to be generated (cf also R4.05.05).

Parameters of the functions of modulation GAMMA and of Jennings & Housner (JENNINGS_HOUSNER), are identified of kind so that the average strong phase of the signals corresponds to that given. In the case of a constant modulation, the total duration of the signal corresponds to the duration of the well informed strong phase.

3.2   Keyword NB_POIN

◊ NB_POIN = nb_poin   [I]

Many points of discretization of the interspectre to be used in the algorithm of generation. nb_poin must be an even number.

If NB_POIN is well informed, then the duration of simulation is determined by this value: $T = dt(N-1)$ and the point of temporal discretization are: $t_j = j\,dt, \quad j=0,\dots,N-1$.

If the keyword NB_POIN is not well informed, one takes the duration of simulation equalizes with four times the duration of the strong phase more t_{ini} : $T = 3\mathrm{TSM} + t_{ini}$. This makes it possible to simulate the accélérogramme over all its length if the variation of the signal is defined by a function of modulation Gamma or of *Jennings & Housner*. The number of points NB_POIN is then calculated starting from this value. In the case of a constant modulation (TYPE=CONSTANT), one takes $T = TSM$ and NB_POIN is not asked.

3.3   Keyword FREQ_FILTRE

◊ FREQ_FILTRE = FF   [R]

Optional keyword to inform a frequency (in Hz) to filter the low frequencies of the seismic signals (accelerogrammes) in the temporal field. It is thus about a high-pass filter. This filter makes it possible to remove a possible drift of the signals in displacement obtained by integration of the accélérogrammes. By default, one does not apply temporal filtering (ff=0.0).

Note:

Attention should be paid not to choose FF too much large (ff=0.05Hz constitute a reasonable value of reference). If FF is too large, then one does not remove only the drift but one removes also most of the contents in low frequencies of the signals.

3.4   Keyword FREQ_CORNER

◊ FREQ_CORNER = FC   [R]

This frequency is known in the community of the seismologists by the term " *corner frequency* ". One can observe that the frequential contents of the natural seismic signals tend towards 0 very quickly starting from a certain minimal frequency, namely for frequencies lower than " *corner frequency* ".

In the case of the generation of signals compatible with a SRO, one can use this order to optimize the adjustment of the contents in low frequencies of the signals.

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In the case of the generation of signals by the DSP of Kanai-Tajimi, it is necessary to apply this filter to obtain a physical model in agreement with the seismological data, in particular the property which the spectral contents must tighten towards zero beyond " *corner frequency* " (without filter, the DSP of Kanai-Tajimi is not worthless in the beginning). By default, one uses a filter with $fc = 0.05 \times \mathtt{FREQ\_FOND}$ for the DSP of Kanai-Tajimi.

3.5   Keyword FREQ_FILTRE_ZPA

◊   FREQ_FILTRE_ZPA =fz   [R]

Optional keyword to inform a frequency (in Hz) to filter them high frequencies beyond frequency ZPA. It is thus about a filter passeslow. This filter applies to the DSP in field frequential. This filter makes it possible to remove residual contents frequential beyond the value of ZPA what can generate erroneous asymptotic values if one calculation the SRO for depreciation lower than the value used to identify the DSP (SPEC_MOYENNE, SPEC_UNIQUE, SPEC_MEDIANE). By default, one does not apply a wirevery low-pass.

Note:

Attention should be paid with not to choose F Z too much small, the cut-off frequency fz filter low-pass Butterworth is not the frequency of beginning of filtering but the central point on zone of transition .
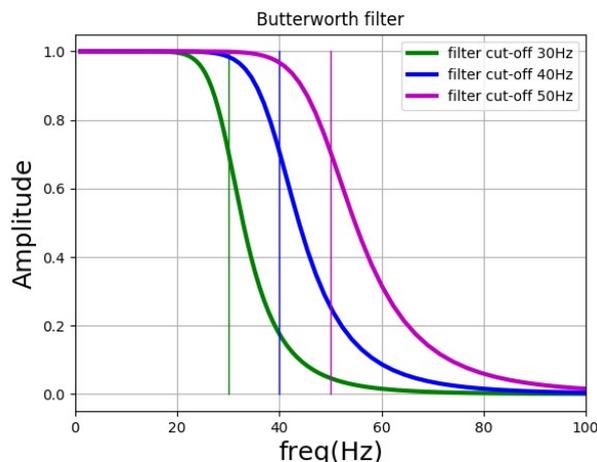
Figure 1: illustration of the pace of the filter of Butterworth for various cut-off frequencies

3.6   Keyword PAS_INST

♦   PAS_INST = dt   [R]

Pas de time of the seismic signals. This value is used to determine the cut-off frequency for simulations by the formula $F = 1/(2\,dt)$ (Shannon). It should be taken care that the cut-off frequency is sufficiently large for modelling the phenomenon well.

3.7   Keyword FREQ_PENTE

◊   FREQ_PENTE = F_p [R]

Slope for the evolution of the centre frequency [Hz/s]: $f(t) = f_0 + f_p(t_0 - t)$, where t_0 is the moment of reference and f_0 the centre frequency at this moment. In GENE_ACCE_SEISME, the moment of reference is selected like the moment in the middle of the strong phase: $t_0 = 0.5\mathrm{TSM} + t_{ini}$. One takes constant values before and after the strong phase (it is advised to

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consult R4.05.05 for more details). It is observed that, generally, the fundamental frequency drops with time. It is necessary in this case to give a negative slope: $f_p < 0$. The code stops in error if the function $f(t)$ product of the negative centre frequencies over the duration of the strong phase. If FREQ_PENTE is not well informed, then one takes a constant fundamental frequency equalizes with f_0. This one must be indicated for the option DSP, in the case of SPEC_UNIQUE, Spec_MEDIANE or SPEC_FRACTILE, the centre frequency of the process results from the target spectrum of answer.

> **Notice** :
> *If one does not inform FREQ_PENTE and if one chooses a function of constant modulation, one obtains a stationary process. This process corresponds to the classical DSP of Kanai-Tajimi (but filtered in low frequencies).*

3.8 Keyword NB_TIRAGE

◊ NB_TIRAGE = Nbt   [I]

The number of signals to be simulated. The value of defect is 1.

3.9 Keyword INIT_ALEA

◊ INIT_ALEA = nor   [I]

If the keyword INIT_ALEA is well informed, one initializes the germ of the random continuations by this value. Two consecutive calculations with same initialization produce it thenS evenS signedux seismicS. If the keyword is not indicated, then the germ used is displayed in the file of the messages.

3.10 Keyword COEF_CORR

◊ COEF_CORR = rho   [R]

This keyword makes it possible to inform a coefficient of correlation for the generation of correlated signals. The coefficient of correlation can take the values between -1 and +1: $-1 < rho < 1$.

If COEF_CORR is informed, then one simulates pairs of correlated signals, with coefficient of correlation rho. These signals can represent the two components of correlated horizontal seismic signals or then of the temporal loadings for studies in multi-support.
In TABLE_FONCTION at exit of the operator, the two components are listed by 'NOM_PARA' who is worth 'ACCE1' for the first and 'ACCE2' for the second signal.

3.11 Keyword RATIO_HV

◊ RATIO_HV = ratio   [R]

If RATIO_HV and COEF_CORR are both well informed, then one generates signals 3D with correlated horizontal components (defined by the coefficient of correlation rho who can be null) and a vertical component not correlated to both others, but to which applies the horizontal/vertical ratio indicated by RATIO_HV. This ratio is often taken equal to $\frac{3}{2}$ but any other value higher than zero can be selected. In TABLE_FONCTION at exit of the operator, the three components are listed by 'NOM_PARA' who is worth 'ACCE1' and 'ACCE2' for the horizontal signals and 'ACCE3' for the vertical component.

> **Notice :**
> RATIO_HV is available only for the option SPEC_FRACTILE and if COEF_CORR is well informed. In the other cases, it is enough to generate vertical signals by a call independent with GENE_ACCE_SEISME and by giving the target spectrum or the parameters of the DSP for the vertical component.

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3.12 Mot_clé factor `MATR_COHE`

This keyword factor must be indicated if one wishes to generate space seismic fields. This is useful to make a temporal study with a variable seismic excitation in space or of standard multi-support. The function of coherence defines the space correlation of the seismic movement. It is then necessary to inform the type of function of coherence and, if necessary, the parameters associated. One finds more details on this function of coherence in the documentation of the operator `DYNA_ISS_VARI` [U4.53.31].
In `TABLE_FONCTION` at exit of the operator, the signals are indexed by their name of node, for example `NODE = N1`.

3.12.1 Operand `GRID`

♦   `GRID   =   e-mail`   `[maillage_sdaster]`

Grid of modeling .

3.12.2 Operand `GROUP_NO_INTERF`

♦   `GROUP_NO_INTERF =  gni`   `[grno]`

With this keyword, one defines the group of nodes for which one wishes to generate a space-time seismic field.

3.12.3 Operand `TYPE`

♦   `TYPE    =    model of coherence`   `[txt]`

One can choose between the function of coherence of Became moth-eaten & Luco (`MITA_LUCO`) or those of Abrahamson (`ABRAHAMSON`, `ABRA_ROCHER`, `ABRA_SOLMOYEN`).
If one chooses `MITA_LUCO`, then one must moreover inform `VITE_ONDE`.   The parameter `PARA_ALPHA` is optional, by default one takes `alpha = 0.1`.

3.12.4 Operands `VITE_ONDE` and `PARA_ALPHA`

♦   `VITE_ONDE   =  vite_onde,`   `[R]`
◊   `PARA_ALPHA  =  / 0.1`   `[DEFECT]`
`                   / alpha,`   `[R]`

One finds a description detailed of these parameters in [U4.53.31].

3.13 Mot_clé factor `PHASE`

This keyword factor must be indicated if one wishes to generate a set of seismic signals taking account of the dephasing of with the wave propagation. Times of arrivals of the signals are calculated according to the coordinates of the nodes of the grid, and compared to a point of reference.
In `TABLE_FONCTION` at exit of the operator, the signals are indexed by their name of node, for example `NODE = N1`.

3.13.1 Operand `GRID`

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♦   GRID   =   e-mail   [maillage_sdaster]

Grid of modeling .

3.13.2 Operand GROUP_NO_INTERF

♦   GROUP_NO_INTERF =   gni   [grno]

With this keyword, one defines the group of nodes for which one wishes to generate a space-time seismic field.

3.13.3 Operand VITE_ONDE

♦   VITE_ONDE   =   vite_onde,   [R]

The propagation velocity of the wave.

3.13.4 Operand DIRECTION

♦   DIRECTION   =   to dir,   [R]

Direction of propagation the wave (directional vector: 3 values).

3.13.5 Operand COOR_REFE

◊   COOR_REFE =   crefe   [R]

This keyword is optional. It makes it possible to inform the coordinates (3D) of a point of reference for the calculation of dephasing (time of arrival of wave). By default, one identifies the node of the grid which sees in first the wave.

3.14 Keyword GRAVITY

♦   GRAVITY   =   G   [R]

In general, one takes GRAVITY =9.81 (m/s^2) (*cf.* too §3.8.2). In this case, IL is necessary to inform ACCE_MAX (PGA), and ECART_TYPE or, if necessary, the spectrum targets (SPEC_OSCI) in g . This size of standardisation is also used for the calculation of the intensity of Arias. By way of an example, to give ACCE_MAX= 0.2 corresponds to a PGA of $0.2g$ with $g=9.81\mathrm{m}/s^2$. The generated accélérogrammes will be then accelerations in m/s^2 .

3.15 Keyword factor DSP

The earthquake is modelled by a nonstationary stochastic process. The spectral concentrations of power (DSP) evolutionary make it possible to take account of a nonstationary phenomenon in amplitude and frequential contents like the earthquake. The variation of the amplitude is taken into account by a function of modulation whereas the evolution of the frequential contents is modelled by the evolutionary DSP of Kanai-Tajimi. The DSP of Kanai-Tajimi moreover is filtered in order to very remove the frequential contents in low frequencies which can lead to digital problems (nonworthless drifts for the integrated signals).

The parameters related to the variation of the amplitude are the intensity of Arias, the duration of the strong phase and the moment of beginning of the strong phase. The parameters related to the DSP and the evolution of the frequential contents are the damping and the fundamental frequency of the DSP of Kanai-Tajimi as well as the slope describing the evolution of the latter in the course of time. These parameters can be given starting from a given acélérogramme, of a SRO (spectrum of answer

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of oscillator) or by calling on the available data in the literature. Moreover, the model being parameterized, it is possible to take account of the variability and the uncertainty of these parameters using random pullings.

The algorithm of simulation and the model are described with more detail in the reference material [R4.06.04].

3.15.1 Operands AMOR_REDUIT, FREQ_FOND

♦ AMOR_REDUIT = amo   [R]

Value of the rate of depreciation criticizes DSP of Kanai-Tajimi.

♦ FREQ_FOND = F_0 [R]

Centre frequency of the DSP of Kanai-Tajimi, it is the frequency where the most energy is concentrated.

3.16 Keywords factors SPEC_MEDIANE, SPEC_MOYENNE, SPEC_UNIQUE and SPEC_FRACTILE

This keyword factor makes it possible to inform given of a SRO targets in order to generate seismic signals in agreement with the target SRO. It is then necessary to determine a "compatible" DSP with the data of the target SRO. There are several options:

* SPEC_UNIQUE : Generation of a seismic signal to which the SRO is very close to the target SRO: it is necessary to proceed to iterations as well as possible to adjust the spectral contents of the signal. If one asks for several signals (NB_TIRAGE), then the adjustment is done by generated signal.
* SPEC_MOYENNE, SPEC_MEDIANE : Generation of Nbt signals whose median/average spectrum respects the target. If the target SRO is a physical spectrum, then the whole of the generated signals in general has a median SRO near to the target. One can however make iterations to improve the adjustment of the SRO, that is to say in median (SPEC_MEDIANE) or on average (SPEC_MOYENNE). If one does not make iterations (NB_ITER nonwell informed) to improve the adjustment, then the two options produce the same result.
* SPEC_FRACTILE : Generation of Nbt signals whose median spectrum and the spectrum with a sigma respect the target. It is about a method for the studies " *best-estimate* ". The generated signals have a variability close to that of the signals real available in the databases, in particular with regard to variability between the achievements (*record-to-record variability*). For that, it is necessary to inform the median spectrum as well as the spectrum with a sigma. The median spectrum as well as the spectrum with a sigma are generally provided by the laws of attenuation.

3.16.1 Operand SPEC_OSCI

♦ SPEC_OSCI =   spec_cible

One informs here the target SRO in the form of a function with in X-coordinate the frequencies and ordinate spectral accelerations (the last must be normalized according to GRAVITY). One can use DEFI_FONCTION to build it. If the option were chosen SPECTRE_FRACTILE, then this spectrum must correspond to the median spectrum (as defined by the laws of attenuation).

3.16.2 Operand SPEC_1_SIGMA

♦ SPEC_1_SIGMA =   spec_cible

Obligatory keyword for the option SPEC_FRACTILE. One informs here the SRO with a target sigma in the form of a function with in X-coordinate the frequencies and ordinate spectral accelerations (the last must be normalized according to GRAVITY). One can use DEFI_FONCTION to build it. The spectrum with a sigma, for example, is provided by the laws of attenuation which suppose a lognormal

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distribution of spectral accelerations and thus of the values of the SRO. That implies that the SRO with a sigma corresponds to the fractile with 84% of the SRO. It is advised to consult the reference material [R4.05.05] for more details on this modeling.

3.16.3 Operand AMOR_REDUIT

♦ AMOR_REDUIT = amo   [R]

Value of the reduced damping of the SRO indicated under SPEC_OSCI.

3.16.4 Operands ERRE_ZPA, ERRE_RMS and ERRE_MAX

◊ ERRE_MAX   = (cmax, emax)   [R]
◊ ERRE_ZPA   = (czpa, ezpa)   [R]
◊ ERRE_RMS   = (crms, erms)   [R]

These keyword are optional, one can inform the weighting coefficients as well as the maximum error wished by the user for the three criteria of adjustment: maximum error on the waveband, error on the ZPA (*zero period acceleration*) and error RMS. It is possible to inform a weighting coefficient (cmax, czpa, crms) but not of target maximum error (emax, ezpa, erms). On the other hand, three weightings should be informed together. The calculated error is the relative error, namely the difference between the value of the spectrum carried out and the value of the target spectrum divided by the value of the target spectrum. If the desired maximum error (emax, ezpa, erms). If one of the errors is larger than the indicated value, an alarm is emitted. The weighting coefficients are used to determine an multi-objectives error balanced for each iteration. This criterion is used to choose, among the results of the iterations, the accélérogramme (or accélérogrammes) at exit of calculation which respect the criterion as well as possible (it is not always the last iteration).

3.16.5 Operand NB_ITER

◊ NB_ITER   = nbiter   [I]

One informs the iteration count to improve the adjustment of the accélérogramme to spectrum (SRO) target. This keyword is optional: by default, one does not make iterations. With the option SPEC_FRACTILE, one cannot reiterate.

3.16.6 Operand METHOD

◊ METHOD   = /'HARMO'   [DEFECT]
              = /'NIGAM'   [TXM]

This optional keyword makes it possible to choose the method for calculation of the spectrum of answer. They are the same methods as those available for calculation of SRO with CALC_FONCTION [U4.32.04]. By default, one uses the method 'HARMO'. The spectrum of answer is then obtained by successive harmonic calculations (for different Eigen frequencies from oscillator) via a FFT/IFFT of the signal as starter. Method 'NIGAM' is detailed in the document [R5.05.01].

3.16.7 Operand FREQ_PAS

◊ FREQ_PAS = fpas   [R]

With this optional keyword, one can choose the step of discretization of the SRO used to determine the compatible DSP. Values of the SRO indicated via SPEC_OSCI are then interpolated to obtain the step of discretization fpas wished. By default, one takes the same step of frequency as that used for the generation of the signals. This last results from the cut-off frequency and point NB_POIN, cf §3.6.

3.17 Keyword factor MODULATION

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Parameters of the functions of modulation GAMMA and of Jennings & Housner (JENNINGS_HOUSNER), are identified of kind so that the strong phase TSM average of the signals corresponds to that given. For a modulation CONSTANT (not of modulation), the duration of the simulated signals corresponds to TSM. One uses the definition being based on the intensity of Arias. One notes $TSM = T_2 - T_1$ where T_1 and T_2 are respectively the moments of time when 5% and 95% of the intensity of Arias (total energy) are carried out. The moment T_1 corresponds to the beginning of the strong phase t_{ini}.

If NB_POIN is given for the modulations Gamma and *Jennings & Housner*, then the total duration of the signals corresponds to (NB_POIN-1) *PAS_INST.

3.17.1 Operand TYPE

♦ TYPE = / 'JENNINGS_HOUSNER' [TXM]
/ 'GAMMA'
/ 'CONSTANT'

Definition of the type of modulation (*cf.* also [R4.05.05]).

Modulation of the type CONSTANT corresponds to one signal without amplitude modulation. If one supposes moreover than the fundamental frequency of the DSP is constant, then one brings back oneself to a stationary process.

3.17.2 Operands INT_ARIAS, ACCE_MAX, ECART_TYPE

If the option were chosen DSP, then it is necessary to inform one of the three parameters intensity of Arias, PGA (maximum acceleration on the ground) or standard deviation to define energy contained in the signals. If one chose one of the three keywords factor SPEC_UNIQUE, SPEC_MEDIANE or SPEC_FRACTILE, then this information is already contained in the target spectrum.

◊ INT_ARIAS = arias [R]

Average intensity of Arias: $Arias = E\left(\dfrac{\pi}{2g} \int_0^\infty X^2(t)dt\right)$ with X the process modelling the seismic movement (acce) and g is gravity.

◊ ACCE_MAX = pga [R]

Maximum acceleration on ground (PGA). One associates this value to the median maximum of the signals to be generated. The standard deviation corresponding is given starting from the factor of peak and for the strong phase TSM.

It is necessary to inform ACCE_MAX (PGA) in g. The value of g is to be informed by the keyword GRAVITY. Thus, ACCE_MAX= 0.2 corresponds to a PGA of $0.2g$ with $g = 9.81 \mathrm{m}/s^2$. The generated accélérogrammes will be then accelerations in m/s^2.

◊ ECART_TYPE = etc. [R]

Standard deviation of the subjacent stationary stochastic process. One applies then the amplitude modulation (GAMMA or JENNINGS_HOUSNER).

It is necessary to inform ECART_TYPE in g (confer also above). The value of g is to be informed by the keyword GRAVITY . One must take GRAVITY =9.81 (m/s^2) to obtain accelerations in m/s^2.

3.17.3 Operand INST_INIT

Code_Aster

Version default

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Responsable : ZENTNER Irmela

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♦/◊ INST_INIT = t_ini   [R]

Moment of beginning of the strong phase in the case of the function of modulation GAMMA. Parameters of the function of modulation GAMMA are identified (by least squares) so that TSM and t_{ini} are respected.

3.18 Operand **INFORMATION**

◊   INFORMATION =

/   1: pas d' impression.

/   2: impression of the relative information to the model and the discretization (treatment of the signal).

3.19 Operand **TITLE**

◊   TITLE = title

title is the title of calculation to be printed at the top of the results [U4.03.01].

4   Produced table

The parameters of the produced table are the following:

PARAMETER	TYPE	DESCRIPTION
NUME_ORDRE	I	sequence numbers (NB_TIRAGE)
FUNCTION	K24	name of the generated functions
NOM_PARA	K24	ACCE1 and ACCE2 (if COEF_CORR)
		ACCE1, ACCE2 and ACCE3 (if RATIO_HV)
NODE	K24	Name of the node (if MATR_COHE)

5   Examples

One can consult the case test zzzz317 [V1.01.317].