

Operator EXTR_MODE

1 Drank

To extract selectively from the modes of data structures modal. The modes are selected according to a criterion of value of modal parameter higher than a certain threshold, then are concaténés in only one final data structure.

One can also print in the results file a summary table on the office pluralities of the unit effective modal masses or the generalized masses of the modes selected.

Product a data structure of the `mode_meca` type or `mode_gene` according to the type of the modes as starter.

2 Syntax

```
resu_mod [*] =EXTR_MODE (
    ◆FILTRE_MODE=_F (
        ◆MODE= MOD [mode_gene]
        / [mode_meca]
        / [mode_meca_c]
        ◆/NUMÉRIQUE_MODE= l_mode [l_I]
        /NUME_MODE_EXCLU = l_mod_ex [l_I]
        /NUME_ORDRE = l_ordre [l_I]
        /TOUT_ORDRE = "OUI"
        / "NON"
        /◆FREQ_MIN=f_min [R]
        ◆FREQ_MAX=f_max [R]
        ◇PRECISION=/prec [R]
        /0.001 [DEFAULT]
        /◇CRIT_EXTR=/ "MASS_GENE"
        /"MASS_EFFE_UN" [DEFAULT]
        /◇SEUIL=rseuil [R]
        /◇SEUIL_X=rseuil [R]
        /◇SEUIL_Y=rseuil [R]
        /◇SEUIL_Z=rseuil [R]
    )
    ◇IMPRESSION=_F (
        ◇CUMUL=/ "OUI"
        / "NON" [DEFAULT]
        ◇CRIT_EXTR=/ "MASS_EFFE_UN" [DEFAULT]
        / "MASS_GENE"
    )
    ◇TITER=titer [l_Kn]
);
```

If MOD is of type [mode_gene] then resu_mod is of type [mode_gene]
If MOD is of type [mode_meca] then resu_mod is of type [mode_meca]
If MOD is of type [mode_meca_c] then resu_mod is of type [mode_meca_c].

3 Operands

3.1 Key word **FILTRE_MODE**

One repeats this key word as many times as there are data structures of the `mode_meca_*` type or `mode_gene` to be filtered and with concatenate.

3.2 Operand **MODE**

Name of the data structure `mode_meca_*` or `mode_gene` with sorting and concatenate with the others.

3.3 Filtering of the modes

to filter the modes, three possibilities are offered to the user.

3.3.1 Operands **NUME_MODE / NUME_ORDRE / TOUT_ORDRE**

Lists sequence numbers or modal positions of the modes which one wishes to preserve.

3.3.2 Operands **NUME_MODE_EXCLU**

Lists modal positions of the modes which one wishes to remove.

3.3.3 Operands **FREQ_MIN / FREQ_MAX / accuracy**

One keeps all the modes which correspond to frequencies ranging between `f_min` and `f_max` to the relative accuracy `prec`. One must have `f_min` lower than `f_max`.

3.3.4 Operand **CRIT_EXTR**

Choice of the parameter which is used as criterion for the filtering of the modes. The parameters are defined in documentation of reference [R5.01.03].

If the criterion is "MASS_EFFE_UN" a mode will be retained as soon as one of its directional unit effective masses modal is higher than a threshold fixed by the user.

If the criterion is "MASS_GENE" a mode will be retained as soon as the ratio of the generalized mass on the sum of the generalized masses of the modes of filtered structure is higher than a threshold fixed by the user.

These criteria have a meaning only for data structures of the `mode_meca_*` type.

3.3.5 Operands **SEUIL, SEUIL_X, SEUIL_Y, limiting**

`SEUIL_Z` Value of the criterion below which one considers that one can filter the mode.

This value, in the case of the parameters currently taken into account, is an adimensional relative value.

One can apply the same threshold in all the directions (keyword `SEUIL`) or differentiate the thresholds according to the directions `X`, `Y` or `Z` (`SEUIL_X`, `SEUIL_Y`, `SEUIL_Z`)

3.4 Key word **PRINTING**

This key word makes it possible to print a table of office plurality of certain parameters. These parameters can be different from those selected in key keys `FILTRE_MODE`.

3.4.1 Operand `CUMUL`

Printing or not printing of the office pluralities of the modal parameter retained by `CRIT_EXTR` for data structure result `resu_mod`.

3.4.2 Operand `CRIT_EXTR`

Choice of the parameter of printing for which one carries out the operation of office plurality. If the criterion is "`MASS_EFFE_UN`" (masses effective unit), one cumulates separately the values of parameters "`MASS_EFFE_UN_DX`", "`MASS_EFFE_UN_DY`", "`MASSE_EFFE_UN_DZ`" (masses modal effective unit in the D* direction) of the extracted modes.

If the criterion is "`MASS_GENE`" one cumulates the values of parameter `MASS_GENE` (generalized mass) of the extracted modes.

The parameters mentioned in this paragraph are more precisely defined in documentation of reference [R5.01.03].

3.5 Key word `TITER`

Titres attached to the product concept by this operator [U4.03.01].

4 Execution

One checks that the parameter for which one carries out filtering exists well in data structure of entry `MOD`. If this parameter is not indicated, one leaves in fatal error. On the other hand, for the key word `PRINTING`, if parameters `MASS_EFFE_UN_*` are not indicated, one emits only one alarm.

In output, the product concept `resu_mod` should not be empty, if not one leaves in fatal error.

It is also checked that all the concepts `mode_meca_*` or `mode_gene` are in the same way standard and that they come from the same initial problem (same matrixes).

After having filtered the interesting modes, one checks that they have a whole a different modal position. In the contrary case, one transmits an alarm message. To remove these duplicated modes, it is necessary to re-use command `EXTR_MODE` and to activate operand `NUME_MODE_EXCLU`.

To date, it is not checked that the data structures of the `mode_meca_*` type correspond to the same norm.

5 Examples of printing

If factor key word `PRINTING` is present, operator `EXTR_MODE` writes in the results file a certain number of paramètrres on the extracted modes.

Example of printing, with key word `CRIT_EXTR=' MASS_EFFE_UN'` and `CUMUL=' OUI'` :

```
-----  
CONCEPT MODESX   OF TYPE MODE_MECA   RESULTING FROM L OPERATOR EXTR_MODE  
  
M A S S . E .           E F
```

NUME_ORDRE	NUME_MODE	FREQUENCY	MASS_EFFE_UN_DX	CUMUL_DX
1	1	2.66902D-01	4.12685D-02	4.12685D-02
2	11	6.49621D+01	1.18667D-01	1.59935D-01
3	19	2.56692D+02	1.02927D-02	1.70228D-01

F E C T I V E		U N I T A I R E	
MASS_EFFE_UN_DY	CUMUL_DY	MASS_EFFE_UN_DZ	CUMUL_DZ
2.22156D-25	2.22156D-25	3.80903D-01	3.80903D-01
4.69363D-25	6.91519D-25	3.11195D-03	3.84015D-01
4.22168D-27	6.95741D-25	7.06977D-03	3.91085D-01

The NUME_ORDRE is the position of the mode in data structure, the NUME_MODE is the modal position in the spectrum (cf operator MODE_ITER_SIMULT [U4.52.03]).

FREQUENCY is the eigenfrequency of the mode.

MASS_EFFE_UN_D* is the unit effective modal mass in the direction * (* = X or Y or Z).

These quantities are defined in documentation of reference [R5.01.03].

CUMUL_* are the cumulated sums of the unit effective masses by direction.

Example of printing, with key word CRIT_EXTR=' MASS_GENE' and CUMUL=' OUI':

```
-----
CONCEPT MODESX      OF TYPE MODE_MECA      RESULTING FROM L OPERATOR EXTR_MODE

                        GENERALIZED MASS
NUME_ORDRE  NUME_MODE    FREQUENCY      MASS_GENE  CUMUL_MASS_GENE
      1           1      2.66902D-01    1.00000D+00  1.00000D+00
      2          11      6.49621D+01    1.00000D+00  2.00000D+00
      3          19      2.56692D+02    1.00000D+00  3.00000D+00
-----
```

MASS_GENE is the generalized mass of the mode, defined in documentation of reference [R5.01.03].

CUMUL_MASS_GENE is the cumulated sum of the generalized masses.

6 Example of use

Here an example presenting various possibilities of the command EXTR_MODE for a modal analysis realized by 5 searches of successive modes:

Computation of the total mass of structure (for checking)

```
massestr=POST_ELEM      (... MASS_INER = (...));
```

Computation of the first 17 frequencies (NUME_ORDRE from 1 to 17; NUME_MODE from 1 to 17)

```
model=MODE_ITER_SIMULT      ( MATR_RIGI = stiffness,
                              MATR_MASS = mass,
                              CALC_FREQ=      _F (OPTION = "PLUS_PETITE",
                                                    NMAX_FREQ = 17      ));
```

```
model=NORM_MODE      ( MODE = model,      reuse = model,
                      NORM = "TRAN_ROTA"
```

Warning : The translation process used on this website is a "Machine Translation". It may be imprecise and inaccurate in whole or in part and is provided as a convenience.

```
);

# Computation of other frequencies (NUME_ORDRE from 1 to 5; NUME_MODE from 18 to 22)

mode2=MODE_ITER_SIMULT      ( MATR_RIGI = stiffness,
                             MATR_MASS = mass,
                             CALC_FREQ=  _F ( OPTION = "TAPE",
                                             FREQ = (20. , 25.) )
                             );

mode2=NORM_MODE             ( MODE = mode2,
                             reuse = mode2,
                             NORM = "TRAN_ROTA"
                             );

# Computation of other frequencies ( NUME_ORDRE from 1 to 6; NUME_MODE from 23 to 28)

mode3=MODE_ITER_SIMULT      ( MATR_RIGI = stiffness,
                             MATR_MASS = mass,
                             CALC_FREQ=  _F ( OPTION = "TAPE",
                                             FREQ = (25. 30.) )
                             );

mode3=NORM_MODE             ( MODE = mode3,
                             reuse = mode3,
                             NORM = ' TRAN_ROTA',
                             );

# Computation of other frequencies ( NUME_ORDRE from 1 to 3; NUME_MODE from 28 to 30)

mode4=MODE_ITER_SIMULT      ( MATR_RIGI = stiffness,
                             MATR_MASS = mass,
                             CALC_FREQ=  _F ( OPTION = "TAPE",
                                             FREQ = (29. , 32.) )
                             );

mode4=NORM_MODE             ( MODE = mode4,
                             reuse = mode4,
                             NORM = ' TRAN_ROTA',
                             );

# Computation of other frequencies (NUME_ORDRE from 1 to 6; NUME_MODE from 31 to 34)

mode5=MODE_ITER_SIMULT      ( MATR_RIGI = stiffness,
                             MATR_MASS = mass,
                             CALC_FREQ=  _F ( OPTION = "TAPE",
                                             FREQ = (32. , 35.) )
                             );

mode5=NORM_MODE             ( MODE = mode5,
                             reuse = mode5,
                             NORM = "TRAN_ROTA"
                             );

# Extraction of the mode=EXTR_MODE

modes      ( FILTRE_MODE = _F ( MODE=mode1
                               ,
                               TOUT_ORDRE=' OUI' ) ,
            ( MODE=mode2
              ,
```

(18,19,20,21,22))

MASS_EFFE_UN',

IMPRESSION=_F
);

NUME_MODE=

```
(  MODE=mode3      ,  
  FREQ_MIN=25      . ,  
  FREQ_MAX=30      . ) ,  
(  MODE=mode4      ,  
  NUME_MODE_EXCLU=28      ) ,  
(  MODE=mode5      ,  
  CRITERE='        SEUIL=0.005      ) ,  
  CUMUL=' OUI ' )
```