

## Operator CALC\_MODE\_ROTATION

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### 1 Goal

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To calculate the modes and the frequencies of the system following according to the number of revolutions,

$$M \ddot{\delta} + (C + \Omega G) \dot{\delta} + K \delta = 0$$

Where  $M$  is the matrix of mass of the system,  $C$  is a matrix of damping,  $G$  is the matrix of gyroscopy (antisymmetric), and  $K$  is the matrix of stiffness of the system.  $\Omega$  represent the number of revolutions.

The data necessary for this macro are:

- 1) matrices:  $K$ ,  $C$ ,  $G$  and  $M$
- 2) A list number of revolutions

This operator returns a list of concept `mode_meca_c` : a concept for each number of revolutions. She calls on the order `CALC_MODES`.

## 2 Syntax

```
CALC_MODE_ROTATION (
# Matrix of rigidity
    ◆ MATR_RIGI = K [matr_asse_depl_r]
# Matrix masses
    ◆ MATR_MASS= M [matr_asse_depl_r]
# Matrix damping
    ◆ MATR_AMOR = C [matr_asse_depl_r]
# Gyroscopic matrix
    ◆ MATR_GYRO = G [matr_asse_depl_r]
# List number of revolutions
    ◆ VITE_ROTA = List [R]
# Choice of the method
    ◆ METHOD = / 'QZ' [DEFECT]
              / 'SORENSEN'
# Type of modal calculation
    ◇ CALC_FREQ = _F (
      ◇ OPTION = / 'CENTER'
              / 'PLUS_PETITE' [DEFECT]
      ◇ NMAX_FREQ = nbF [I]
      ◇ SEUIL_FREQ= /1.E-2 [DEFECT]
                  /f_seuil [R]
    )
# For final checks
    ◇ VERI_MODE = _F (
      ◇ STOP_ERREUR = / 'YES' [DEFECT]
              / 'NOT'
      ◇ THRESHOLD = / 1.E-6 [DEFECT]
              / R [R]
      ◇ PREC_SHIFT = / 0.05 [DEFECT]
              / prs [R]
      ◇ STURM = / 'YES' [DEFECT]
              / 'NOT'
    )
);
```

## 3 Operands

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### 3.1 Operands MATR\_RIGI/MATR\_MASS/ MATR\_AMOR/MATR\_GYRO/INFORMATION/METHOD/OPTION

They have the same meaning as in the order CALC\_MODES [U4.52.02].

**Note:**

*Because of presence of the matrices of damping and gyroscopy, only methods QZ and SORENSEN are usable.*

### 3.2 Keyword CALC\_FREQ

Play the same part as in the order CALC\_MODES [U4.52.02], has the same internal keywords with the same values by default.

**Note:**

*The number of modes  $nbF$  is the same one for all the number of revolutions.*

### 3.3 Operand VITE\_ROTA

List number of revolutions  $\Omega$  in *rad/s*.

### 3.4 Operand Keyword VERI\_MODE

The internal operands have the same meaning as in of the same keyword name of order CALC\_MODES [U4.52.02].

## 4 Example

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# Calculation of the first 5 modes in rotation by using the method QZ :

```
lmod=CALC_MODE_ROTATIONR (MATR_RIGI = RIGIDITY,  
                           MATR_MASS = MASS,  
                           MATR_AMOR=AMOR,  
                           MATR_GYRO =GYASS,  
                           VITE_ROTA=L_VITROT,  
                           METHOD = 'QZ',  
                           CALC_FREQ=_F (OPTION=' PLUS_PETITE', NMAX_FREQ=5),  
                           VERI_MODE=_F (STOP_ERREUR=' NON'));
```

CALC\_MODE\_ROTATION return a table (table\_contenor) containing the modal bases calculated for each number of revolutions.

mode\_meca\_c product are named as follows: mod\_0, ... mod\_i. .mod\_nbV, *i* is the index number of revolutions in VITE\_ROTA .