# Operator CALC_FORC_NONL

## 1 Goal

To create a new result of complementary nodal forces to use in Lorder has DYNA_VIBRATED under the keyword EXCIT_RESU.

# 2 Syntax

```
resu      [dyna_trans]     = CALC_FORC_NONL

    (
      ♦  RESULT       =  resu,                        [dyna_trans]
      ♦  MODEL = model,                                  [model]
      ♦  CHAM_MATER = chmater,                           [cham_mater]
      ◊  CARA_ELEM =carac,                               [cara_elem]
      ◊  BEHAVIOR =_F (
               ♦  RELATION =/cf relations [U4.51.11]

               ◊  DEFORMATION =/   'SMALL',              [DEFECT]
                               /   'PETIT_REAC',
                               /   'SIMO_MIEHE',
               /  ALL = 'YES',                           [DEFECT]
               /  | GROUP_MA = lgrma,                    [l_gr_maille]
                  | MESH = lma,                       [l_maille]
                     ),

      ◊  /  TOUT_ORDRE    =  'YES'  ,                   [DEFECT]
         /  NUME_ORDRE    =  l_nuor ,                   [l_I]
         /  LIST_ORDRE    =  l_ordr ,                   [listis]
         /  NOEUD_CMP     =  l_mode ,                   [l_Kn]
         /  NUME_MODE     =  l_numo ,                   [l_I]
         /  NOM_CAS       =  nomcas ,                   [KN]
         /  /  INST =           l_inst ,                [l_R]
            /  LIST_INST    =  l_inst ,                [listr8]
            /  FREQ =          l_freq ,                [l_R]
            /  LIST_FREQ    =  l_freq ,                [listr8]
         /  CRITERION       = 'RELATIVE',                 [DEFECT]
               ◊ PRECISION  =  /  prec,                 [R]
                               /  1.0D-6 ,              [DEFECT]
         /  CRITERION    = 'ABSOLUTE',
               ♦ PRECISION  =     prec,                 [R]

    )
```

# 3 Operands

The order allows it calculation of the complement of internal forces due to nonthe linearities of behavior. This calculation relate to the laws of behavior where the internal forces depend primarily on the fields kinematics (displacements, speeds, accelerations); it thus relates to especially nonthe linearities located such as for example the contact penalized between discrete elements. The terms calculated with the nodes are obtained by the difference between the integrated residue in internal forces (depending at the same time on the fields kinematics and the parameters of law of behavior) and the internal force which would be obtained starting from the same fields kinematics by considering a linear behavior for the structure.

**Notice 1:**

*name of the concept result created of type* `dyna_trans` *is obligatorily different from the name of concept result of the type* `dyna_trans` *used as starter under the operand* `RESULT` *and an evolution of fields of the type constitutes* `'DEPL'`*. This new result of complementary nodal forces is used under the keyword* `EXCIT_RESU` *in Lorder has* `DYNA_VIBRA` *with* `TYPE_RESU=' HARM'` *(in this case after transformation by the operator* `REST_SPEC_TEMP` *[U4.63.34]) and* `DYNA_LINE_TRAN` *or* `DYNA_VIBRA` *and* `TYPE_RESU=' TRAN'`*. An example is provided in the case test SDLS119A.*

**Notice 2:**

*In the precise case of calculation with the relation* `'DIS_CHOC'` *assigned to discrete elements, It is then necessary always to direct the discrete element of contact in the direction structure towards thrust. That it is with elements* `POI1` *, like always by the keyword* `ORIENTATION` *of* `AFFE_CARA_ELEM` *, but also with elements* `SEG2` *where one must define well the element in the direction structure candidate in the contact, associated with node 1, towards the thrust, associated with node 2.*

## 3.1 Operands TOUT_ORDRE / NUME_ORDRE / LIST_ORDRE / NUME_MODE/ NOEUD_CMP / NOM_CAS / INST / LIST_INST / FREQ / LIST_FREQ / PRECISION / CRITERION

See [U4.71.00] for the description of these operands.

### 3.1.1 Operand MODEL

♦ `MODEL = Mo,`

Name of the model, necessary to enter

### 3.1.2 Operand CHAM_MATER

◊ `CHAM_MATER = chmater,`

Name of the material field where the material characteristics of the elements are defined. This argument is necessary for calculation because the laws of behavior defined in the keywords `BEHAVIOR` always require a material field.

### 3.1.3 Operand CARA_ELEM

◊ CARA_ELEM = carac,

The concept of the elementary characteristics of type cara_elem is necessary for calculation if there exists in the model of the elements of structure.

### 3.1.4 Operand BEHAVIOR

◊ BEHAVIOR = _F

Keyword factor allowing to assign laws of behavior to meshs or groups of meshs of the grid.

One defines an assignment by occurrence of the keyword BEHAVIOR.

#### 3.1.4.1 Operand RELATION

◊ RELATION,

Name of a relation of law of behavior under format text. The allowed relations are those where the internal forces depend primarily on the fields kinematics (displacements, speeds, accelerations); in addition to the relation 'ELAS', the first relation envisaged is the relation 'DIS_CHOC' assigned to discrete elements.

#### 3.1.4.2 Operand DEFORMATION

◊ DEFORMATION,
Name of the type of deformation under format text compatible with the type of the elements affected by the law of behavior.

#### 3.1.4.3 Operands TOUT/GROUP_MA/MAILLE

◊ ALL = 'YES',

The relation is affected on all the grid.

◊ GROUP_MA = lgma,

The relation is affected on the groups of meshs contained in the list lgma.

◊ MESH = lma,

The relation is affected on the meshs contained in the list lma.