

Operator NUME_DDL

1 Goal

To number the unknown factors of a system of linear equations. This operator “also prepares” the assembly of the matrix associated with this system with equations.

It is in this operator that the method of resolution of the linear systems is selected: LDLT, combined gradient, multi-frontal...

Product a structure of data of the type `nume_ddl`.

2 Syntax

```
naked [nume_ddl] = NUME_DDL (
    ♦ / MODEL      = Mo,                [model]
      ◊ LOAD      = lchar,             / [l_char_meca]
                                          / [l_char_ther]
                                          / [l_char_acou]

      / MATR_RIGI = lmel,              / [l_matr_elem_TEMP_R]
                                          / [l_matr_elem_DEPL_R]
                                          / [l_matr_elem_DEPL_C]
                                          / [l_matr_elem_PRES_C]

      / METHOD = 'MULT_FRONT',          [DEFECT]
      ◊ RENUM = / 'MONGREL',           [DEFECT]
                / 'MANDELEVIUM',
                / 'MDA',

      / METHOD = 'LDLT',
      ◊ RENUM = / 'RCMK',              [DEFECT]
                / 'WITHOUT',

      / METHOD = 'MUMPS',
      ◊ RENUM = / 'CAR',               [DEFECT]
                / 'AMD',
                / 'MFA',
                / 'MONGREL',
                / 'PORD',
                / 'QAMD',

      / METHOD = 'PETSC',

      / METHOD = 'GCPC',
      ◊ RENUM = / 'RCMK',              [DEFECT]
                / 'WITHOUT',

      ◊ INFORMATION = / 1,             [DEFECT]
                    / 2,
                    )
```

3 General information

This order makes it possible to number the equations (and the unknown factors) of the linear systems to solve. One also prepares the work of assembly of the matrices, by drawing up the tables of pointers corresponding to the storage chosen for these matrices.

The choice of the method of resolution of the linear systems is made by the keyword `METHOD` (method `'MULT_FRONT'` by default).

4 Operands

4.1 Operand `MODEL/LOAD`

◆ / `MODEL = Mo` , `LOAD = lchar`

The code will number the degrees of freedom of the elements of the model `Mo` as well as the degrees of freedom of dualisation of the conditions kinematics dualized possibly present in the loads of the list `lchar`.

4.2 Operand `MATR_RIGI`

◆ / `MATR_RIGI = lme1`

List of `matr_elem_*` allowing to establish the classification of the unknown factors of the problem.

The goal of this operator is to number all the degrees of freedom of the problem. These degrees of freedom are those carried by the elementary matrices calculated by the operator `CALC_MATR_ELEM(lme1)`.

Because of dualisation of the conditions "kinematics", the degrees of freedom of Lagrange are carried by `matr_elem` calculated by the option `'RIGI_MECA'`(or `'RIGI_THER'`,...) on the loads where the conditions kinematics are defined.

It is thus important to give in `lme1`, the list of all them `matr_elem` of "rigidity" and not to forget the loads in the operator `CALC_MATR_ELEM` [U4.61.01].

4.3 Operand `METHOD`

This operand is used to choose the method of resolution which one will apply to the future linear systems which will be built on `nume_ddl` product by this order. See the documentation of the keyword `SOLVEUR` [U4.50.01]

```
/ 'MULT_FRONT' method "multi_frontale" without swivelling  
/ 'MUMPS'      method "multi_frontale" with swivelling  
/ 'LDLT'      factorization of the type LU without swivelling  
/ 'GCPC'      conditioned pre combined gradient  
/ 'PETSC'     access to the iterative solveurs of the PETSc library
```

4.4 Operand `RENUM`

See the documentation of the keyword `SOLVEUR` [U4.50.01]

4.5 Operand INFORMATION

◇ INFORMATION =

- / 1 on the file MESSAGE.
- full number of degrees of freedom, many nodes,
- number of degrees of freedom LAGRANGE,
- maximum height a column (and average height),
- many terms stored (for storage 'MORSE'),
- many blocks (for line storage of sky),
- information concerning the renumerotation.

5 Examples

See the examples in the order TO SOLVE [U4.55.02]