Operator CHAINAGE_THM

1 Goal

To calculate the variables of order for the resolution by chaining in THM.

This order creates the fields necessary to be able to carry out the resolution by a method by chaining, different from the traditional method by strong coupling of the equations (cf “Note of use of module THM” [U2.04.05] for more details on the resolution of problems THM). This method applies more particularly to the slightly coupled problems.

This order is used in 2 directions:

- mechanics towards hydraulics: product a structure of the type evol_varc. From the field of mechanical displacements known on the mechanical grid, one from of deduced the nodal voluminal deformation at the 2 last moments from the mechanical result. One projects then this nodal voluminal deformation on the hydraulic grid.

- hydraulics towards mechanics: starting from the field of pressure known on the hydraulic grid, one projects this field of pressure on the mechanical grid.
  - product a structure of the type cham_no, if mechanical calculation is carried out with MECA_STATIQUE
  - product a structure of the type evol_varc , if mechanical calculation is carried out with STAT_NON_LINE

Beforehand, the user must have calculated the matrices of projection allowing to save time in the phases of projection between the grids mechanics and hydraulics.

2 Syntax

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chproj [evol_varc, cham_no] = CHAINAGE_THM  (

♦  TYPE_CHAINAGE    =      /   'HYDR_MECA',                          [TXM]
                           /   'MECA_HYDR',
                           /   'INIT',

# If TYPE_CHAINAGE=' INIT'

♦  MODELE_MECA      =   "mechanical model"                  /   [model]
♦  MODELE_HYDR      =   "hydraulic model"                /   [model]
♦  MATR_MH    =   "matrix of projection for the mechanical direction towards hydraulics",
                  [corresp_2_mailla]
♦  MATR_HM1   =   "1st matrix of projection for the hydraulic direction towards mechanics",
                     [corresp_2_mailla]
♦  MATR_HM2   =   "2nd matrix of projection for the hydraulic direction towards mechanics",
                        [corresp_2_mailla]

# If TYPE_CHAINAGE=' MECA_HYDR'

 ♦ RESU_MECA =   "result of mechanical calculation to chain towards hydraulics"
                                                          /   [evol_elas]
                                                          /   [evol_noli]

♦  MODELE_HYDR   =   "hydraulic model of arrival"
                                                          /   [model]

♦  MATR_MH    =   matproj,                                [corresp_2_mailla]

♦  INST    =   inst,                                      [R]


# If TYPE_CHAINAGE=' HYDR_MECA'

♦   RESU_HYDR =   "result of hydraulic calculation to chain towards mechanics"
                                                          /   [evol_noli]

♦  MODELE_MECA   =   "mechanical model of arrival"
                                                          /   [model]

♦  MATR_HM1   =   "1st matrix of projection",          [corresp_2_mailla]
♦  MATR_HM2   =   "2nd matrix of projection",          [corresp_2_mailla]

♦  TYPE_RESU     =   /   'EVOL_VARC',                        [TXM]
                     /   'CHAM_NO',
◊  INST    =   inst, (obligatory if TYPE_RESU=' EVOL_VARC')  [R]

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

3 Operands

3.1 Operand TYPE_CHAINAGE

♦ TYPE_CHAINAGE = / 'INIT',
/ 'HYDR_MECA',
/ 'MECA_HYDR',

The first operation to be made within the framework of chaining THM is to calculate the matrices of projection to save time on the many projections carried out inside the macro-order. This operation is done by 'INIT' . The user must then give the models mechanics and hydraulics used by the keywords MODELE_MECA and MODELE_HYDR . At exit 3 matrices are produced, under the keywords MATR_MH (for the mechanical direction towards hyraulic) , MATR_HM1 and MATR_HM2 (for the hydraulic direction towards mechanics) .

Then, it can pass to the phase of chaining itself. There are thus two directions of passage: mechanics towards hydraulics or of hydraulics towards mechanics.

If one informs RESU_HYDR, one will choose TYPE_CHAINAGE=' HYDR_MECA'.
If one informs RESU_MECA, one will choose TYPE_CHAINAGE=' MECA_HYDR'.

3.2 Operand RESU_MECA

♦ RESU_MECA = resu

Name of the mechanical result which one seeks to chain.

3.3 Operand RESU_HYDR

♦ RESU_HYDR = resu

Name of the hydraulic result which one seeks to chain.

3.4 Operand MODELE_MECA

♦ MODELE_MECA = resu

Name of the mechanical model of arrival.

3.5 Operand MODELE_HYDR

♦ MODELE_HYDR = resu

Name of the hydraulic model of arrival.

3.6 Operand TYPE_RESU

♦ TYPE_RESU = / 'EVOL_VARC',
/ 'CHAM_NO',

Type of the result returned by the order. Obligatory if TYPE_CHAINAGE=' HYDR_MECA' or 'MECA_HYDR'
The user will always choose EVOL_VARC, except in case TYPE_CHAINAGE=' HYDR_MECA', with a mechanical resolution carried out then by MECA_STATIQUE.

3.7 Operand INST

◊ INST = inst

Moment to which one wishes to calculate the variable of ordering of the chaining. Obligatory in all the cases, except if TYPE_CHAINAGE=' HYDR_MECA', with a mechanical resolution carried out then by MECA_STATIQUE.

3.8 Operand MATR_MH

♦ MATR_MH = matproj

This keyword is used for the mechanical direction towards hydraulics.
This keyword is useful to save time on the phases of projection. matproj must be beforehand calculated. That avoids recomputing the structure of data corresp_2_mailla between the grids mechanics and hydraulics if those remain constant in the course of time (what is in practice often the case, apart from the case of the adaptive grids).

The concept is produced in the case of TYPE_CHAINAGE=' INIT' , then re-used like concept of entry in the case TYPE_CHAINAGE=' MECA_HYDR' .

3.9 Operands MATR_HM1 and MATR_HM2

♦ MATR_HM1 = matproj1
♦ MATR_HM2 = matproj2

Keywords MATR_HM1 and MATR_HM2 function of par.
These keywords are useful to save time on the phases of projection. Matproj1 and matproj2 must be calculated beforehand. That prevents recomputing the SD corresp_2_mailla between the grids hydraulics and mechanics if those remain constant in the course of time (what is in practice often the case, apart from the case of the adaptive grids).

The concepts are produced in the case of TYPE_CHAINAGE=' INIT' , then re-used like concepts of entry in the case TYPE_CHAINAGE=' MECA_HYDR' .

3.10 Operand INFORMATION

◊ INFORMATION = / 1,
/ 2,

Parameter of impression