Titre : Opérateur CHAINAGE_THM
Responsable : GRANET Sylvie

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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.

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2   Syntax

```
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,
```
                                              )
```

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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`.

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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