

Operator IMPR_MAIL_YACS

1 Goal

The object of this order is to recover (*via* YACS) data of the fluid grid to the interface fluid-structure and to generate the files grids corresponding to the native format of grid of *Code_Aster*.

This operator is used by the macro-order `CALC_IFS_DNL` (*cf.* U7.06.01 documentation) which allows calculations fluid-structures coupled in non-linear transitory mode. For that, one comes to couple *Code_Aster*, for the structure part, with *Code_Saturne*, for the fluid field, thanks to supervisor YACS of Salomé.

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2 Syntax

```
IMPR_MAIL_YACS (
    ◇ UNITE_MAILLAGE = / 30 , [DEFECT]
                    / ulmail ,
    ◆ TYPE_MAILLAGE = / 'TOP' ,
                    / 'MEDIUM' ,
    ◇ INFORMATION = / 1 ,
[DEFECT]
                    / 2 ,
)
```

3 Principle of operation

Method of coupling for the interaction fluid-structure based on *Code_Aster* and *Code_Saturne* require the data exchange between these codes. Indeed, it is not about a monolithic approach where all the coupled problem would be solved in a single computer code: one couples two codes, each one being confined with his speciality. This coupling is managed by the order `CALC_IFS_DNL` (U7.06.01).

All the data to be exchanged use protocol YACS of Salomé.

These data can be of two different nature:

- parameters of smalls (of the scalars, for example),
- fields (grids, displacements, speeds or efforts with the interfaces, for example).

In order to keep a good modularity, favourable with the evolutions, different operators were thus developed, each one treating one of the types of data to be exchanged.

The scalar data are handled by `RECU_PARA_YACS` (U7.08.01), fields by `ENV_CINE_YACS` (U7.07.01) and `MODI_CHAR_YACS` (U7.08.02) or the operator `IMPR_MAIL_YACS` who recovers, *via* YACS, fluid grids of the interfaces. All these orders are called by `CALC_IFS_DNL`.

To be able to exchange the fields with the interface fluid-structure, grids being incompatible and techniques of space discretization being even different (EF in *Code_Aster* and VF in *Code_Saturne*), intermediate stages of projections must be introduced.

Since these stages of projections are done everything in *Code_Aster* (with the operator `PROJ_CHAMP`), it is essential to recover the definition of the fluid grid to the interface fluid-structure. The operator `IMPR_MAIL_YACS` that allows, by data exchange with YACS, and it generates at exit a file containing the grid of the fluid interface, with the native format *Code_Aster*.

This grid can then be read again classically with `LIRE_MAILLAGE`.

In practice, the macro-order `CALC_IFS_DNL` fact two distinct calls to `IMPR_MAIL_YACS`. Indeed, for projections of fields, one must have two grids for the interface with the fluid field: grid of the nodes tops and that of the nodes mediums of the faces.

4 Keyword `UNITE_MAILLAGE`

This keyword allows to choose the logical number of unit `ulmail` corresponding to the file of grid which will be generated. The value by default is 30.

5 Keyword `TYPE_MAILLAGE`

This keyword makes it possible to define which nature of grid is considered:

- grid of the nodes tops (`TYPE_MAILLAGE = 'TOP'`),
- or that of the nodes mediums of the faces (`TYPE_MAILLAGE = 'MEDIUM'`).

In the operator `CALC_IFS_DNL`, one uses successively these two options and that generates thus two grid different (it is thus necessary well to specify two distinct logical units).

The first grid is used for to project the fields defined in the nodes tops, therefore the fields kinematics, the second to project the efforts coming from the fluid and which are definite constant by face.