

Interface of the file of grid IDEAS with Aster

Summary:

The purpose of this document is to describe the principle of the interface `IDEAS` (SDRC) with `Aster`.

This interface is activated in `Aster` by the procedure `PRE_IDEAS` [U7.01.01].

Datasets of universal file I-DEAS^{MT} read again by interface IDEAS-Aster are the dataset 151 (title), the datasets 15.781 or 2411 (coordinates of the nodes), the datasets 71.780 or 2412 (description of the meshes), the datasets 752,2417,2429,2430,2431,2432,2435 or 2467 (groups of nodes or meshes) and the dataset 735 (nodes or meshes attached to the curves, meshes area and meshes volume).

So versions I-DEAS^{MT} currently supported are versions 4.5 and 6 as well as versions 1. , 2. , 3. , 4. , 5. , 6. , 7. , 8. , 9. and 10. of Master degree Series.

1 Vocabulary IDEAS

``geometry'`

together of geometrical entities on which the grid is based. They can be curves (``curve'`) surfaces (``mesh area'`), volumes (``mesh volume'`).

``curve'`

linear geometrical entity being able to be made up of under-entities, segments, arcs of a circle, options. The meshes which are based on these under-entities are segments with 2 or 3 nodes.

``mesh area'`

geometrical entity surface broadside by ``curves'` on which the meshes of surface rest: triangles with 3 or 6 nodes or quadrangles with 4 or 8 nodes.

``mesh volume'`

geometrical entity voluminal broadside by ``mesh areas'`. The meshes of volume which are based on these under-entities are hexahedrons with 8 or 20 nodes, pentahedrons with 6 or 15 nodes or tetrahedrons with 4 or 10 nodes.

``group'`

an unspecified grouping (chosen by the user) of geometrical entities, nodes or meshes; the user gives him a name.

``universal file'`

the formatted file produces by IDEAS constitute the data file of the interface. It contains all the grid (nodes and meshes), the geometrical entities, the geometrical groups and associations entities - grid.

``geometrical association entity - grid'`

list of nodes or meshes being based on a given geometrical entity.

- for each ``curve'`, the nodes which compose it,
- for each ``mesh area'` :
 - the nodes which compose it,
 - in 2D the meshes which compose it.
- for each ``mesh volume'` :
 - nodes and the meshes which compose it.
 - the nodes which compose it,
 - in 3D the meshes which compose it.

2 Goal of the interface of grid

Contained information in the universal file IDEAS (for the versions 4.5 and 6 and them versions 1. , 2. , 3. , 4. , 5. , 6. , 7. , 8. , 9. and 10. of Master degree Series) are retranscribed in the file of grid. That relates to in particular the coordinates of the nodes, the meshes, the groups of nodes and meshes. They are generally simple transfers of subfiles, except for the meshes where a permutation of the nodes is necessary.

The names created by the interface are:

- for nodes : NO follow-up of the number of node IDEAS,
- for meshes : MY follow-up of the number of element IDEAS.
The meshes are gathered in subfiles of the homogeneous type: SORTED. , QUAD. , TETRA. , PENTA. , HEXA.
- for the groups of nodes or meshes created by the user and named in IDEAS, the name is simply retranscribed **in capital letters** :
 - 8 alphanumeric with the maximum (if not truncation of the name),
 - the underlined white is allowed.

Note:

The name of the group cannot start with " COUL_ "if not he is ignored by the interface (a message of alarm informs the user of it).

- in IDEAS, one can assign a color to each generated mesh (by defaults, the meshes are of green color). The colors are located by a number (for example 7 for the green). To keep this information in Aster, the interface PRE_IDEAS can generate groups of meshes of name COUL_ n° color IDEAS containing all the meshes of color "n° color IDEAS". To generate these groups of meshes, the user must explicitly ask it by CREA_GROUP_COUL = 'yes' in the order PRE_IDEAS.

Without explicit request of the user, these groups of meshes are not create in order to limit the number of groups of meshes and unnecessarily not to increase the size of the file of grid.

From geometrical associations entities - grid, the interface built:

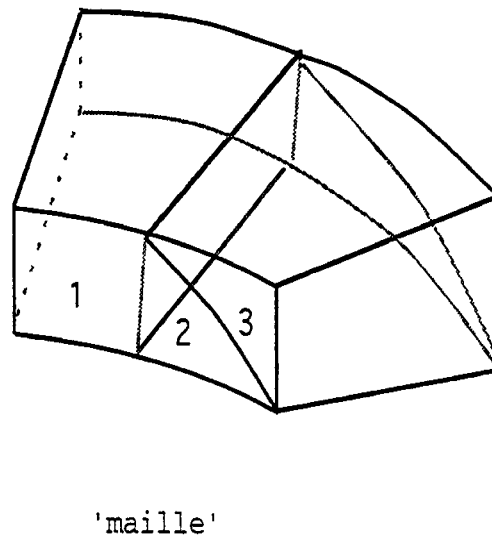
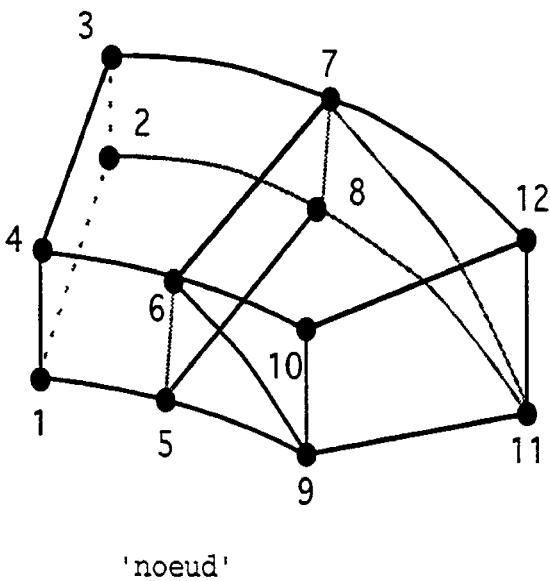
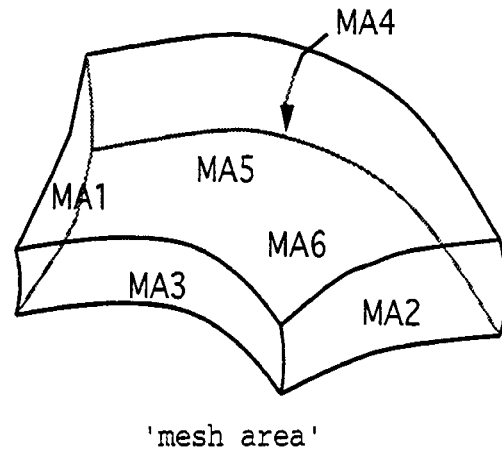
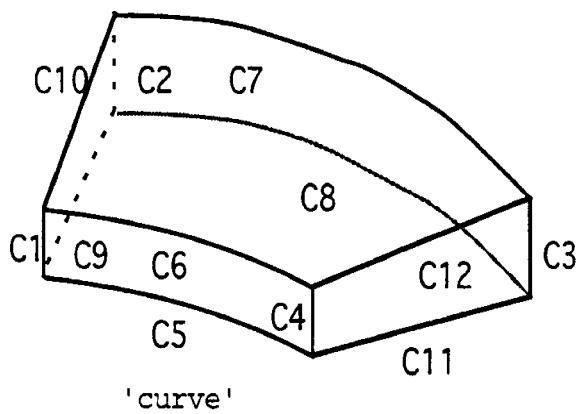
- GROUP_MA associated with 'mesh volume' in 3D or with 'mesh area' in 2D. They are called M_VOLU_i or M_AREAI for the geometrical entity of origin, number I.
- GROUP_NO associated with 'mesh volume', 'mesh area' or 'curve', which bears the names M_VOLU_i, M_AREAI, CURVE_i according to the cases.

Note:

mesh area and them mesh volume do not exist any more in versions 1. , 2. , 3. , 4. , 5. , 6. , 7. , 8. , 9. and 10. of Master degree Series. The user must thus take care to define the groups of nodes and the groups of meshes which it needs for his study.

The interface of grid (PRE_IDEAS) does not retranscribe the boundary conditions and loadings possibly present in the universal file.

3 Example: Grid IDEAS



There exists also the group of nodes
FACE_INF 1 2 5 8 9 11

File grid Aster product by the operator PRE_IDEAS

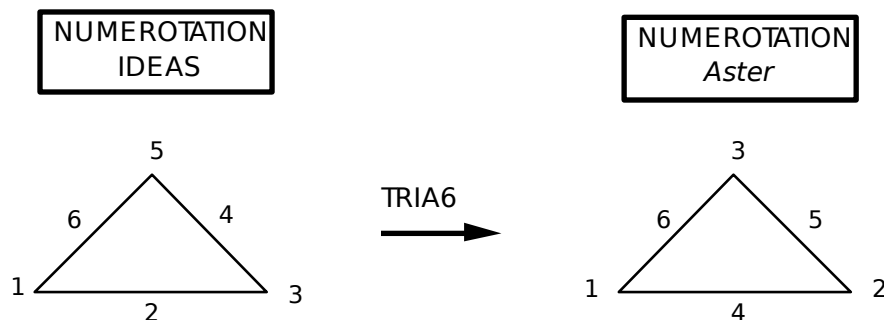
```
COOR_3D
  NO1   x1   y1   z1
  ...   ...   ...   ...
  NO12  x12  y12  z12
FINSF
HEXA8
  MA1   NO1   NO5   NO8   NO2   NO4   NO6   NO7   NO3
FINSF
PENTA6
  MA2   NO5   NO9   NO6   NO8   NO11  NO7
  MA3   NO6   NO9   NO10  NO7   NO11  NO12
FINSF
GROUP_NO NAME = FACE_INF
  NO1     NO2   NO5   NO8   NO9   NO11
FINSF
GROUP_NO NAME = CURVE1
  NO1     NO4
FINSF
...      ...      ...      ... others GROUP_NO for CURVE2 with CURVE11
GROUP_NO NAME = CURVE12
  NO10    NO12
FINSF
GROUP_NO NAME = M_AREA1
  NO1     NO2   NO3   NO4
FINSF
...      ...      ...      ... others GROUP_NO for M_AREA2 with M_AREA5
GROUP_NO NAME = M_AREA6
  NO1     NO5   NO9   NO11  NO8   NO2
FINSF
GROUP_NO NAME = M_VOLU1          % totality of the nodes
  NO1 ... .. .. NO12
FINSF
GROUP_MA NAME = M_VOLU1          % totality of the meshes
  MA1     MA2   MA3
```

4 Local classification of the meshes of IDEAS and Aster

Notice preliminary :

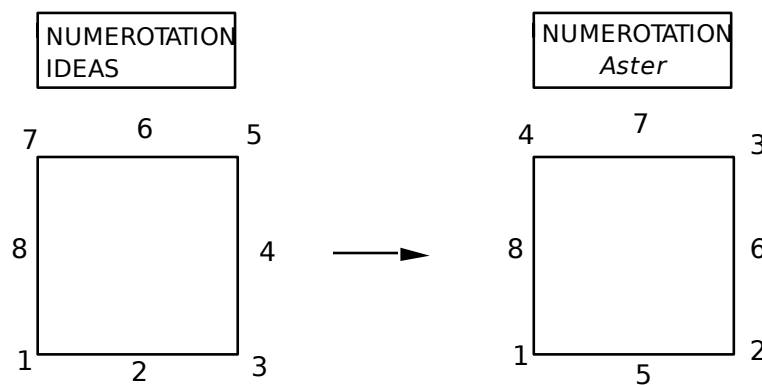
The numbers being reproduced on the diagrams which follow are the local numbers of the nodes.

4.1 Classification of TRIANGLES (TRIA6)



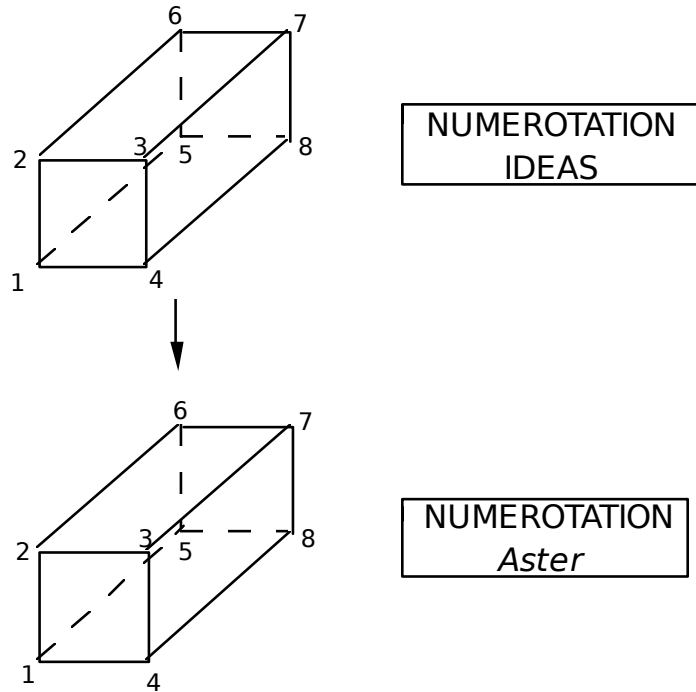
4.2 Classification of QUADRANGLES (QUAD8)

Meshes of the type QUAD9 are not available in IDEAS

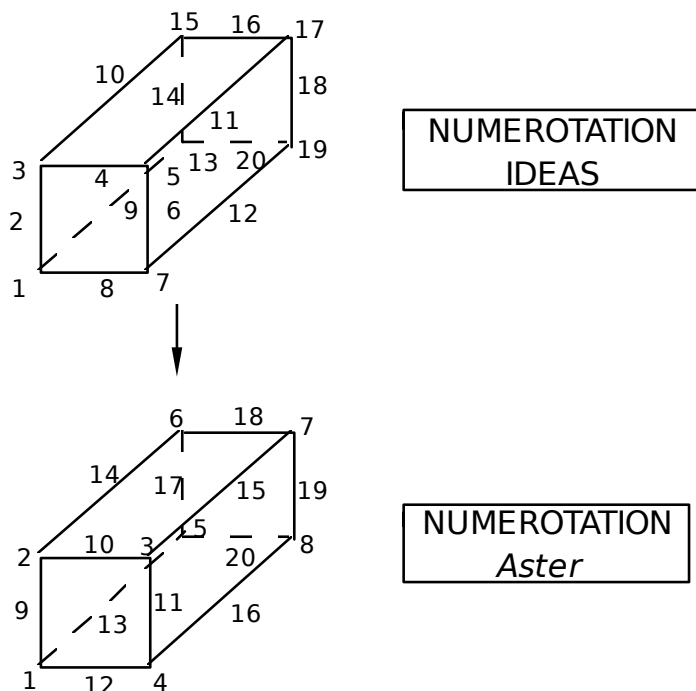


4.3 Classification of HEXAHEDRONS (HEXA8 - HEXA20)

4.3.1 HEXA8

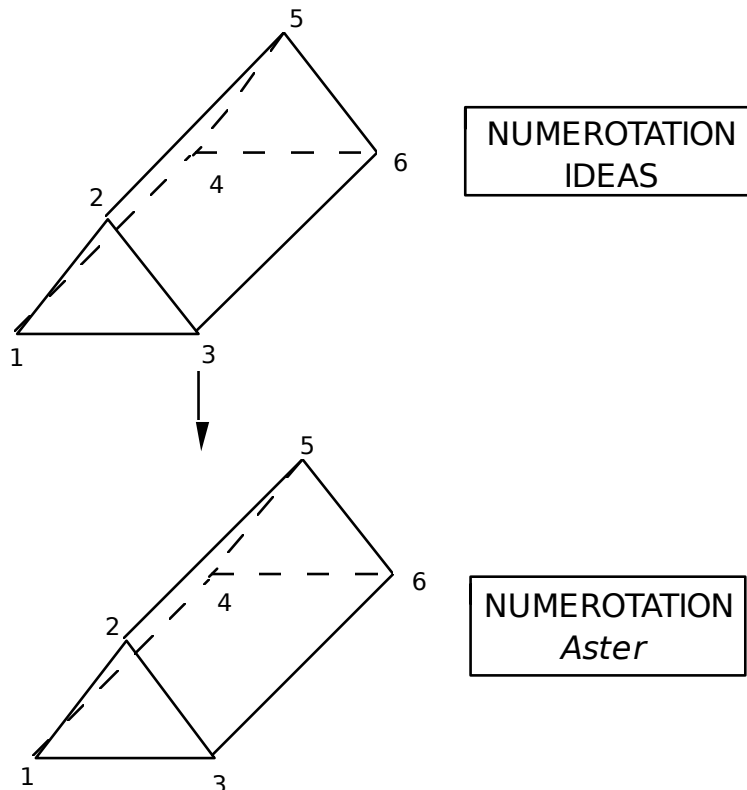


4.3.2 HEXA20

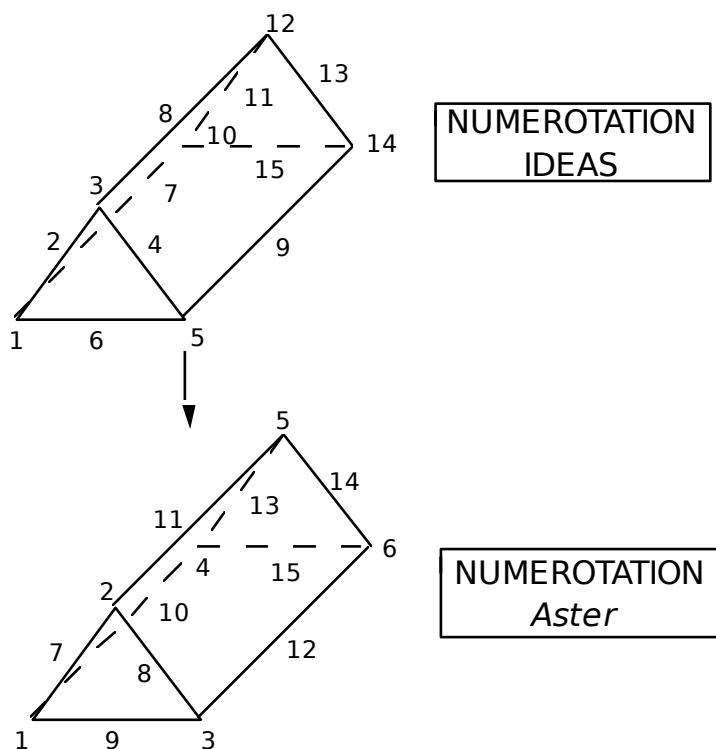


4.4 Classification of PRISMS (PENTA6 - PENTA15)

4.4.1 PENTA6

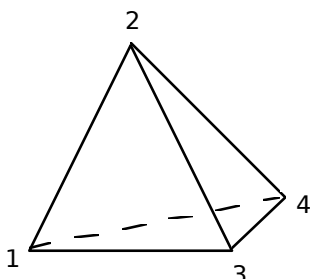


4.4.2 PENTA15

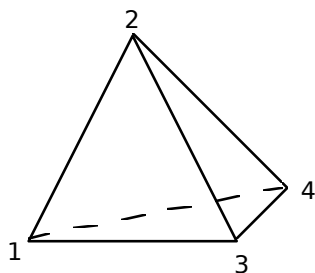


4.5 Classification of TETRAHEDRONS (TETRA4 - TETRA10)

4.5.1 TETRA4

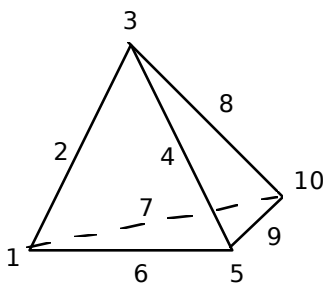


NUMEROTATION
IDEAS

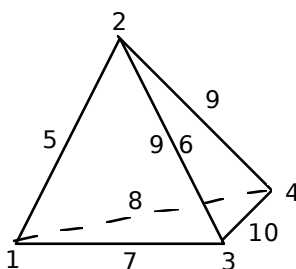


NUMEROTATION
Aster

4.5.2 TETRA10



NUMEROTATION
IDEAS



NUMEROTATION
Aster

5 Frames of reference

The interface `IDEAS-Aster` transcribes only the grids whose nodes are defined by coordinates in Cartesian reference mark.