

## ZZZZ161 - Exchange with med format, data-processing control

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### Abstract:

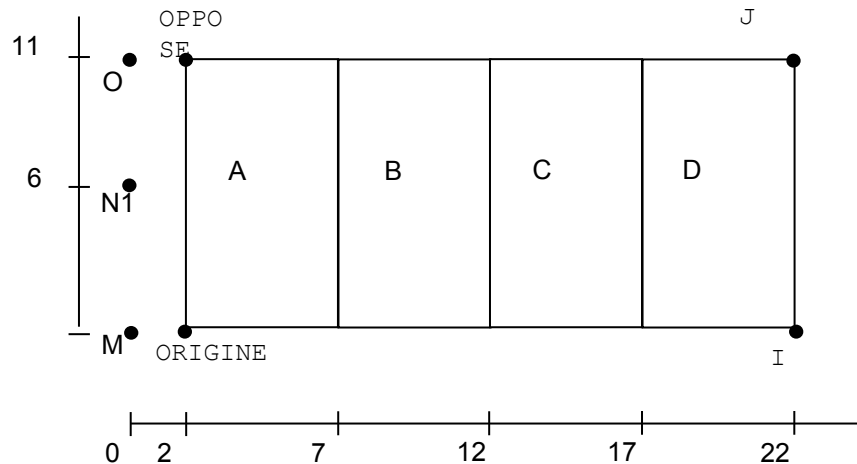
This case test controls the writings of fields to med format and their relecture by ASTER. It validates in particular the writing of fields nondefinite on the complete field or definite on several element types. It also controls the exchange of fields of variables.

It should be noted that mechanical computation is only one pretext and does not have any ambition of validation in oneself.

## 1 Problem of reference

### 1.1 Geometry

the field is a rectangle of size  $10 \times 20$ , separate in 4 slices of  $10 \times 5$ . 3 points are associated with this rectangle:  $M$ ,  $N$  and  $O$ .



### 1.2 Properties of the material

Two materials are used:

The material 1 has the following characteristics:

$$E = 180\,000 \text{ N.m}^{-2}$$

$$\nu = 0,3$$

$$\alpha = 1,5 \cdot 10^{-7}$$

$$\rho = 7700 \text{ kg.m}^{-3}$$

It is applied in the slices  $A$  and  $B$ .

The second material has the following characteristics:

$$E = 220\,000 \text{ N.m}^{-2}$$

$$\nu = 0,3$$

$$\alpha = 1,6 \cdot 10^{-7}$$

$$\rho = 8300 \text{ kg.m}^{-3}$$

It is applied in the slices  $C$  and  $D$ .

### 1.3 Boundary conditions and loadings

At the point  $ORIGINE$ , displacement is null according to  $y$ .

On all left edge, i.e. between the points  $ORIGINE$  and  $J$  normal displacement is null.

On higher edge, i.e. between the points  $J$  and  $OPPOSE$ , the pressure is imposed on 1000.

## 1.4 Initial conditions

Without object.

## 2 Reference solution

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### 2.1 Method of calculating used for the reference solutions

The computation is in static mechanics. It is only one pretext required one result.

### 2.2 Results of reference

To the node *OPPOSE*, displacement has the following values:

$$u_x = 0,4183044 \quad u_y = 1,639849$$

### 2.3 Uncertainty on the solutions

Without object.

## 3 Modelization A

### 3.1 Characteristic of the modelization

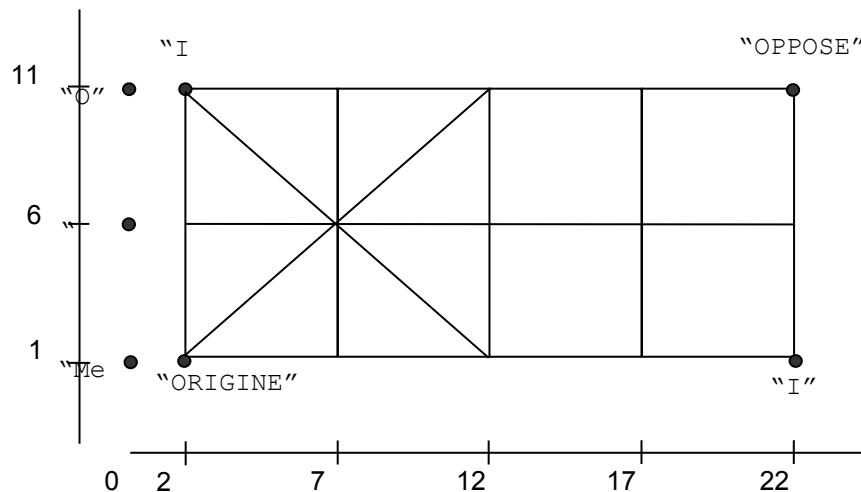
The computation is made in two-dimensional static mechanics, in plane strain.

### 3.2 Characteristics of the mesh

the slices *A* and *B* are with a grid with 8 triangles TRIA3. They form the named mesh group "SORTED". The slices *C* and *D* are with a grid with 4 quadrangles QUAD4. They form the mesh group named "QUAD".

The 4 triangles of the slice *B* and the 2 quadrangles of the slice *C* are gathered in group "MILIEU".

The external frontier segments are with a grid with 12 segments SEG2. They are gathered in 4 named groups BORD\_INF BORD\_DRO , BORD\_SUP and BORD\_GAU .



### 3.3 Functionalities tested

This case tests the various options of writing to format "MED" via command IMPR\_RESU. For that we calculate various options complementary to the only displacement and we create a field of variables equivalent to the field of displacement to the nodes. The printings are successively those:

- the field of displacement to the nodes and the stress field with Gauss points, expressed on all the mesh. That starts the creation of a profile for displacement because it is not defined everywhere: the three nodes *M*, *N* and *O* do not comprise a value,
- the field of variables. It uses the same profile as the field of displacement of result standard,
- components "SIXY" and "SIYY" of the stress field to the nodes by element "SIGM\_ELNO",
- error indicator "ERRE\_ELGA\_NORE" on meshes of the group *MILIEU*. That starts the creation of two profiles because the written values are not it on all meshes. The first profile relates to the 4 triangles out of the 8 of the total; the second relates to the 2 quadrangles out of the 4 of the total.

The relecture since format "MED" is that of the field of displacement to the nodes contained in the field of variables.

## 4 Results of the modelization A

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### 4.1 Values tested

the comparison takes place on the value of displacement to the node "OPPOSES" with a relative tolerance of  $10^{-4}\%$ .

Identification	Value	relative Variation in %
$u_x$	0,4183044	1,55 10 <sup>-7</sup>
$u_y$	- 1,639849	2,71 10 <sup>-5</sup>

## 5 Summary of the results

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No particular comment is to be made on this case test. It is only used to ensure the perennality of the writings and readings med format.