

## MUMPS05 - Validation of solver MUMPS in parallel with a centralized matrix

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### Summary:

This test validates the solver MUMPS in parallel with a matrix centralized under various configurations:

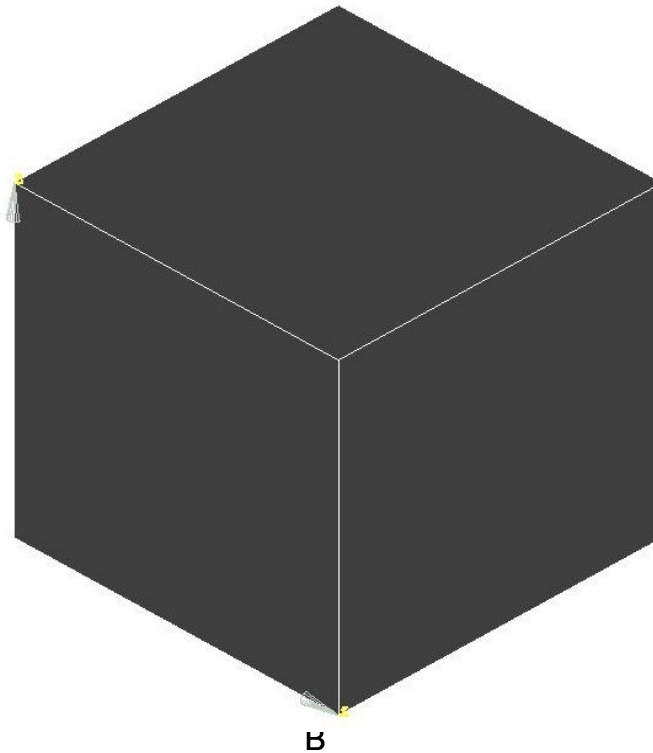
- Modification of the value of the keyword DISTRIBUTION/METHODE (CENTRALISEE, MAIL\_DISPERSER, under-fields);
- The balancing of load via the keyword CHARGE\_PROC0\_MA/SD and on character IN\_CORE/OUT\_OF\_CORE;
- Renuméroteurs METIS/SCOTCH.

## 1 Problem of reference

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### 1.1 Geometry

It is about a cube of 1 m of with dimensions.



### 1.2 Material properties

- $E = 1.0 E5 N / m^2$
- $\nu = 0.3$

### 1.3 Boundary conditions

A force  $F_z = 1.0 E4 N$  is exerted on the face defined by the group 'COTE\_H'.

Imposed displacements are:

- $DX = DY = 0$  in A
- $DY = 0$  out of B
- $DZ = 0$  on the face defined by the group 'COTE\_B'

## 2 Solution

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### 2.1 Sizes and results of reference

The reference variable used is displacement according to the axis X and centers it Z with node D.  
Displacement at the point C:  $DX=0, DY=0.1$

## 3 Modeling A

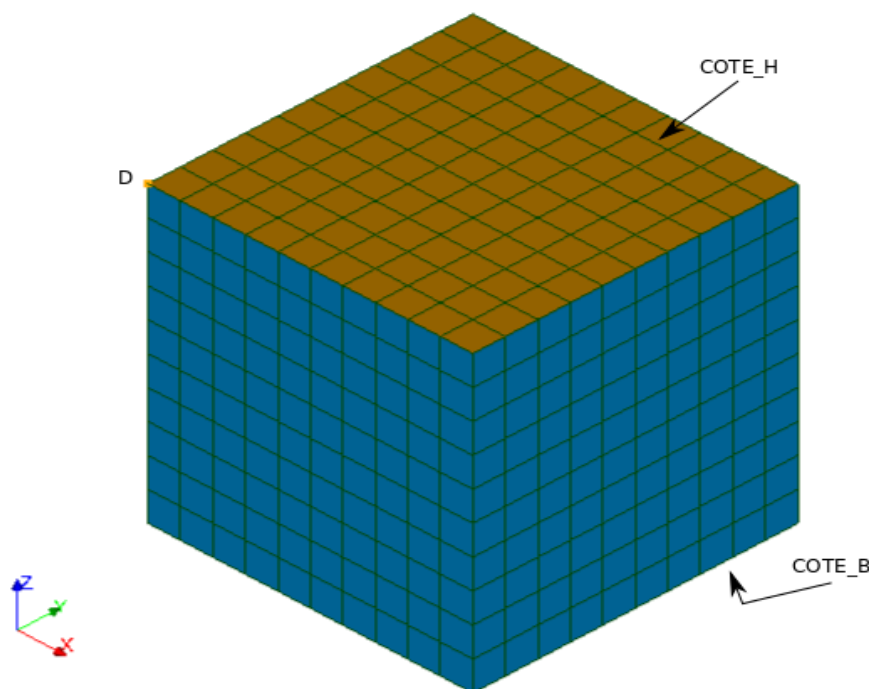
### 3.1 Characteristics of modeling A

A modeling is used 3D.

Many nodes 1331  
Many meshes 1720

That is to say:

SEG2	120
QUAD4	600
HEXA8	1000



### 3.2 Configurations of solveurs tested

Carried out into sequential:

- With dualized load and MUMPS CENTRALIZES + MONGREL + ACCELERATION='FR'/'FR+'/'LR'/'LR+'
- With dualized load and MUMPS CENTRALIZES + SCOTCH TAPE + ACCELERATION='FR'/'FR+'/'LR'/'LR+'
- With dualized load and MUMPS DISTRIBUTES by meshes automatic balancing of load
- With dualized load and MUMPS DISTRIBUTES by meshes balancing of load FORCE TO RELIEVE THE PROC 0
- With dualized load and MUMPS DISTRIBUTES by under-fields, automatic balancing of load,
- With dualized load and MUMPS DISTRIBUTES by under-fields, balancing of load forced to relieve the proc 0,
- With dualized load and MUMPS DISTRIBUTES by under-fields, with MATRICE\_DISTRIBUEE

## 4 Modeling B

### 4.1 Characteristics of modeling B

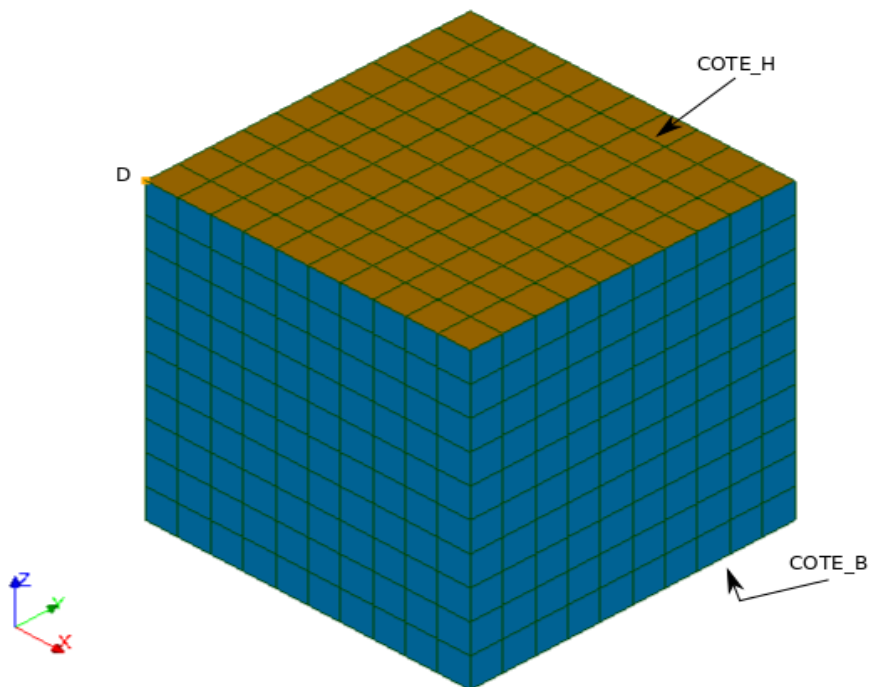
A modeling is used 3D.

Many nodes 1331

Many meshes 1720

That is to say:

SEG2	120
QUAD4	600
HEXA8	1000



### 4.2 Configurations of solveurs tested

Carried out into sequential:

- With dualized load and MUMPS CENTRALIZES
- With dualized load and MUMPS DISTRIBUTES by meshes automatic balancing of load

## 5 Modeling C

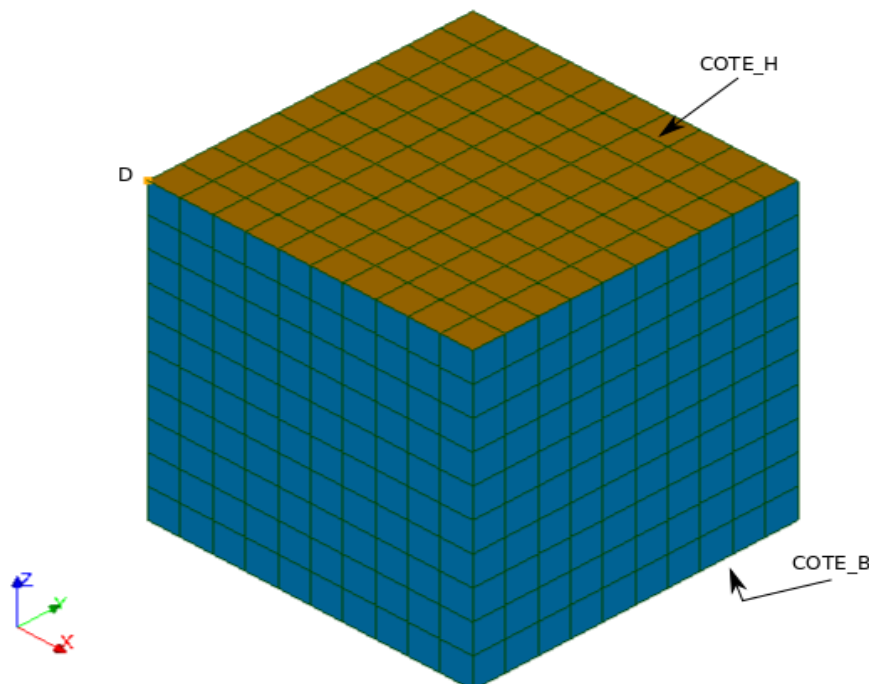
### 5.1 Characteristics of modeling C

A modeling is used 3D.

Many nodes 1331  
Many meshes 1720

That is to say:

SEG2	120
QUAD4	600
HEXA8	1000



### 5.2 Configurations of solveurs tested

Carried out in parallel on 8 CPU and 2 nodes:

- With dualized load and MUMPS CENTRALIZES + MONGREL
- With dualized load and MUMPS CENTRALIZES + SCOTCH TAPE
- With dualized load and MUMPS DISTRIBUTES by meshes automatic balancing of load
- With dualized load and MUMPS DISTRIBUTES by meshes balancing of load FORCE TO RELIEVE THE PROC 0
- With dualized load and MUMPS DISTRIBUTES by under-fields automatic balancing of load
- With dualized load and MUMPS DISTRIBUTES by under-fields balancing of load forcé to relieve the proc 0
- With dualized load and MUMPS DISTRIBUTES by under-fields with MATRICE\_DISTRIBUEE

## 6 Summary of the results

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This CAS-test shows the good performance of the solver MUMPS in the various studied cases.