
PETSC02 - Validation of PETSc with the distribution of the assembled matrix

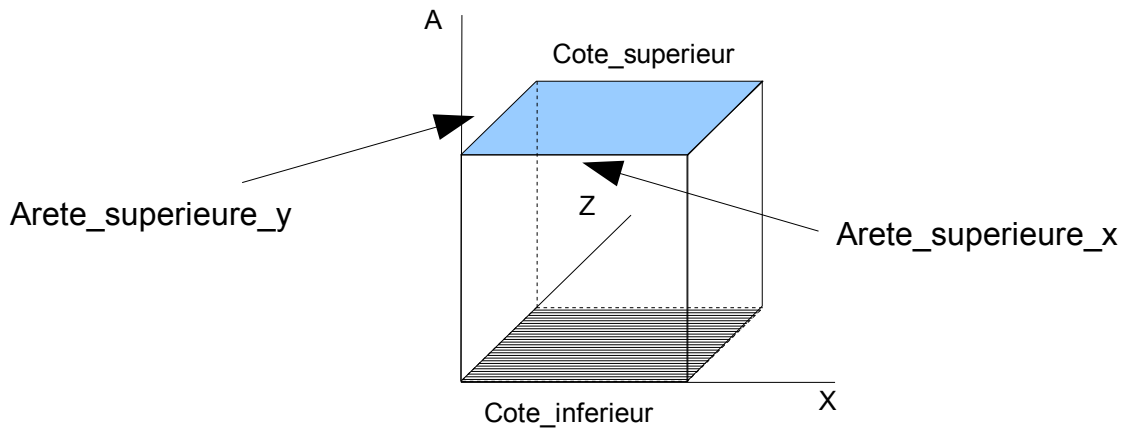
Summarized:

This benchmark makes it possible to validate the operation of solver `PETSC` with the distribution of the assembled matrix. It comprises three modelizations. Among them, two relate to the elimination of boundary conditions (`AFFE_CHAR_CINE`) and validate the use of multigrid pre-conditioners `m1` and `BOOMER`. The last rests in more on the dualisation of boundary conditions (`AFFE_CHAR_MECA`) and is used for the validation of pre-conditioner `LDLT_SP`.

In addition, each modelization validates all the modes of distribution of elementary computations (by groups of elements, by mesh).

1 Problem of reference

1.1 Geometry



the cube considered is there of size $1\text{m} \times 1\text{m} \times 1\text{m}$.

The point A has as coordinates: $(0, 0, 0,5)$

1.2 Properties of the material

- $E = 1,0 \cdot 10^{11} \text{ N/m}^2$
- $\nu = 0,3$

1.3 Boundary conditions and loadings

imposed Displacements:

Lower side: $DX = 0$, $DY = 0$ and $DZ = 0$,

higher Side : $DZ = 1$

2 Reference solution

2.1 Method of calculating used for the reference solution

the reference solution is of standard NON-regression.

2.2 Quantity and result of reference

the reference variables used are:

- average displacement following z on the Cote_superieur mesh group
- average displacement following x on the Arete_superieure_y mesh group
- following average displacement y on the Arete_superieure_x mesh group
- displacement following z to the point A .

3 Modelization A

3.1 Characteristic of the modelization

Modelization 3D :

Many nodes: 27
Number of meshes: 8 HEXA8

The modelization A uses AFFE_CHAR_CINE and pre-conditioner BOOMER. Each distribution of elementary computations is tested.

4 Modelization B

4.1 Characteristic of the modelization

Modelization 3D :

Many nodes: 27
Number of meshes: 8 HEXA8

The modelization B uses AFFE_CHAR_CINE and AFFE_CHAR_MECA as well as pre-conditioner LDLT_SP. Each distribution of elementary computations is tested.

5 Modelization C

5.1 Characteristic of the modelization

Modelization 3D :

Many nodes: 27
Number of meshes: 8 HEXA8

The modelization C uses AFFE_CHAR_CINE and pre-conditioner mL. Each distribution of elementary computations is tested.

6 Summary of the results

This benchmark shows the correct operation of solver `PETSC` with the distribution of the assembled matrix, whatever the elementary distribution, the boundary conditions and the preconditioners used.