

SSNV170 - Cubic in simple tension (constant strainrate)

Summarized:

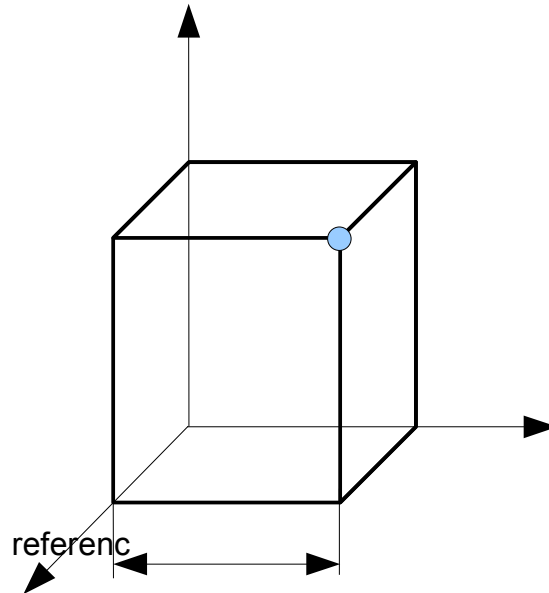
This case test makes it possible to implement an axial creep test. The two nonlinear modelizations simulate a simple traction test with a constant imposed strainrate. In the two modelizations, the tension is carried out on a cube modelled in 3D with a mesh HEXA8.

- Modelization A
- Use of the nonlinear behavior model viscoplasticity of Lemaître.

- Modelization b:
- Use of the cyclic behavior model of elastoplasticity of Taheri.

1 Problem of XZGLABCDEFHYGéométrie

1.1



the cube is in space $[0.,1.] \times [0.,1.] \times [0.,1.]$.

Coordinates of the points (m) :

$$A:(0., 0., 0.)$$

$$G:(1., 1., 1.)$$

Geometry of the cube

$$L=1$$

1.2 Properties of the Elastic

•material

• $E=200.0 \times 10^3 Pa$ Young Modulus

• $\nu=0.3$ Lemaitre

•Poisson's ratio

• $n=10.8$; $\frac{1}{K}=6.9 \times 10^{-4}$; $\frac{1}{m}=0.102$

•Taheri

• $R_0=0.001$

• $\alpha=0.$

• $m=1.$

• $A=0.$

• $b=0.$

• $C_1=0.$

• $C_\infty=0.$

Warning : The translation process used on this website is a "Machine Translation". It may be imprecise and inaccurate in whole or in part and is provided as a convenience.

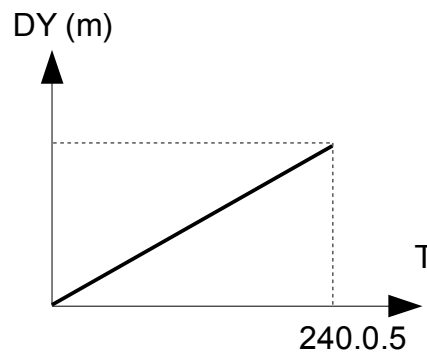
- $S=900$.

1.3 Boundary conditions and loadings

imposed Displacement (m) :

- face $ABCD$: $DZ=0$
- face $AEHD$: $DY=0$
- face $BFGC$: $DY=0.5$
- face $ABFE$: $DX=0$

The displacement DY imposed on the face $BFGC$, varies gradually according to the function presented on the figure below.



2 Reference solution

2.1 Méthode de calcul used for the reference solutions

the reference was obtained by comparison of the solutions between the two modelizations.

2.2 Variable reference

•Forced $SIYY$ to the point G

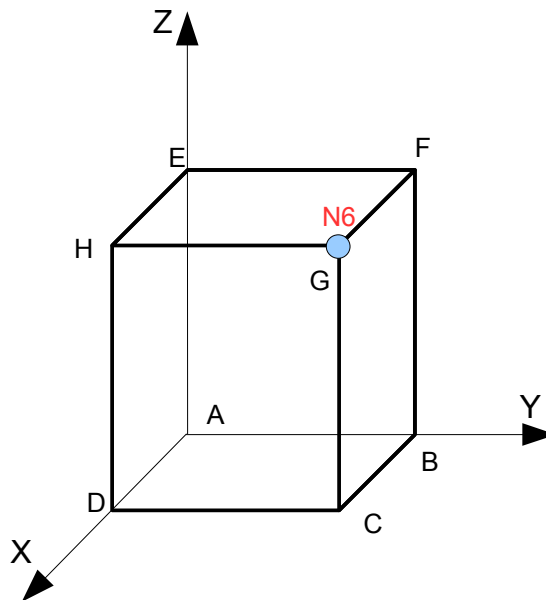
2.3 Result of reference

| Quantity | time | Not | Reference |
|-------------|------|-----|-----------|
| $SIYY (Pa)$ | 40 | G | 632.29325 |
| | 240 | G | 761.7493 |

3 Modelization A

3.1 Characteristic of the modelization A

Modelization 3D,
Behavior model of LEMAITRE



| | | | | |
|------------------|---|-----|-------|---|
| Nombre of nodes | 8 | | | |
| Number of meshes | 6 | Is: | | |
| | | | QUAD4 | 5 |
| | | | HEXA8 | 1 |

Mesh groups

- *DEVANT* face *ABCD*
- *BAS* face *AEHD*
- *HAUT* face *BFGC*
- *GAUCHE* face *ABFE*

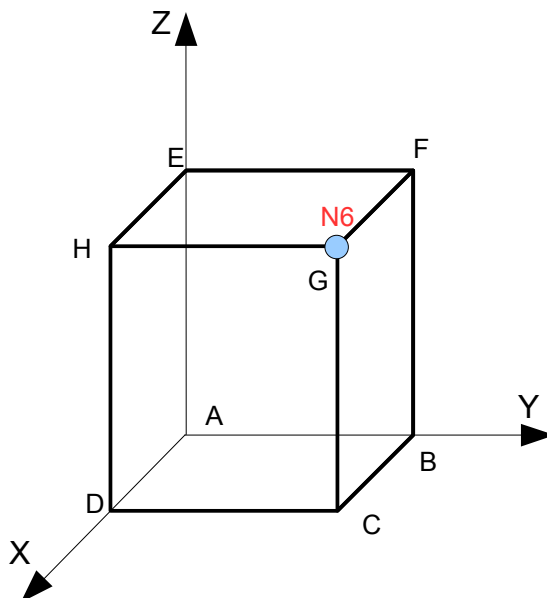
3.2 Quantities tested and results

| Quantity | time | Node | Reference | Aster | Variation (%) |
|------------------|------|-----------|-----------|-----------|---------------|
| <i>SIYY (Pa)</i> | 40 | <i>N6</i> | 632.29325 | 632.29325 | 9.19E-8 |
| | 240 | <i>N6</i> | 761.7493 | 761.7493 | -2.54E-7 |

4 Modelization B

4.1 Characteristic of the modelization B

Modelization 3D,
Behavior model of VISC_TAHERI



Nombre of nodes 8
Number of meshes 6 Is:
 QUAD4 5
 HEXA8 1

Mesh groups

- *DEVANT* face *ABCD*
- *BAS* face *AEHD*
- *HAUT* face *BFGC*
- *GAUCHE* face *ABFE*

4.2 Quantities tested and results

| Quantity | time | Node | Reference | Aster | Variation (%) |
|------------------|------|-----------|-----------|-----------|---------------|
| <i>SIYY (Pa)</i> | 40 | <i>N6</i> | 632.29325 | 632.29325 | 9.19E-8 |
| | 240 | <i>N6</i> | 761.7493 | 761.7493 | -2.60E-7 |

5 Summary of the results

the comparison between the results got by this benchmark and those of references is very satisfactory.