

SSNV170 - Cubic in simple traction (speed of constant deformation)

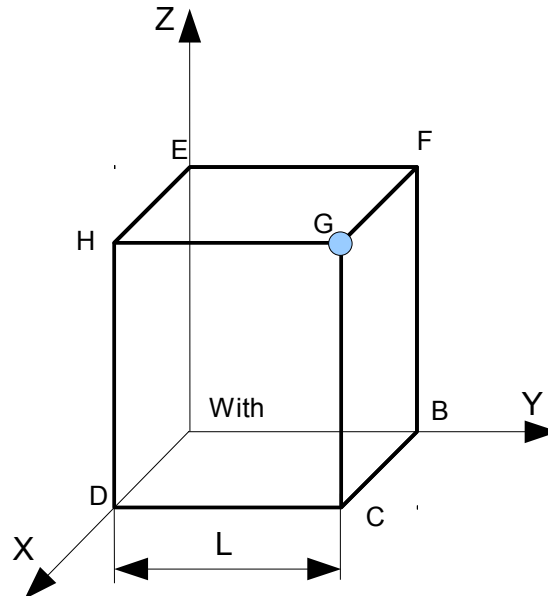
Summary:

This case test makes it possible to implement an axial creep test. Two non-linear modelings simulate a simple tensile test with a speed of constant imposed deformation. In two modelings, traction is carried out on a cube modelled in 3D with a mesh HEXA8.

- Modeling A
 - Use of the relation of nonlinear behavior viscoplasticity of Lemaitre.
- Modeling b:
 - Use of the relation of cyclic behavior of elastoplasticity of Taheri.

1 Problem of reference

1.1 Geometry



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 material

- Rubber band
 - $E=200.0 \times 10^3 Pa$ Young modulus
 - $\nu=0.3$ Poisson's ratio
- Lemaitre
 - $n=10.8$; $\frac{1}{K}=6.9 \times 10^{-4}$; $\frac{1}{m}=0.102$
- Taheri
 - $R_0=0.001$
 - $\alpha=0.$
 - $m=1.$
 - $A=0.$
 - $b=0.$
 - $C_1=0.$
 - $C_\infty=0.$

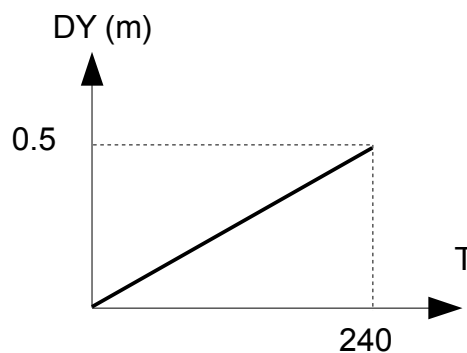
- $S=900$.

1.3 Boundary conditions and loadings

Imposed displacement (m) :

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

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



2 Reference solution

2.1 Method of calculating used for the reference solutions

The reference was obtained by comparison of the solutions between two modelings.

2.2 Reference variable

- Constraint $SIYY$ at the point G

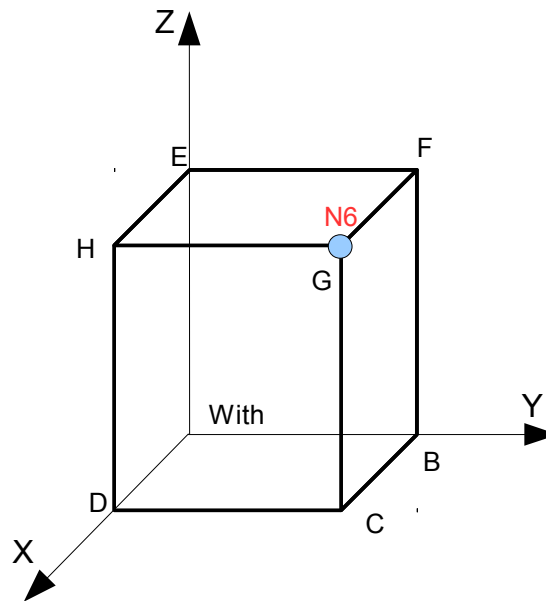
2.3 Result of reference

Size	moment	Not	Reference
$SIYY (Pa)$	40	G	632.29325
	240	G	761.7493

3 Modeling A

3.1 Characteristics of modeling A

Modeling 3D,
Relation of behavior of LEMAITRE



Many nodes	8	That is to say:	QUAD4	5
Many meshes	6		HEXA8	1

Groups of Meshs

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

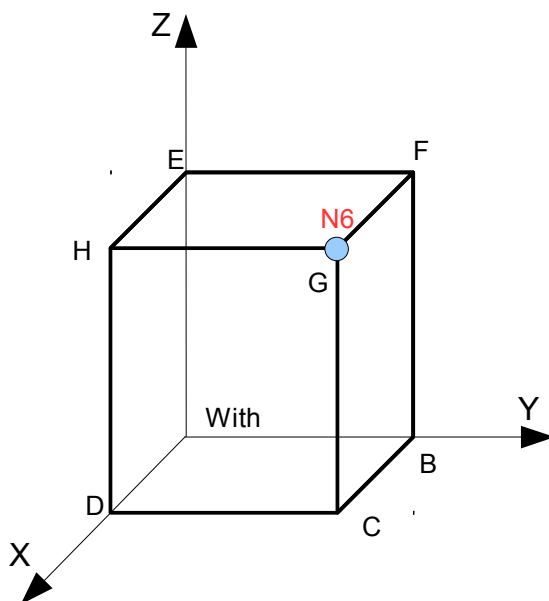
3.2 Sizes tested and results

Size	moment	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 Modeling B

4.1 Characteristics of modeling B

Modeling 3D,
Relation of behavior of VISC_TAHERI



Many nodes	8	
Many meshes	6	That is to say:
		QUAD4 5
		HEXA8 1

Groups of Meshes

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

4.2 Sizes tested and results

Size	moment	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 CAS-test and those of references is very satisfactory.