

SSNV211 - Triaxial compression test drained with the model VISC_DRUC_PRAG

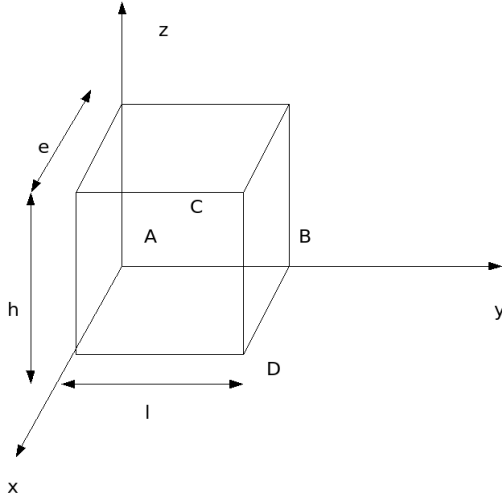
Summary

This test makes it possible to validate the model `VISC_DRUC_PRAG` based on the model élastoplastique Drucker-Prager. creep is taken into account by a law power of the Perzyna type. It is about a triaxial compression test in pure mechanics or drained condition. Calculations are carried out only on the solid part of the ground without hydraulic coupling. One applies a level of containment of 5 MPa . By reason of symmetry, one is interested only in the eighth of a sample subjected to a triaxial compression test. Modeling is axisymmetric.

It is about a test of nonregression.

1 Problem of reference

1.1 Geometry



height: $h = 1\text{ m}$
width: $l = 1\text{ m}$
thickness: $e = 1\text{ m}$

Coordinates of the points (in meters):

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
<i>x</i>	0.	0.	0.5	1.
<i>y</i>	0.	1.	0.5	1.
<i>z</i>	0.	0.	0.5	0.

1.2 Material property

elastic properties under the keyword ELAS:

$$E = 5000.0 \text{ in MPa}$$

$$\nu = 0.12$$

$$\alpha = 0.0$$

viscoplastic properties under the key VISC_DRUC_PRAG:

$$P_{ref} = 0.1 \text{ in MPa}$$

$$A = 1.5 \cdot 10^{-12} \text{ in } s^{-1}$$

$$n = 4.5$$

$$p_{pic} = 0.015$$

$$p_{ult} = 0.028$$

$$\alpha_0 = 0.065$$

$$\alpha_{pic} = 0.26$$

$$\alpha_{ult} = 0.091$$

$$R_0 = 1.3021 \text{ in MPa}$$

$$R_{pic} = 6.24808 \text{ in MPa}$$

$$R_{ult} = 1.30808 \text{ in Mpa}$$

$$\beta_0 = -0.15$$

$$\beta_{pic} = 0.$$

$$\beta_{ult} = 0.13$$

1.3 Initial conditions, boundary conditions, and loading

Phase 1:

One brings the sample in a homogeneous state: $\sigma_{xx}^0 = \sigma_{yy}^0 = \sigma_{zz}^0$, by imposing the corresponding confining pressure on the front, side right-hand side and higher faces. Displacements are blocked on the faces postpones ($u_x=0$), side left ($u_y=0$) and lower ($u_z=0$).

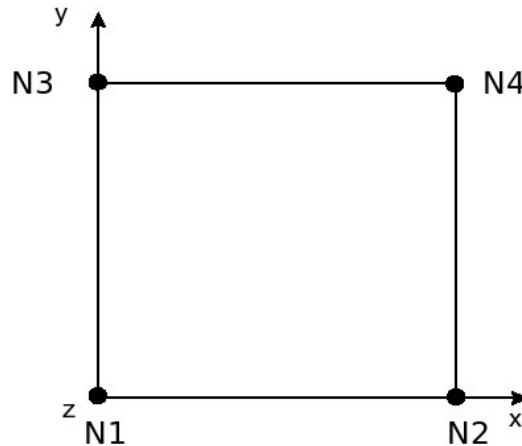
Phase 2:

One maintains displacements blocked on the faces postpones ($u_x=0$), side left ($u_y=0$) and lower ($u_z=0$), as well as the confining pressure on the front faces and side right-hand side. One applies a displacement imposed to the higher face: $u_z(t)$, in order to obtain a deformation $\varepsilon_{zz} = -6$.

2 Modeling A

2.1 Characteristic of modeling

2D_Axi :



Cutting: 1 in height, 1 in width.

Loading of phase 1:

Confining pressure: $\sigma_{xx}^0 = \sigma_{zz}^0 = -5 \text{ MPa}$

2.2 Characteristic of the grid

Many nodes: 4

Many meshes and types: 1 QUAD4 and 4 SEG2

2.3 Sizes tested and results

For $\sigma_{xx}^0 = \sigma_{zz}^0 = -5 \text{ MPa}$

Localization	Moment	Constraint (MPa)	Aster
Not N4	7000.	σ_{yy}	- 5,000
	13000.	σ_{yy}	- 11,667
Localization	Moment	Displacement	Aster
Not N4	7000.	DX	-7.6 10 ⁻⁴
	13000.	DX	3.4598 10 ⁻²

3 Summary of the results

It is about a test of nonregression developed to validate the model VISC_DRUC_PRAG in pure mechanics.