WTNV138 - Triaxial compression test not drained with the model VISC_DRUC_PRAG

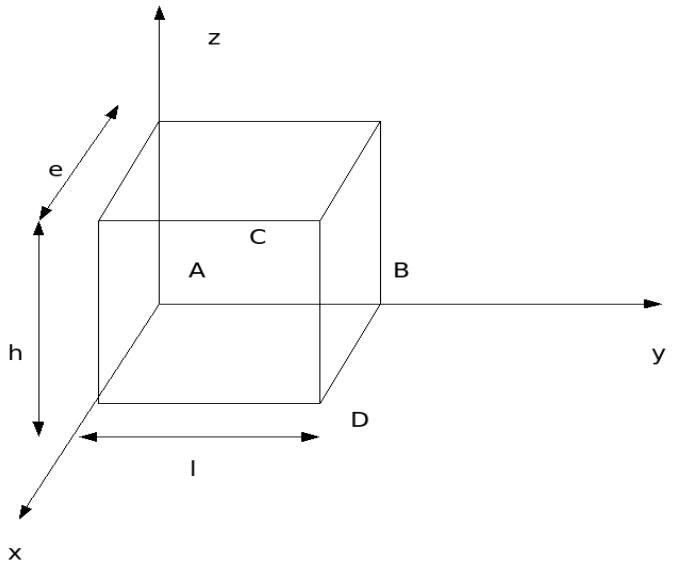
Summarized

This test makes it possible to validate VISC_DRUC_PRAG with hydraulic coupling the model. It is about a triaxial compression test in not drained condition. The aspect not drained is modelled by a voluminal strain null squelette and the hydraulic coupling is taken into account, the sample is completely saturated, the incompressible squelette and the fluid being supposed.

By reason of symmetry, one is interested only in the eighth of a sample subjected to a triaxial compression test.
The level of containment is of $8\,MPa$.

1 Problem of reference

1.1 Geometry



height: $h=1\,m$
width: $l=1\,m$
thickness: $e=1\,m$

Coordinates of the points (in meters):

	A	B	C	D
x	0.	0.	0.5	1.
y	0.	1.	0.5	1.
z	0.	0.	0.5	0.

1.2 Material property

elastic properties under key word ELAS:

$E=5000.0$ in MPa
$\nu=0.12$
$\alpha=0.0$

viscoplastic properties under word VISC_DRUC_PRAG:

$P_{ref}=0.1$ in MPa
$A=1.5.10^{-12}$ of s^{-1}
$n=4.5$
$p_{pic}=0.015$
$p_{ult}=0.028$
$\alpha_0=0.065$
$\alpha_{pic}=0.26$

$\alpha_{ult}=0.091$
$R_0=1.3021 \quad MPa$
$R_{pic}=6.24808$ of MPa
$R_{ult}=1.30808 \quad MPa$
$\beta_0=-0.15$
$\beta_{pic}=0.$
$\beta_{ult}=0.13$

1.3 Initial conditions, boundary conditions, and loading

Phase 1:

One brings the sample in a homogeneous state of effective stresses: $\sigma^0_{xx}=\sigma^0_{yy}=\sigma^0_{zz}$, by imposing the corresponding stagnation pressure on the front, side right and higher sides and by imposing null water pressures everywhere. Displacements are blocked on the sides postpones ($u_x=0$), side left ($u_y=0$) and lower ($u_z=0$).

Phase 2:

One maintains displacements blocked on the sides postpones ($u_x=0$), side left ($u_y=0$) and lower ($u_z=0$). On all the sides, the hydraulic flux are null.

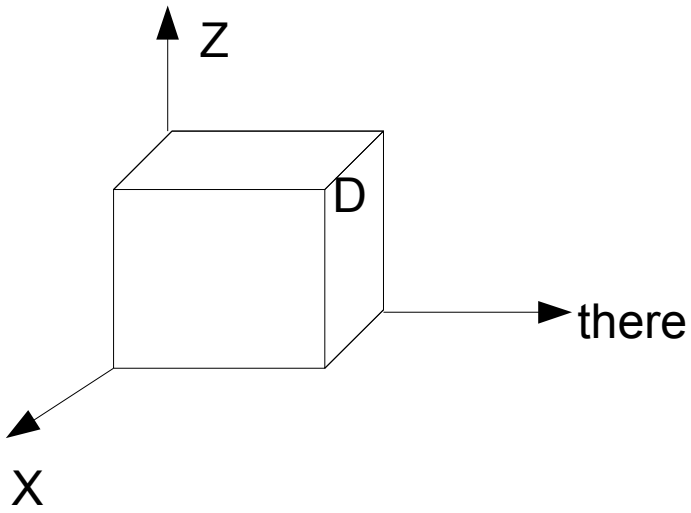
One applies a displacement forced to the upper face in order to 2) obtain $\varepsilon_{zz}=-0,06$ a strain (counted starting from the beginning of the phase. On the front sides and side right, one imposes boundary conditions in total stress:

$\sigma.n=\sigma_0(=8\,MPa)$

2 Modelization A

2.1 Characteristic of the modelization

3D:



Cutting: 1 in height, in width and thickness.

Loading of phase 1:
Confining pressure: $\sigma^0_{xx}=\sigma^0_{yy}=\sigma^0_{zz}=-8\,MPa$.
Coefficient of biot: 1
UN_SUR_K of water: 0
Modelization: 3D_HM

2.2 Characteristic of the mesh

Many nodes: 20
Number of meshes and types: 1 HEXA20 and 6 QUA8

2.3 Quantities tested and results

Localization	Time	Displacement	Aster
Point D	7000.	DX	-2,453 10-3
Item D	13000.	DX	2,632 10-2

Localization	Time	Forced (MPa)	Aster
Point D	7000.	σ_{yy}	-8 10+6
Item D	13000.	σ_{yy}	-14,28 10+6

3 Summary of the results

This case test is a test of non regression developed the model to validate VISC_DRUC_PRAG in hydromechanics in not drained conditions.