
WTNP110 - Saturated orthotropic flow 2D

Summarized:

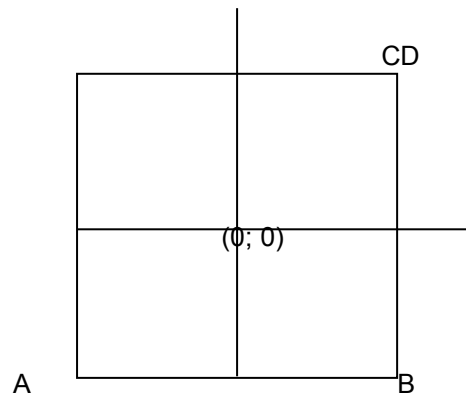
The test presented here makes it possible to check the good performance of the operators used for the resolution of the equations of a flow in orthotropic saturated medium. This test corresponds to test 1.2 of the plane of qualification of the project ALLIANCES [bib1].

One also validates the estimators of error *a posteriori* in residue developed for the THM.

The reference solution is an analytical solution.

1 Problem of reference

1.1 Geometry



Coordinated points (*m*):

<i>A</i>	-0,1	-0,1	<i>C</i>	0,1.0,1.
				0,1
<i>B</i>		-0,1	<i>D</i>	-0,1 0,1

1.2 Properties of the material

One gives here only the properties whose solution depends, knowing that the command file contains other data of material (elasticity moduli,...) who finally do not play any part in the solution of with the dealt problem.

Liquid water	Density ($kg.m^{-3}$)	1
	Viscosity	1
Parameters homogenized	intrinsic Permeability (component in <i>X</i>)	1
	intrinsic Permeability (component in <i>Y</i>)	3/4
	intrinsic Permeability (component in <i>Z</i>)	1
initial State	fluid	
	1 Porosity Pressure	0

1.3 Boundary conditions and loadings

On *AB* $P=P(X)=-45X+30.5$
 On *BC* $P=P(X)=-80Y+18$
 On *CD* $P=P(X)=-45X+14.5$
 On *DA* $P=P(X)=-80Y+27$

2 Reference solution

2.1 Method of calculating

the analytical solution in pressure is a polynomial of degree in x and y , the velocity is constant and horizontal:

$$P(x, y) = -45x - 80y + 22.3$$
$$V(x, y) = (45 K_x; 80 K_y) = (45; 60)$$

2.2 Quantities and results of reference

One gives the value of the pressure and velocity in 3 points:

x	-0,05	0,00	+0,05
y	-0,05	0.00	0.05
P	28,8	22.5	16.3
V_x	45	45	45
V_y	60	60	60

2.3 bibliographical References

[1] Project Alliances plane of qualification, note ANDRA CNT-ASCS 02-075B

3 Modelization A

3.1 Characteristic of the modelization A

Modelization in plane strains. 20×20 elements $Q8$

3.2 Quantities tested and Standard

Node	results of value	Time (s)	Reference (analytical)	Aster	Difference (%)
<i>N441</i> (0.05;0.05)	<i>PREI</i>	1	16,3	16,25	0,3%
<i>N241</i> (-0.05;-0.05)	<i>PREI</i>	1	28,8	28,5	0.96%
<i>N341</i> (0 ;0)	<i>PREI</i>	1	22,5	22,5	0. %

One also validates the estimators of error in time and space by tests of NON-regression.

Urgent type of	value (s)	Aster	Difference (%)
ERRE_TPS_GLOB		1.1,5E-8	0%

Node	Standard in Component	value	Time (s)	Aster	Difference (%)
<i>N313</i> (-0.09;-0.01)	ERME_NOEU	ERHMHY_G		1.1,9E-12	0. %

4 Summary of the results

Very good agreement with the reference solution.