

MoMaS Benchmarks

Modeling Compressible Two-Phases

Two-Components Flow in porous media

Application to gas migration in underground nuclear waste
repository

Advertising

Test-Cases

Perspectives

November 21, 2009



Context

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Modeling Compressible
Two-Phases
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Perspectives

- ▶ Hydrogen gas generation due to corrosion of the steel engineered barriers in a Nuclear Waste Repository storage

Context

- ▶ Hydrogen gas generation due to corrosion of the steel engineered barriers in a Nuclear Waste Repository storage
- ▶ flow either saturated (liquid) OR **unsaturated** (liquid/gas)

- ▶ Hydrogen gas generation due to corrosion of the steel engineered barriers in a Nuclear Waste Repository storage
- ▶ flow either saturated (liquid) OR **unsaturated** (liquid/gas)
- ▶ Most of Simulations, use standard models, and when there is gas phase appearance/disappearance :
 - – variable switching or substitution, constrained formulation
 - – artificial small non-zero saturation

Benchmarks en cours

Écoulements diphasiques

in :

http://www.gdrmommas.org/ex_qualifications.html

OR, in: <http://sources.univ-lyon1.fr>

Physical assumptions

Saturated-Unsaturated two phases flow

- ▶ 2 phases : liquid (incompressible) and gas (compressible)

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- ▶ Isothermal flow
- ▶ Additional assumption : no water vapor (not essential)

Aims:

- ▶ One Case-Test is dedicated to One type and Only One type of difficulty
- ▶ Addressing difficulties coming from non-standard physical situations
 - ▶ Gas phase Appearing/Disappearing
 - ▶ Non-equilibrium for the Initial Conditions
 - ▶ ...ETC...
- ▶ Starting with Quasi-1D flow

Numerical Test Data Base - Pb 1, Pb 2, Pb 3

Quasi-1D Simulations

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Description of 3
Test-Cases

Results of
Simulations

Perspectives

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Quasi-1D Simulations

$$\phi^w \cdot \mathbf{n} = 0$$

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$$\phi^h \cdot \mathbf{n} = Q_{in}^h$$



$$X = X_{out}$$

$$p_l = p_{l,out}$$

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► Boundary conditions :

- Injection of pure gas on left side
- Impervious condition on top and bottom side
- Pure water ($X_{out} = 0$) (Test 1) or Two-phases ($X_{out} \neq 0$) (Test 2) and a fixed pressure, on the right side

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▶ Initial conditions :

stationary state without injection ($Q_{in}^h = 0$)

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Physical Parameters

- ▶ Van Genuchten-Mualem model for capillary pressure and relative permeabilities
- ▶ Fixed temperature, $T = 303 K$

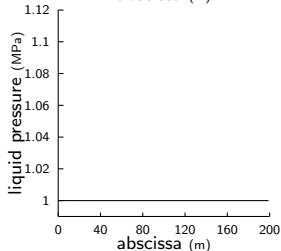
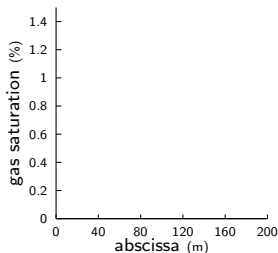
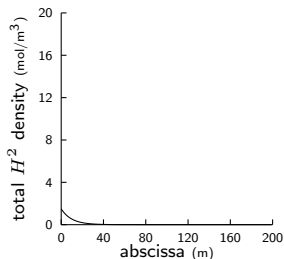
Porous medium parameters			Fluid characteristics		
Parameter	Value		Parameter	Value	
k	$5 \cdot 10^{-20}$	m^2	D_l^h	$3 \cdot 10^{-9}$	m^2/s
Φ	0.15	(-)	μ_l	$1 \cdot 10^{-3}$	$Pa \cdot s$
P_r	$2 \cdot 10^6$	Pa	μ_g	$9 \cdot 10^{-6}$	$Pa \cdot s$
n	1.49	(-)	$H(T = 303K)$	$7.65 \cdot 10^{-6}$	$mol/Pa/m^3$
S_{lr}	0.4	(-)	M_l	10^{-2}	kg/mol
S_{gr}	0	(-)	M_g	$2 \cdot 10^{-3}$	kg/mol
			ρ_l^{std}	10^3	kg/m^3
			ρ_g^{std}	$8 \cdot 10^{-2}$	kg/m^3

Parameter	Value	
L_x	200	m
L_y	20	m
Q^h	$1.5 \cdot 10^{-5}$	$m/year$
$p_{l,out}$	10^6	Pa
T_{simul}	$5 \cdot 10^5$	$years$

Analysis and simulation

Test 1: Gas injection in a fully water saturated host rock

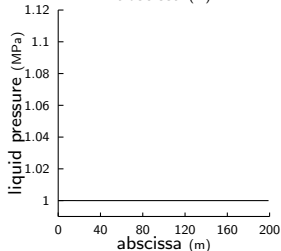
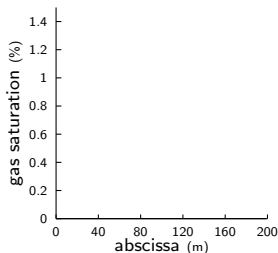
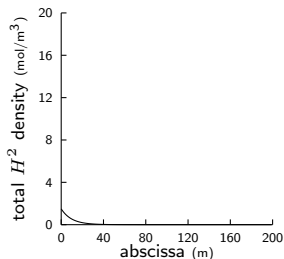
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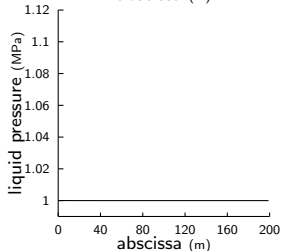
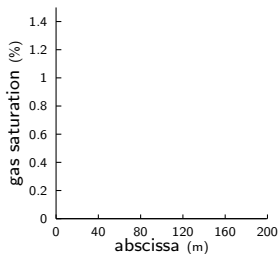
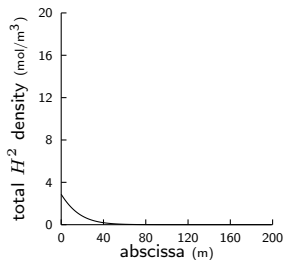
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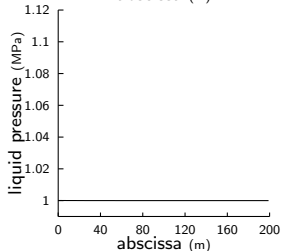
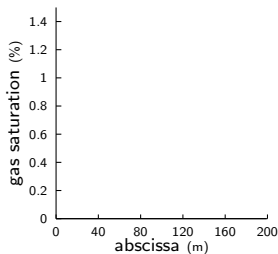
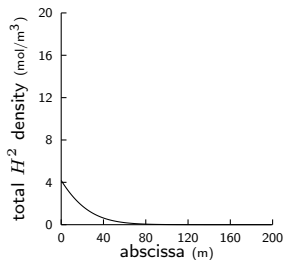
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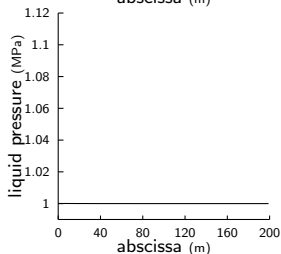
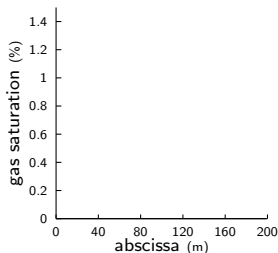
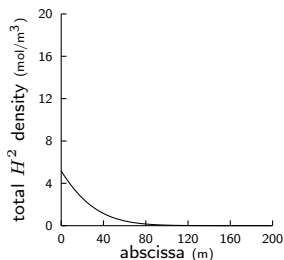
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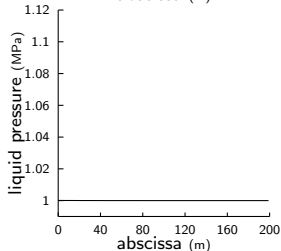
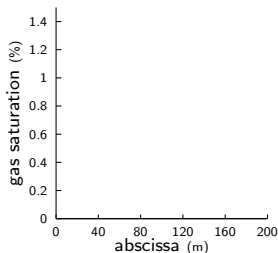
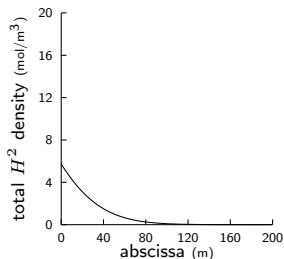
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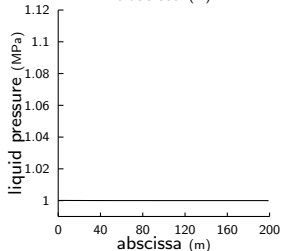
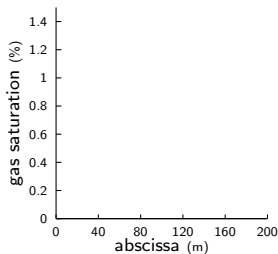
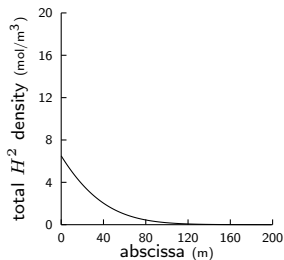
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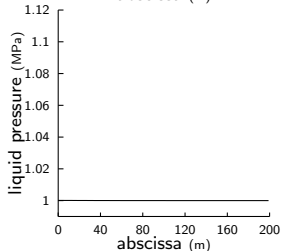
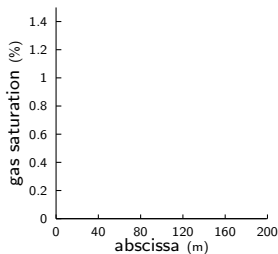
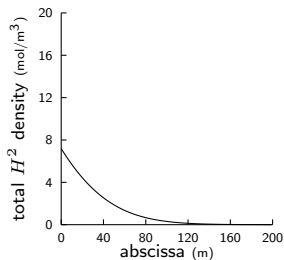
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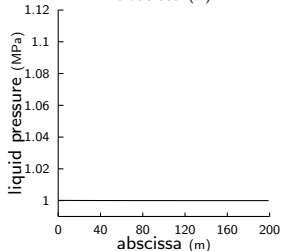
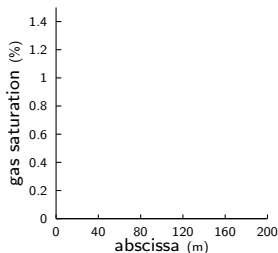
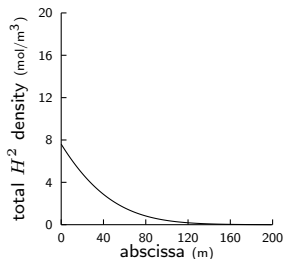
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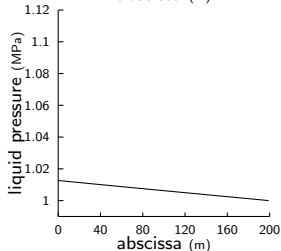
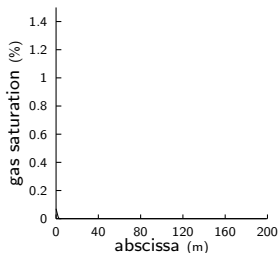
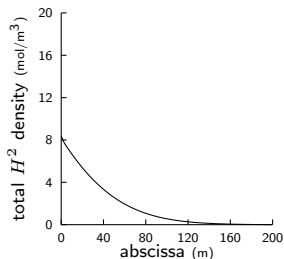
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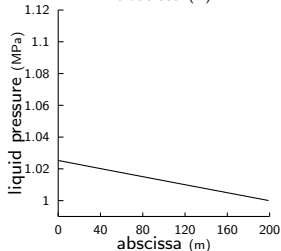
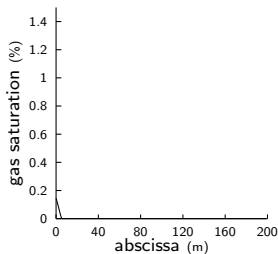
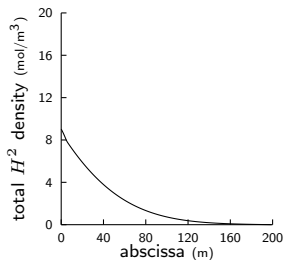
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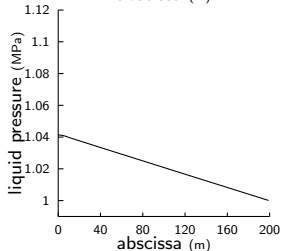
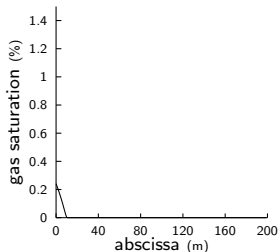
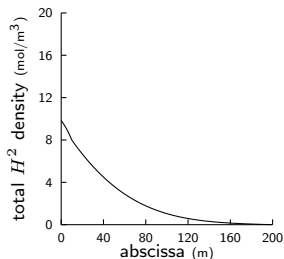
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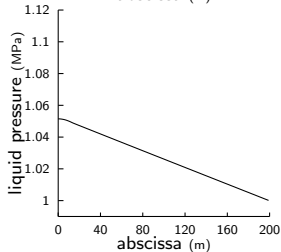
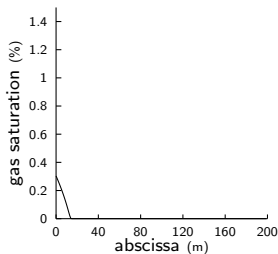
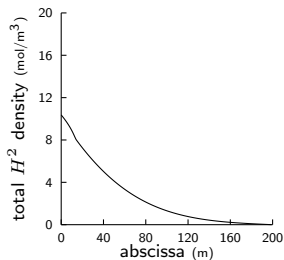
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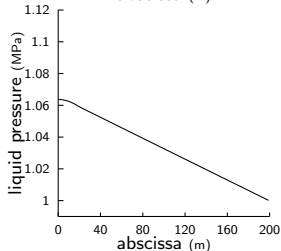
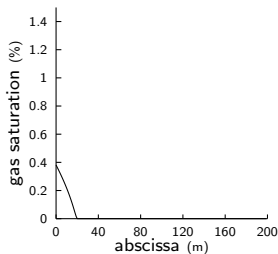
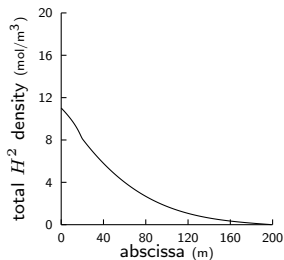
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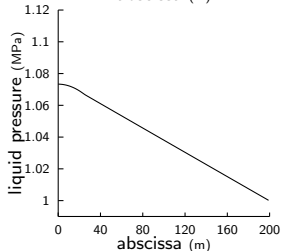
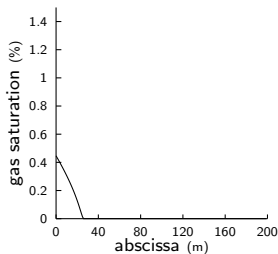
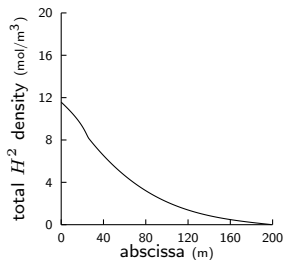
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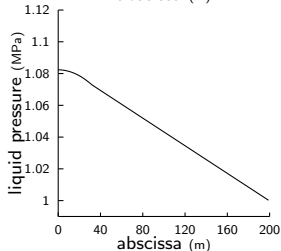
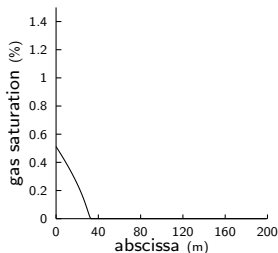
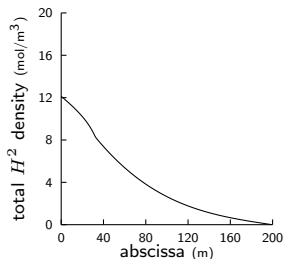
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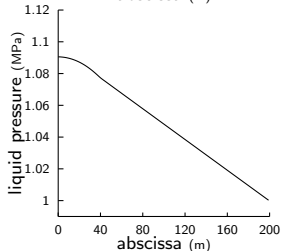
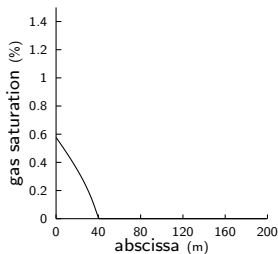
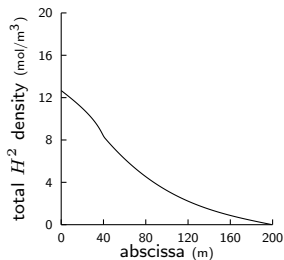
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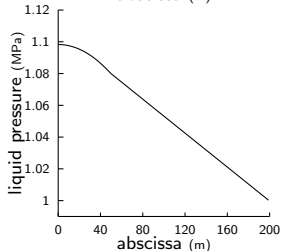
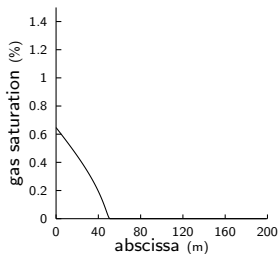
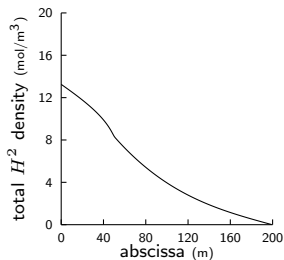
First: only solved Hydrogen density increases; second: the gas phase (S_g) appears $\Rightarrow \nabla p_l$ (from $p_c(1 - S_l)$) and q_l ; finally smaller ∇p_l and no water injection slow down the p_l



Analysis and simulation

Test 1: Gas injection in a fully water saturated host rock

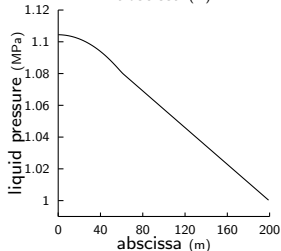
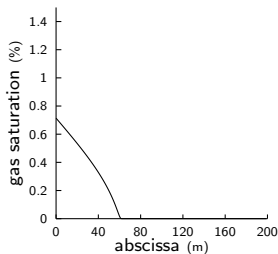
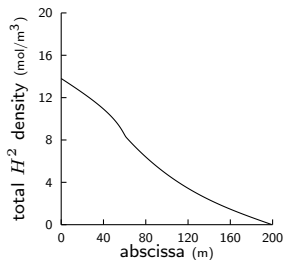
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Analysis and simulation

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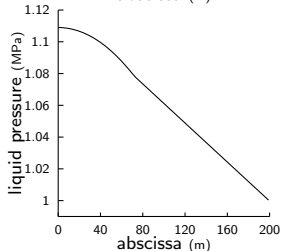
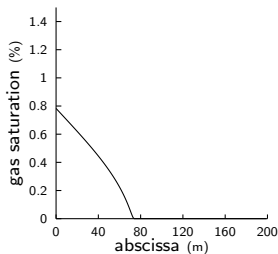
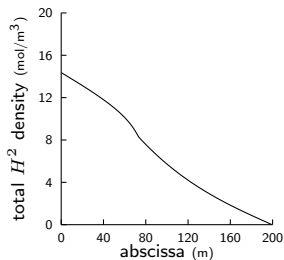
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Analysis and simulation

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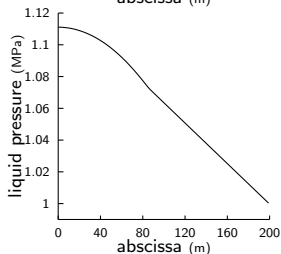
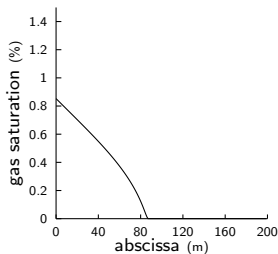
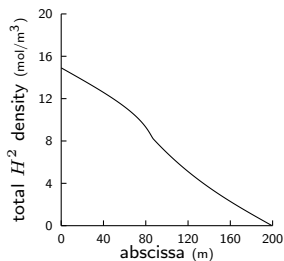
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Analysis and simulation

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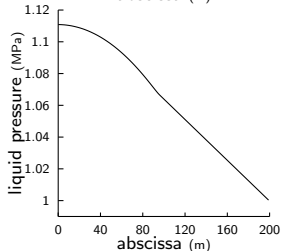
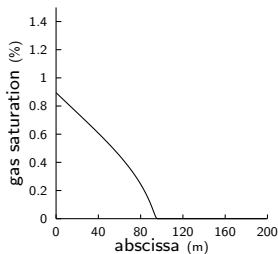
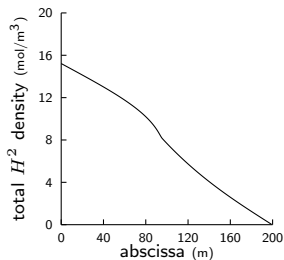
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Analysis and simulation

Test 1: Gas injection in a fully water saturated host rock

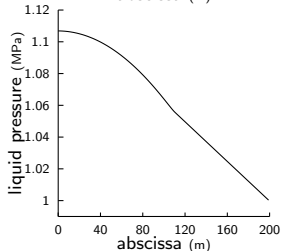
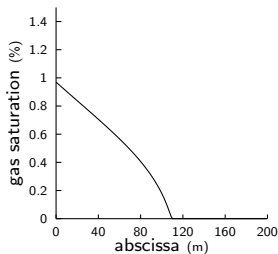
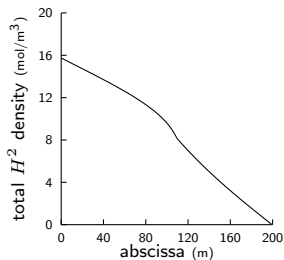
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Analysis and simulation

Test 1: Gas injection in a fully water saturated host rock

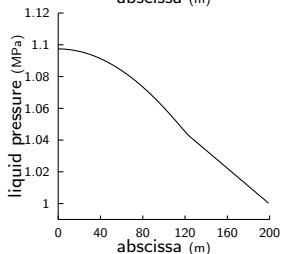
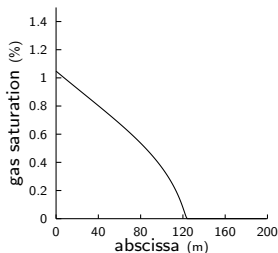
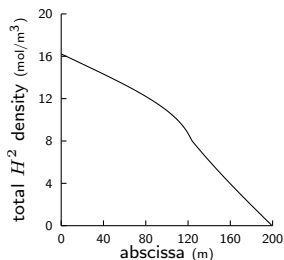
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Analysis and simulation

Test 1: Gas injection in a fully water saturated host rock

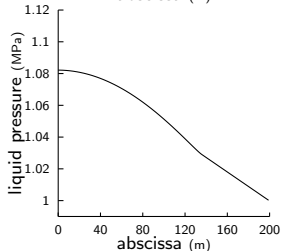
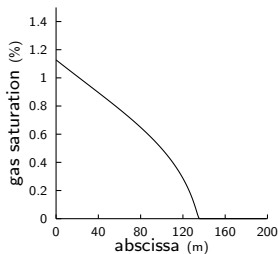
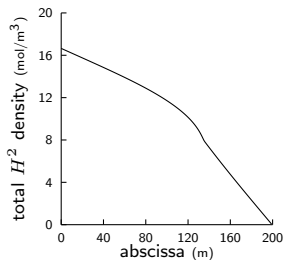
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Analysis and simulation

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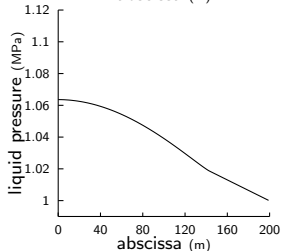
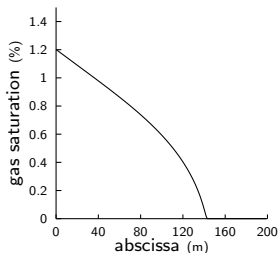
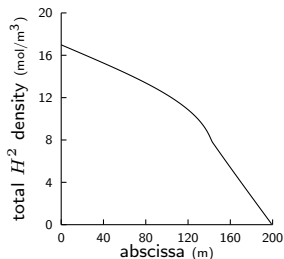
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Analysis and simulation

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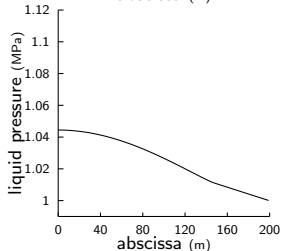
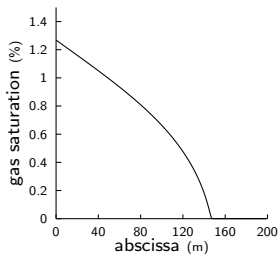
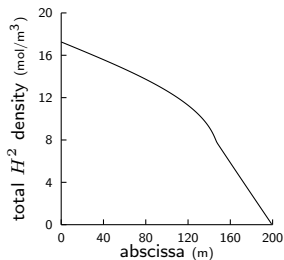
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Analysis and simulation

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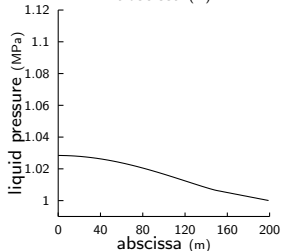
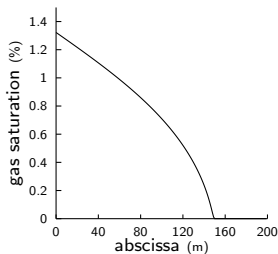
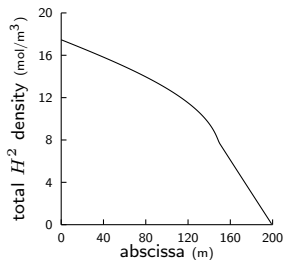
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Analysis and simulation

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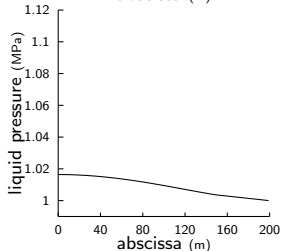
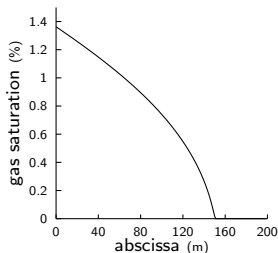
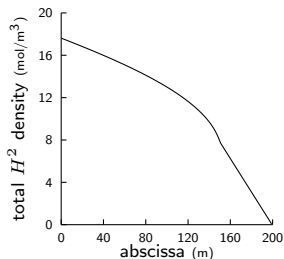
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Analysis and simulation

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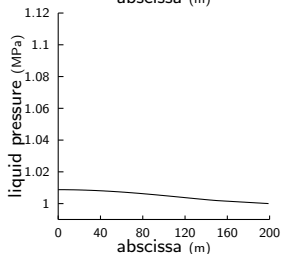
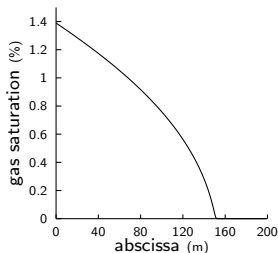
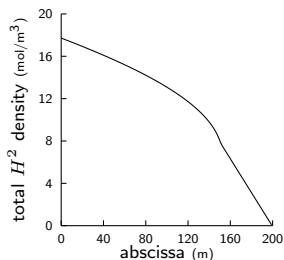
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Analysis and simulation

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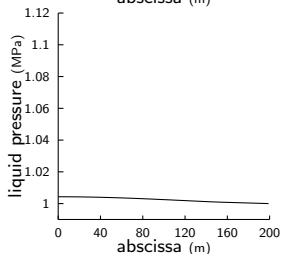
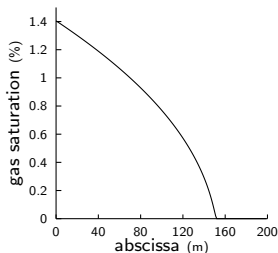
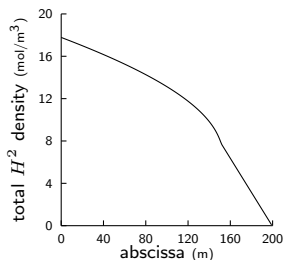
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Analysis and simulation

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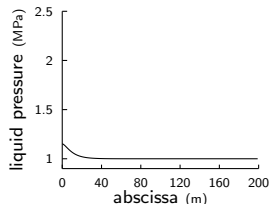
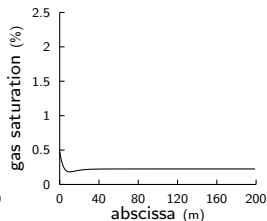
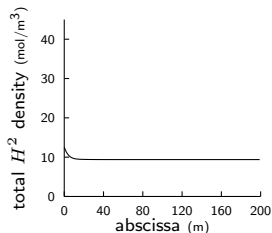
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

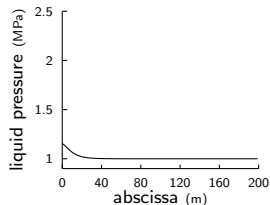
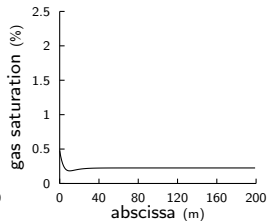
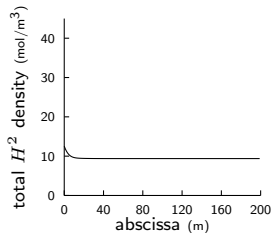
Injected Hydrogen increase the p_l which allows the liquid to dissolve more gas than it comes from injection \Rightarrow a plug of liquid appears and is pushed by the injected gas to the R.H.S. (with unsaturated Dirichlet cond.); we are back to Test 1.



Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

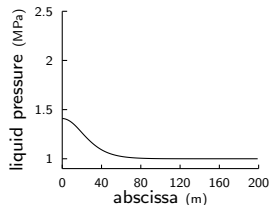
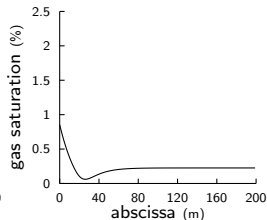
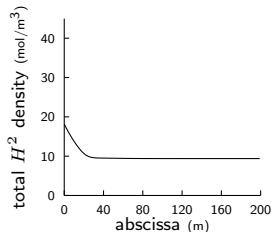
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

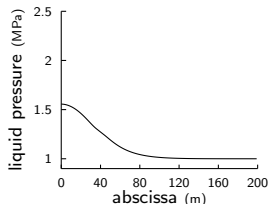
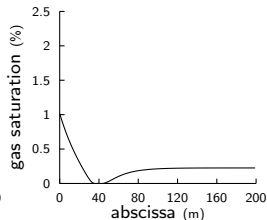
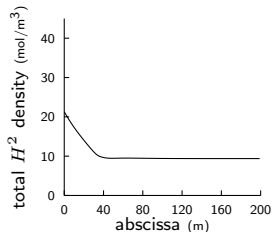
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

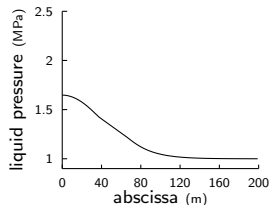
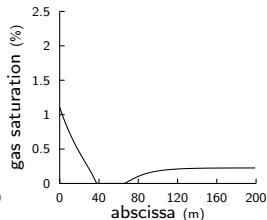
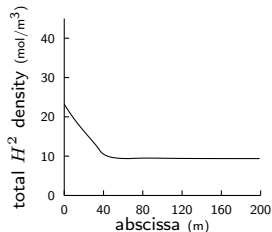
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Analysis and simulation

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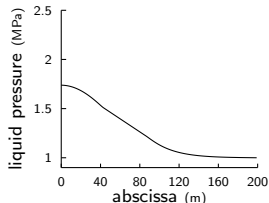
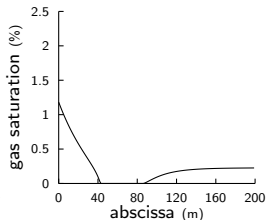
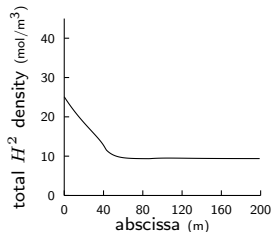
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

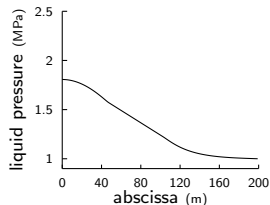
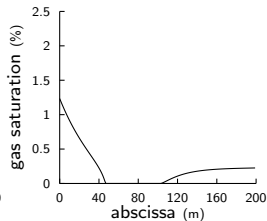
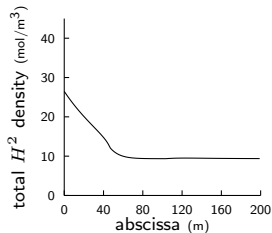
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

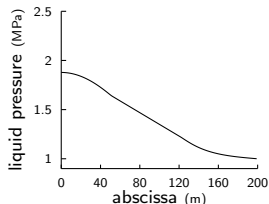
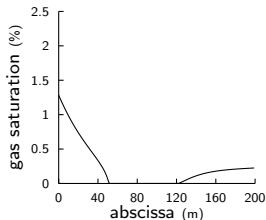
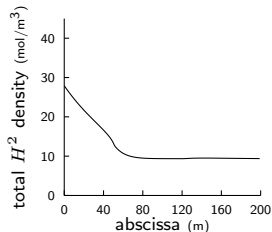
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

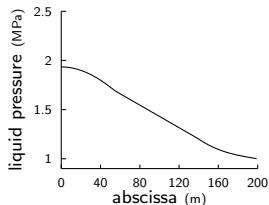
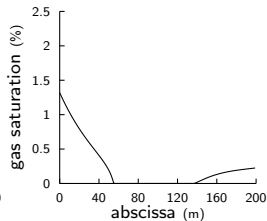
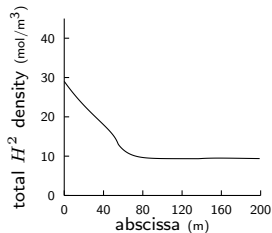
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

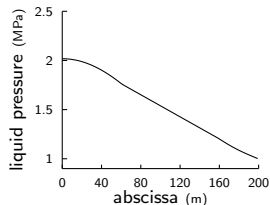
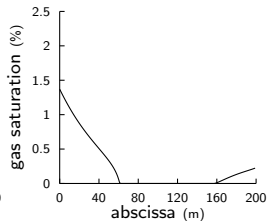
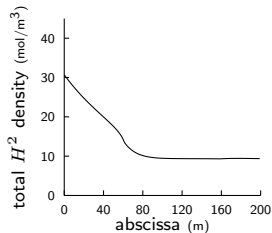
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

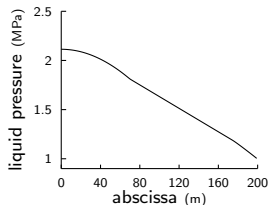
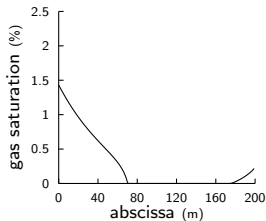
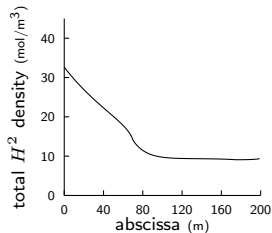
Injected Hydrogen increase the p_l which allows the liquid to dissolve more gas than it comes from injection \Rightarrow a plug of liquid appears and is pushed by the injected gas to the R.H.S. (with unsaturated Dirichlet cond.); we are back to Test 1.



Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

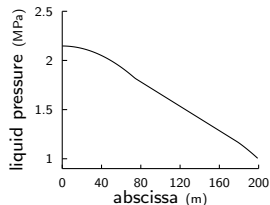
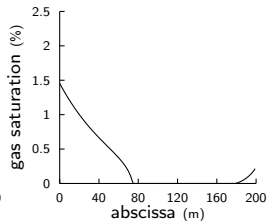
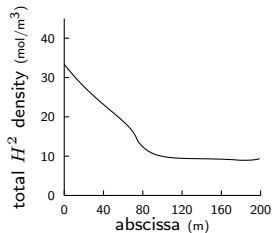
Injected Hydrogen increase the p_l which allows the liquid to dissolve more gas than it comes from injection \Rightarrow a plug of liquid appears and is pushed by the injected gas to the R.H.S. (with unsaturated Dirichlet cond.); we are back to Test 1.



Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

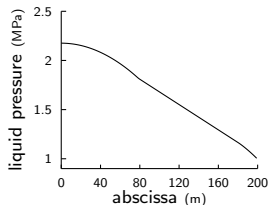
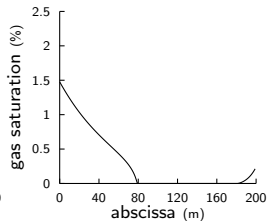
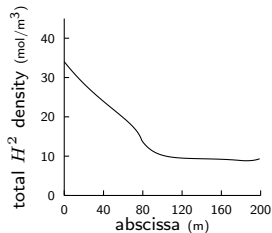
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

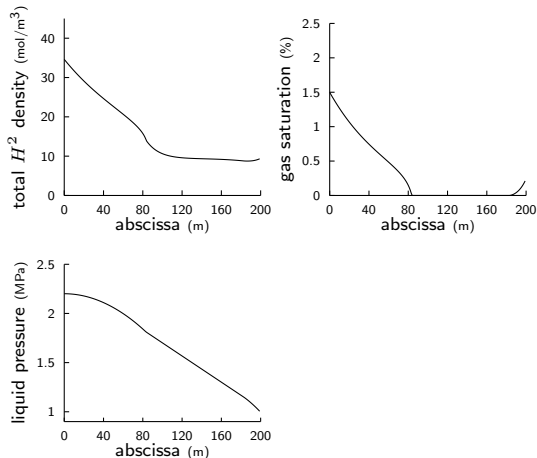
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

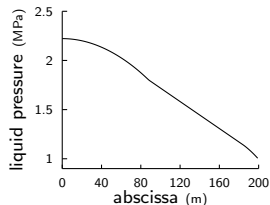
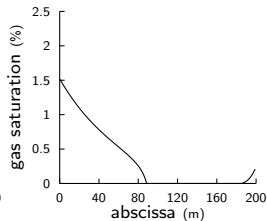
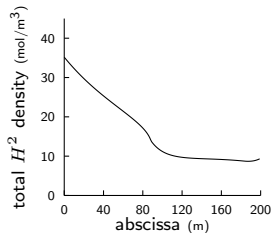
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

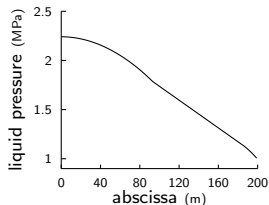
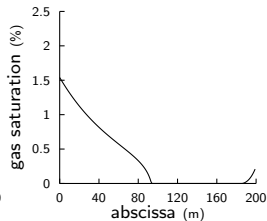
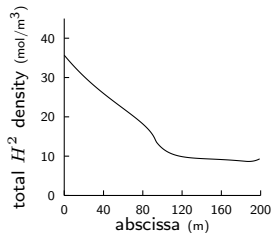
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

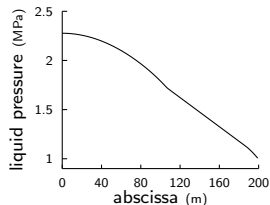
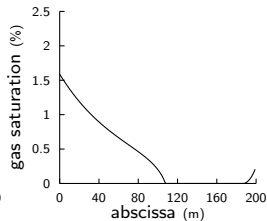
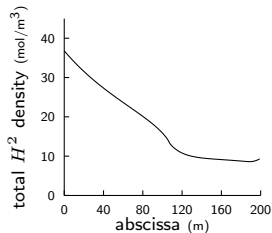
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

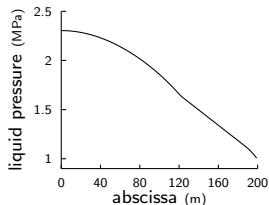
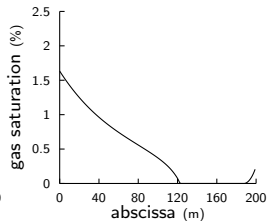
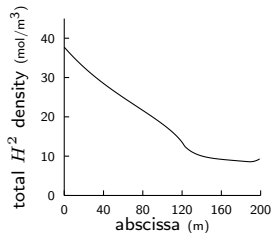
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

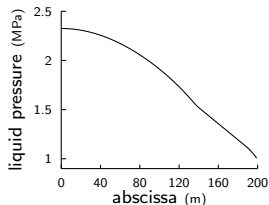
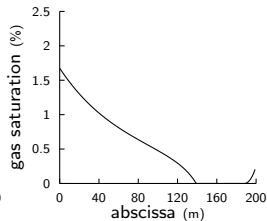
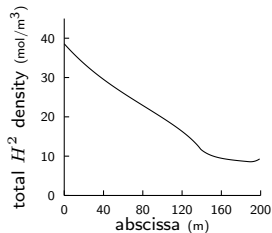
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

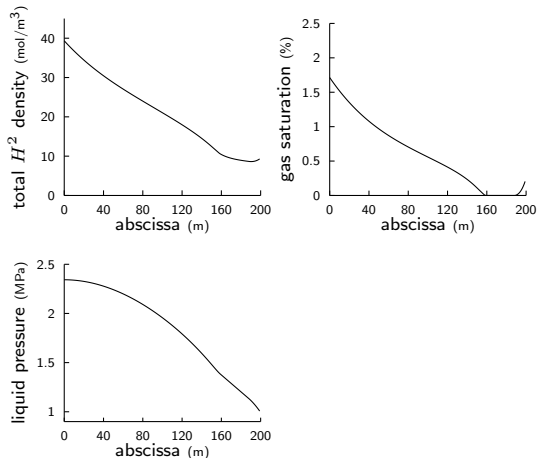
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

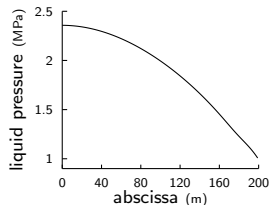
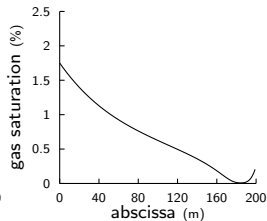
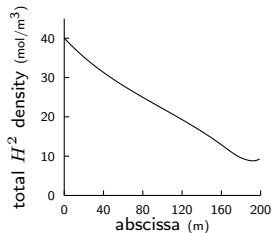
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

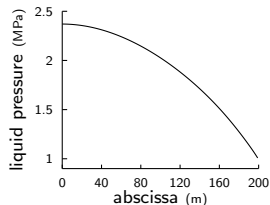
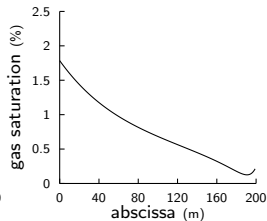
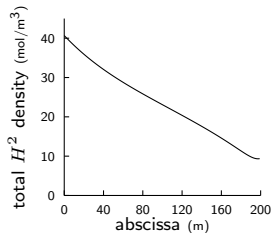
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

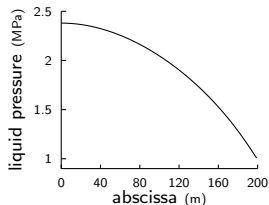
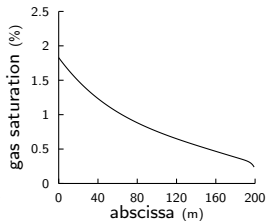
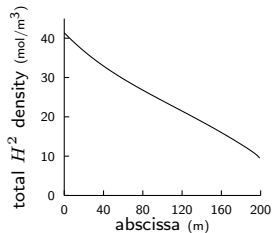
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Analysis and simulation

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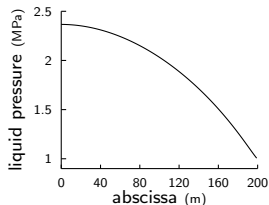
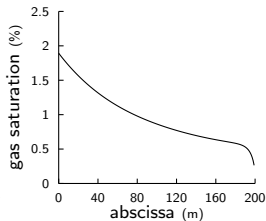
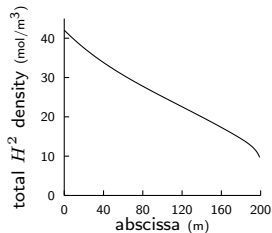
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

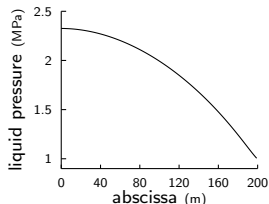
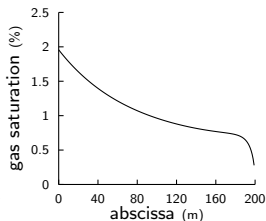
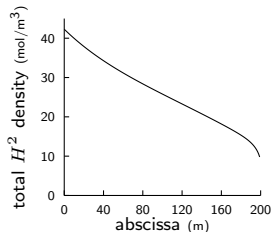
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

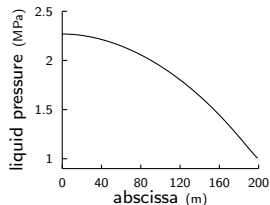
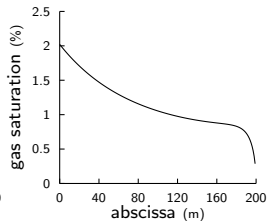
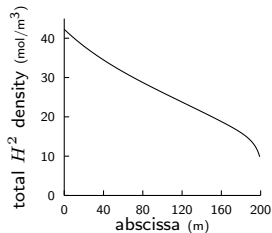
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

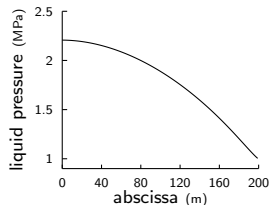
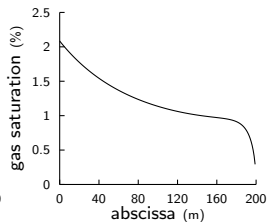
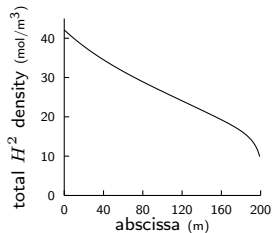
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Analysis and simulation

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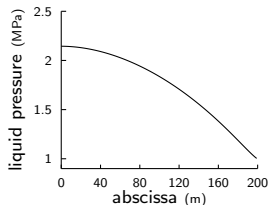
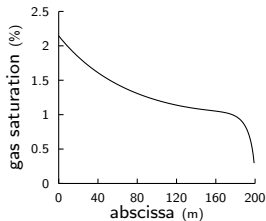
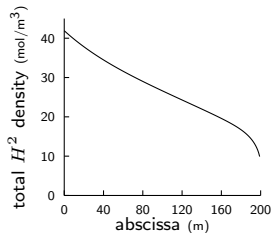
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Analysis and simulation

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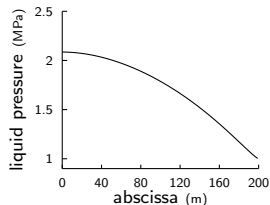
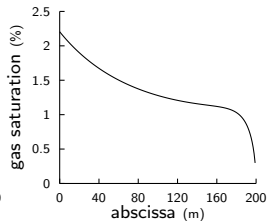
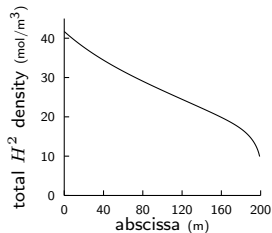
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

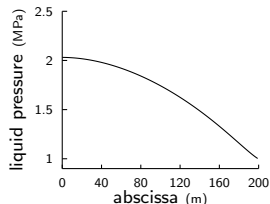
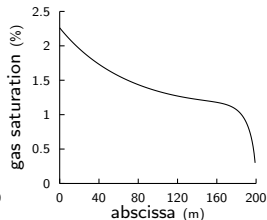
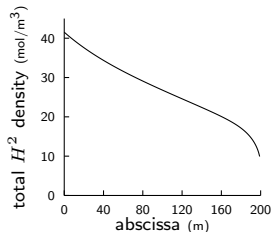
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

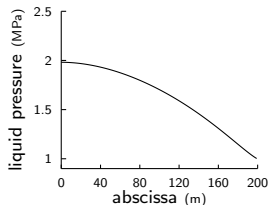
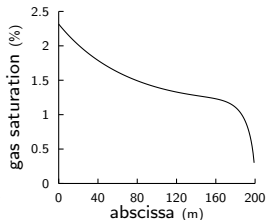
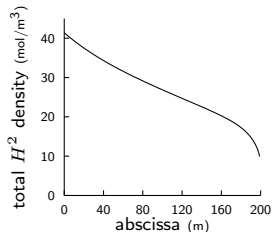
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Analysis and simulation

Test 2: Gas injection in a unsaturated host rock

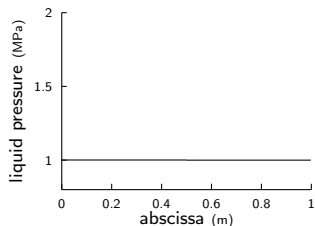
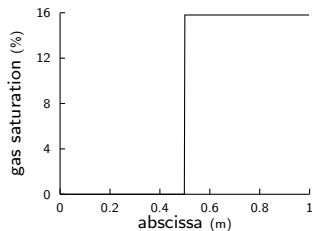
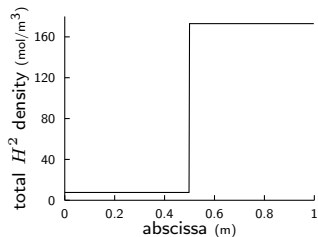
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Analysis and simulation

Test 3: Non-equilibrium initial conditions

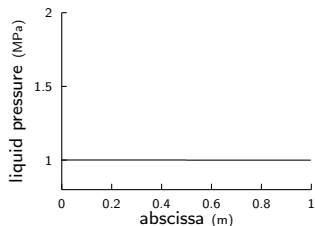
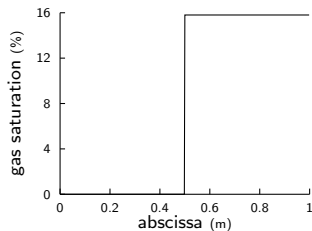
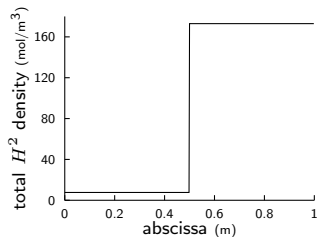
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

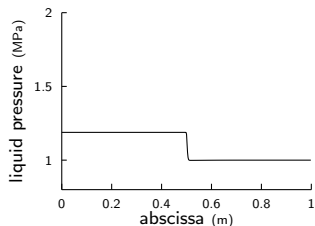
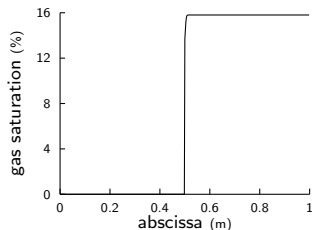
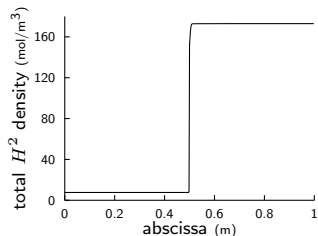
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Analysis and simulation

Test 3: Non-equilibrium initial conditions

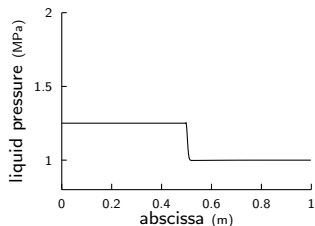
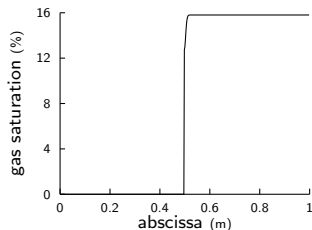
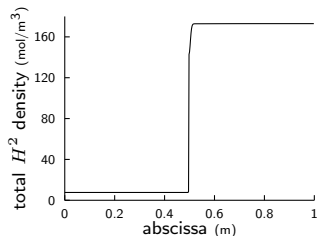
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Analysis and simulation

Test 3: Non-equilibrium initial conditions

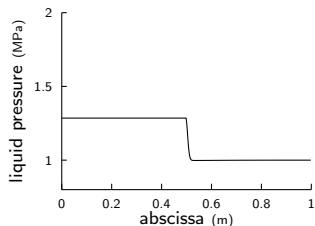
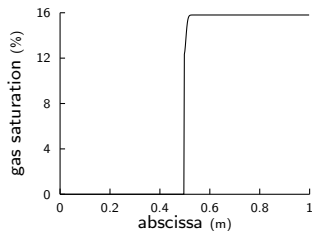
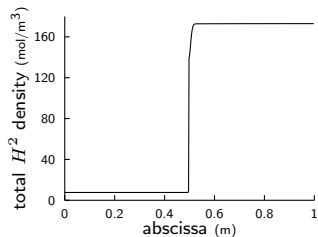
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

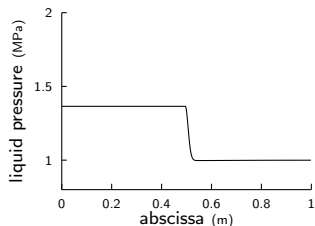
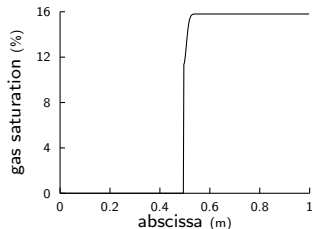
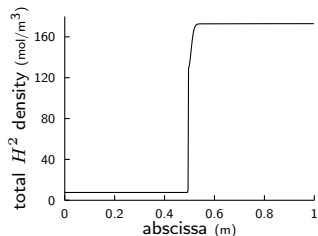
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

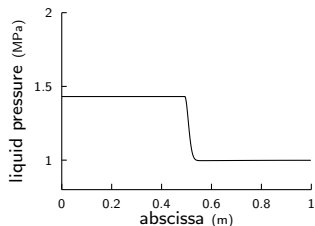
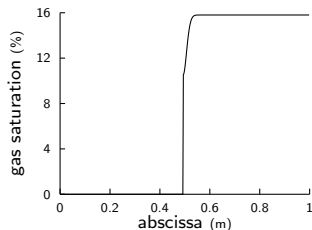
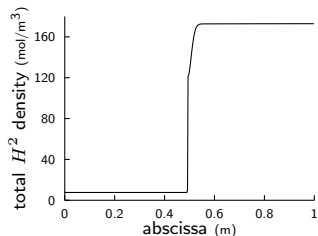
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

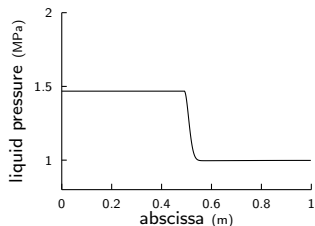
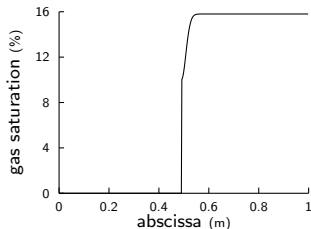
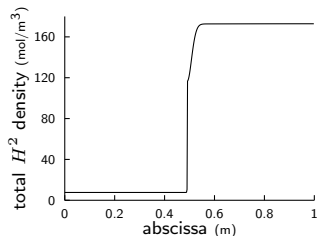
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

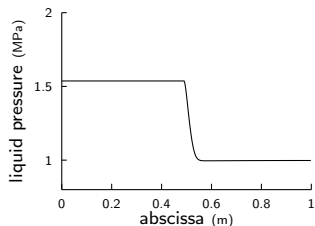
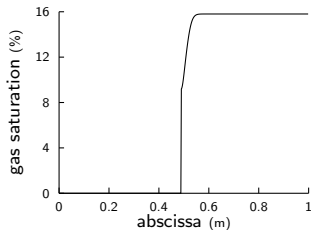
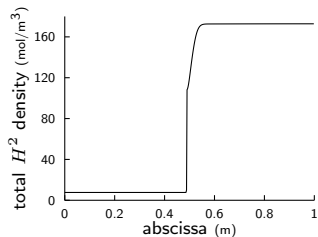
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

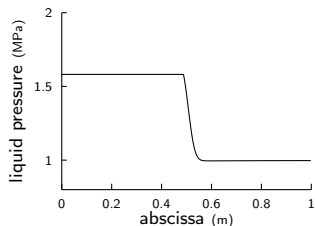
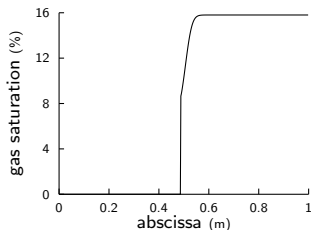
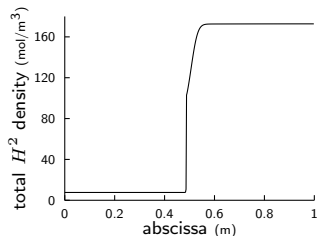
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

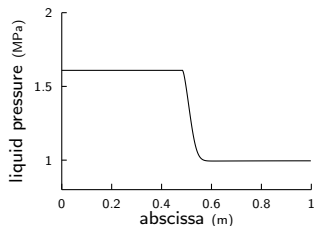
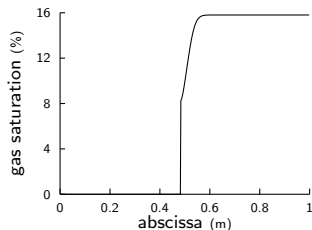
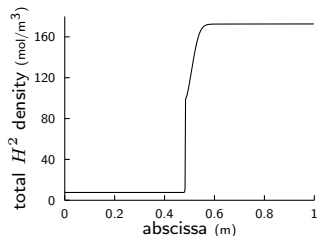
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

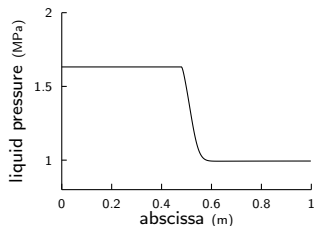
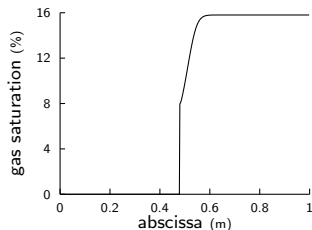
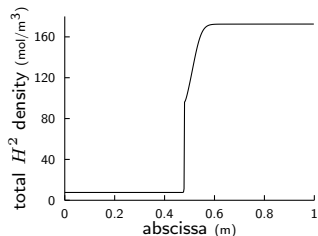
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

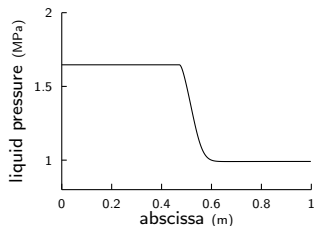
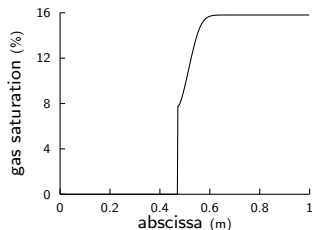
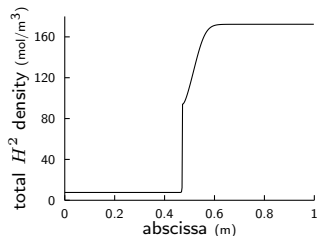
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

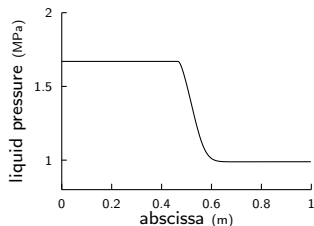
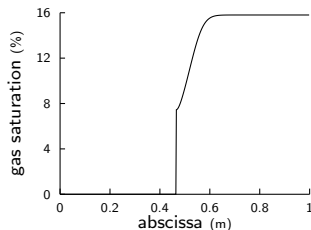
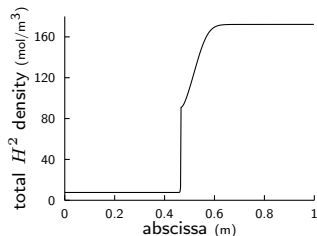
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

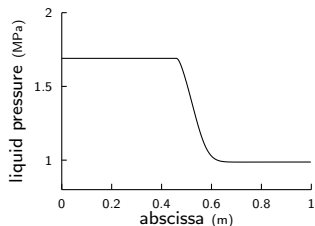
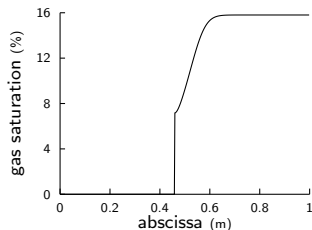
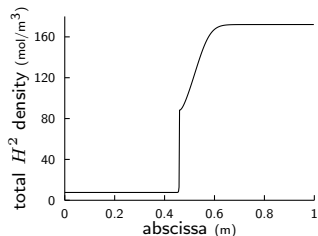
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

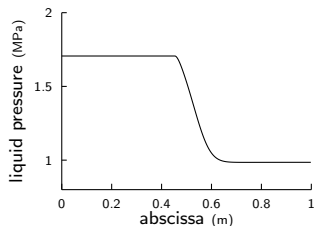
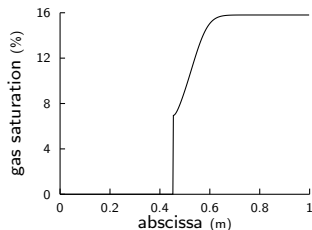
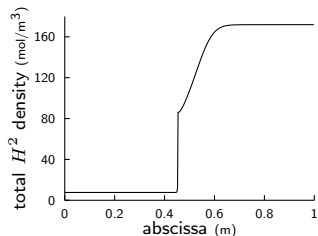
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

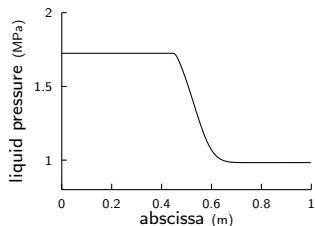
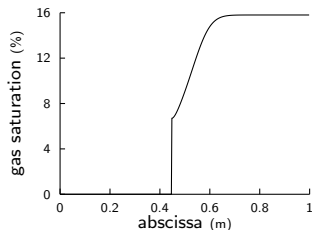
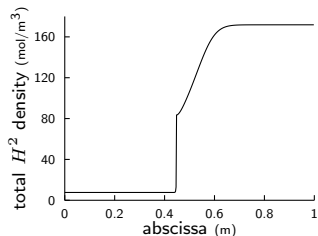
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

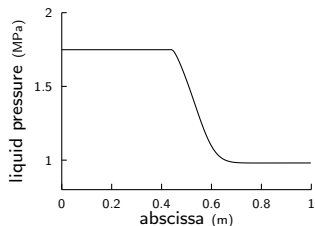
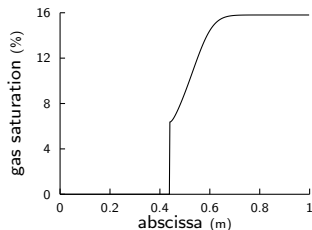
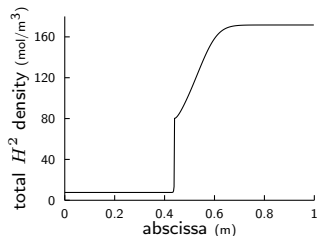
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

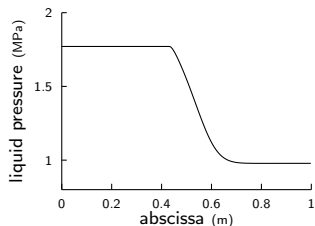
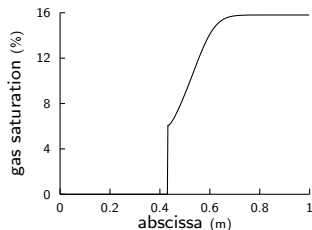
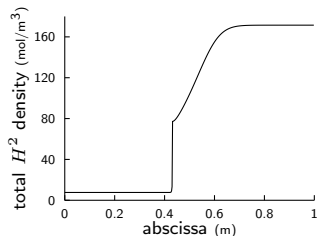
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

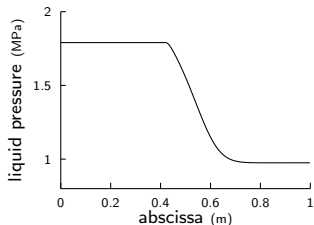
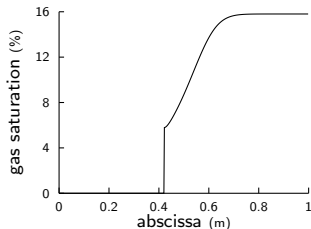
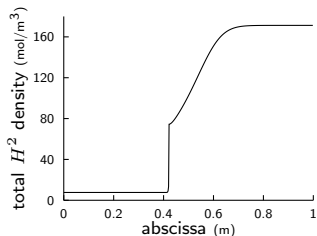
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

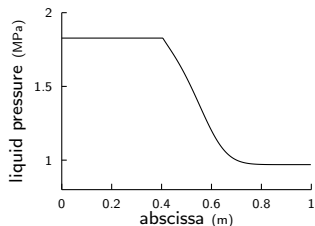
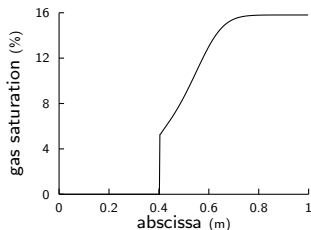
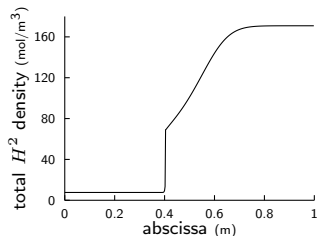
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

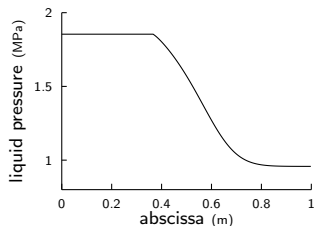
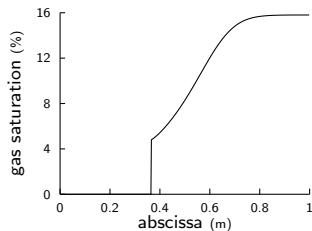
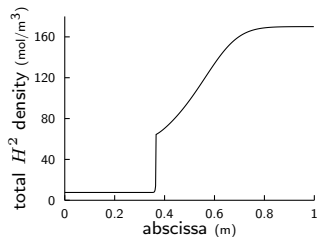
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

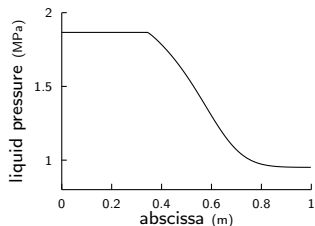
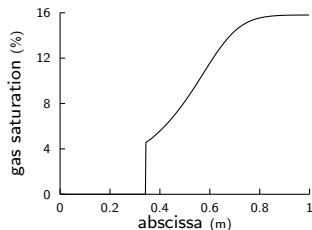
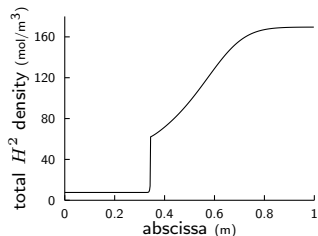
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

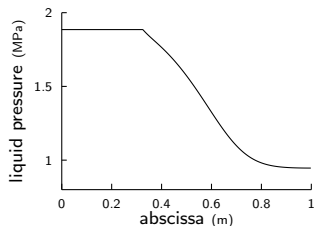
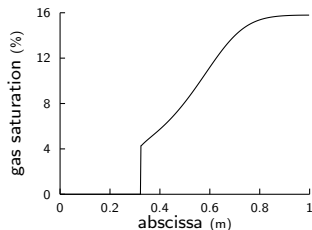
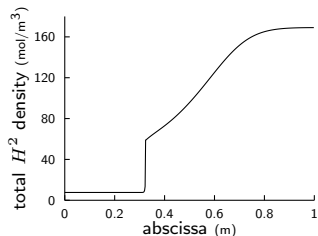
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

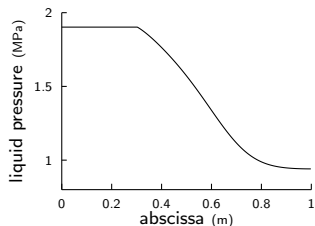
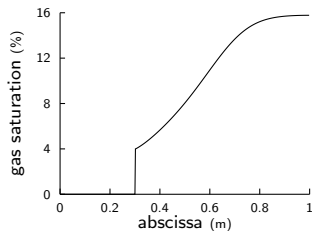
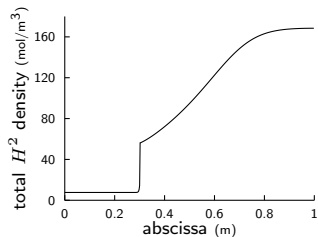
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

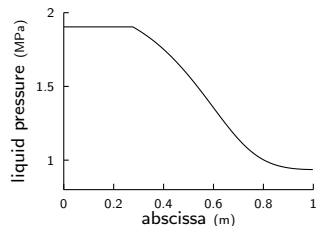
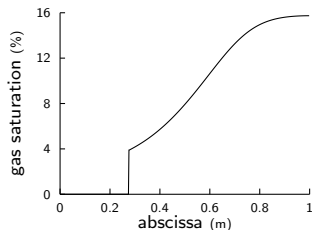
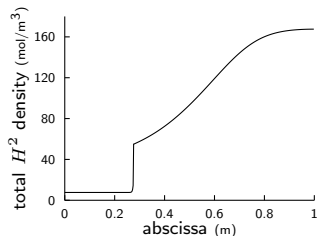
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

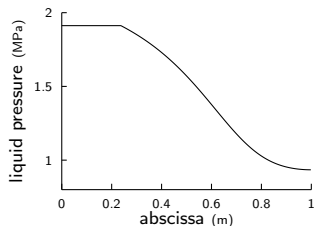
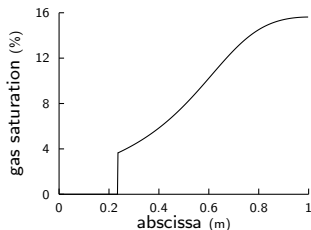
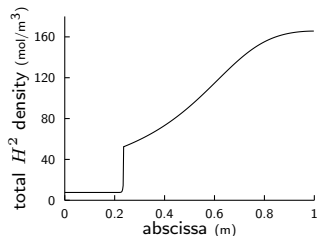
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

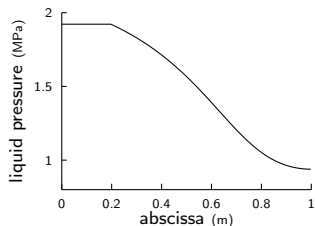
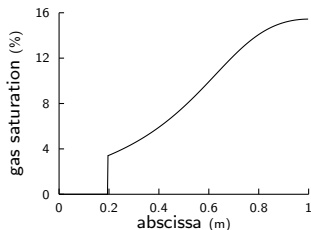
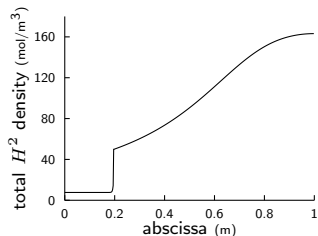
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

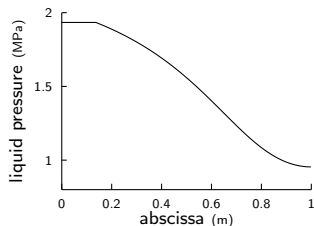
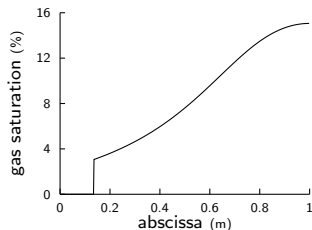
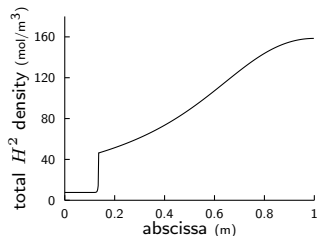
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

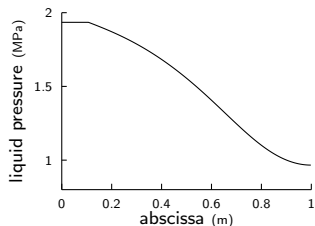
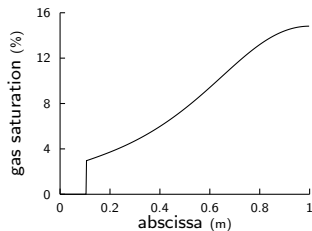
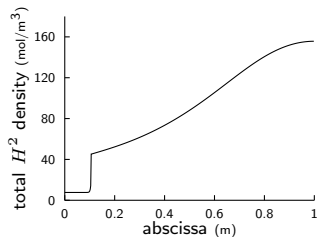
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

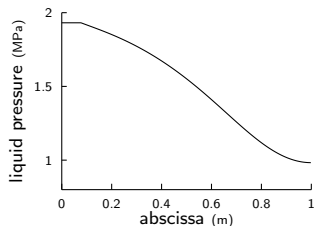
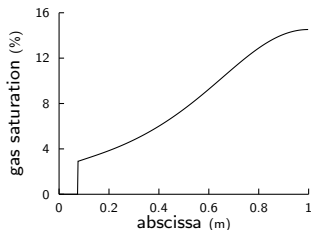
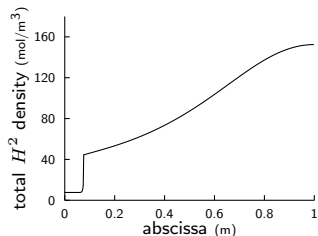
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

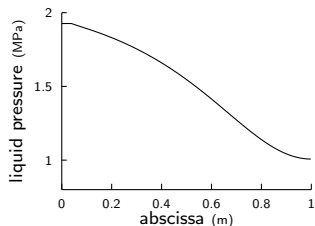
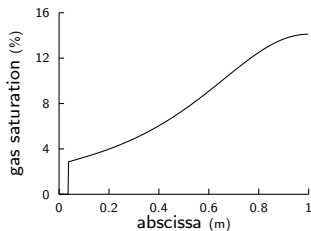
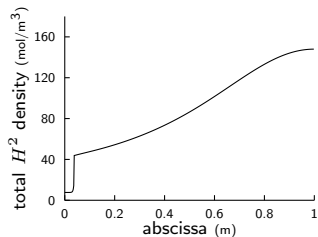
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

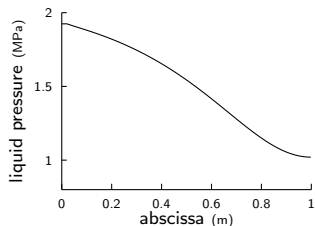
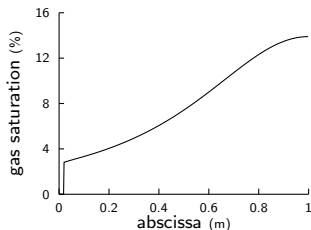
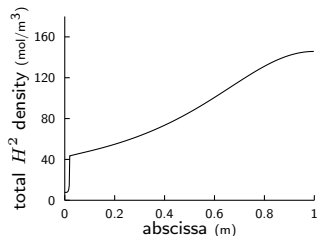
Starting from Non equilibrium initial condition (discontinuity of the gas-phase pressure at the starting time).



Analysis and simulation

Test 3: Non-equilibrium initial conditions

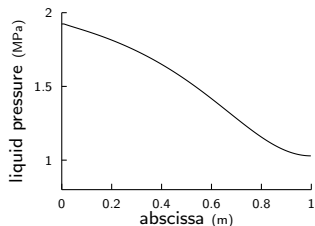
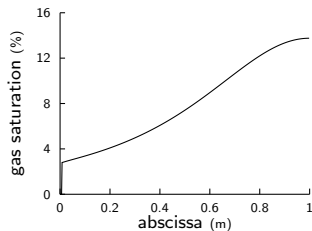
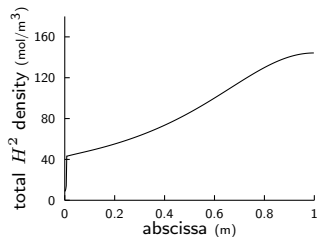
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Analysis and simulation

Test 3: Non-equilibrium initial conditions

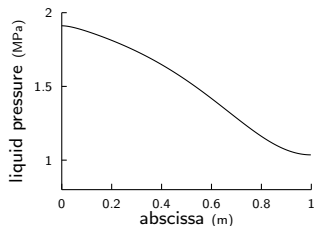
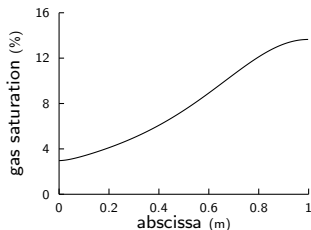
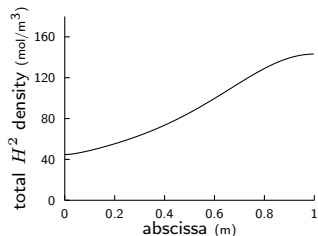
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Analysis and simulation

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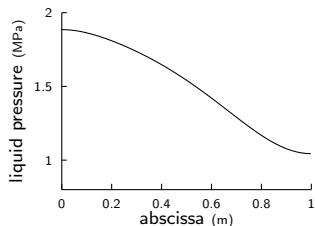
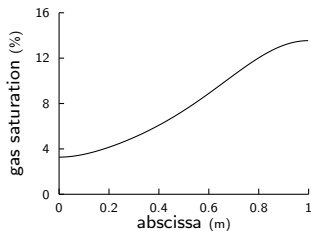
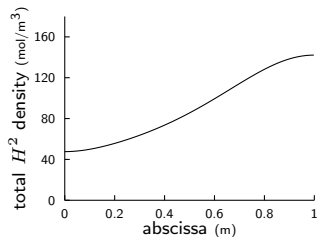
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Analysis and simulation

Test 3: Non-equilibrium initial conditions

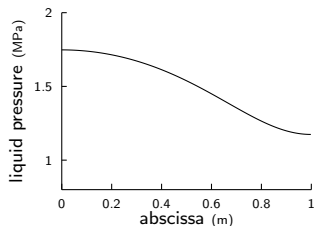
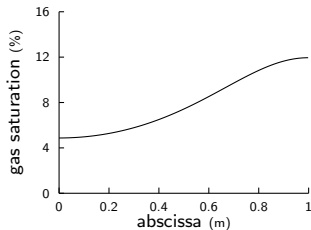
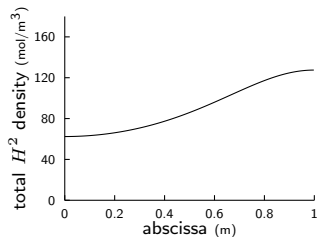
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Analysis and simulation

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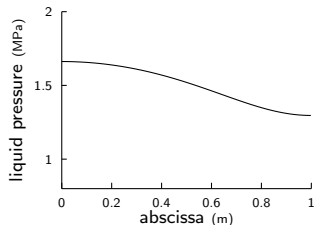
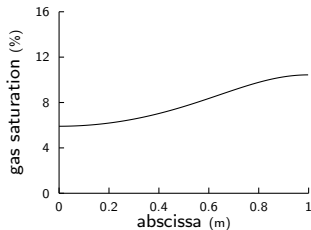
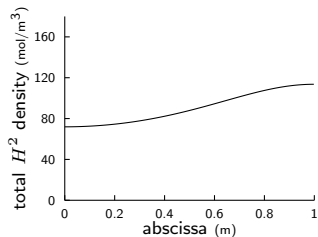
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Analysis and simulation

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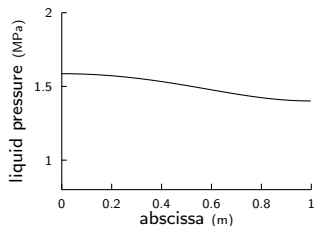
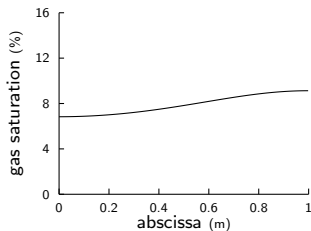
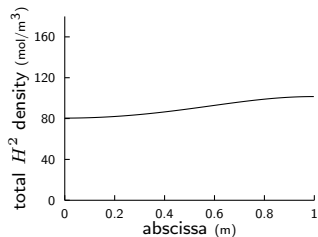
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Analysis and simulation

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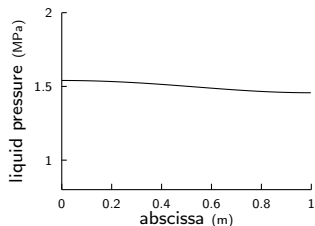
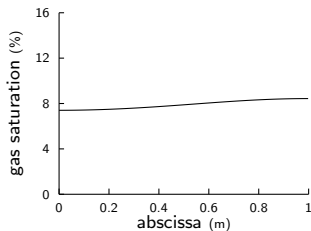
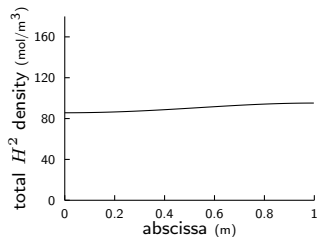
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Analysis and simulation

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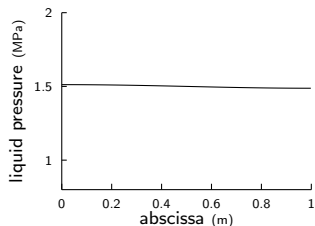
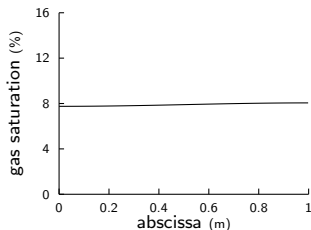
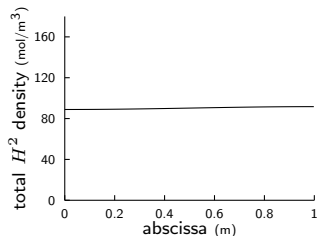
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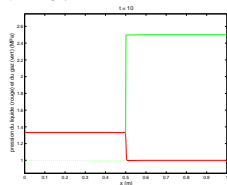


Analysis and simulation

Test 3: Non-equilibrium initial conditions

Coming Out of an "Extended Negative Pressure"

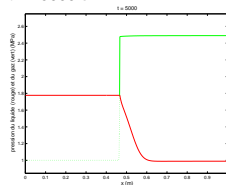
$t = 10 \text{ s}$



Profil de la pression du **liquide** et du

gaz

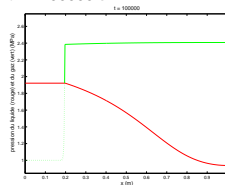
$t = 5000 \text{ s}$



Profil de la pression du **liquide** et du

gaz

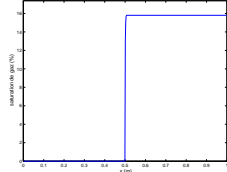
$t = 100000 \text{ s}$



Profil de la pression du **liquide** et du

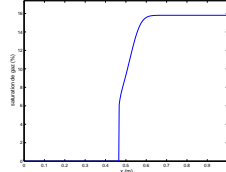
gaz

$t = 10$



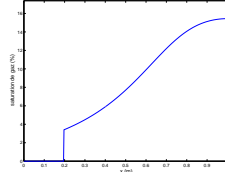
Profil de la saturation de gaz

$t = 5000$



Profil de la saturation de gaz

$t = 100000$



Profil de la saturation de gaz

Advertising

Test-Cases

Description of 3
Test-Cases

Results of
Simulations

Perspectives

Analysis and simulation

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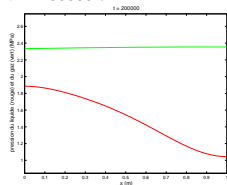
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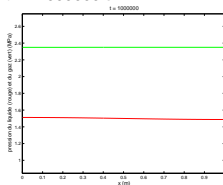
$t = 200000 \text{ s}$



Profil de la pression du **liquide** et du

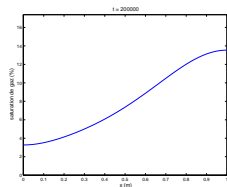
gaz

$t = 1000000 \text{ s}$

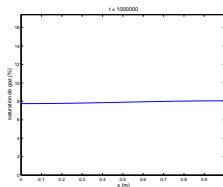


Profil de la pression du **liquide** et du

gaz



Profil de la saturation de gaz



Profil de la saturation de gaz

Conclusions

Last call before taking off

MoMaS Benchmarks
Modeling Compressible
Two-Phases
Two-Components
Flow in porous media

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Test-Cases

Perspectives

Perspectives :

Conclusions

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- ▶ NO entrance fees

SEE YOU SOON in :

http://www.gdrmomas.org/ex_qualifications.html

OR, in: <http://sources.univ-lyon1.fr>