

Documentation  
of  
FullSWOF\_1D

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# Chapter 1

## Todo List

### Class `Boundary_condition`

Improve boundary conditions at the second order for the wall and periodic conditions.

Take into account source terms (friction and topography) in the boundary conditions, see

### Member `Choice_condition::calc` (SCALAR, SCALAR, SCALAR, SCALAR, SCALAR, SCALAR, SCALAR, SCALAR, int)

Add time dependance in the boundary conditions.

### Member `Choice_friction::set_c` (SCALAR)

For future evolutions: `Friction::set_c` will not be necessary when the friction coefficient will be read as in 2D.

### Member `ENO::ENO` (Parameters &, VECT)

Exception should be treated.

### Member `ENO_mod::ENO_mod` (Parameters &, VECT)

Exception should be treated.

### Member `F_HLL::calc` (SCALAR, SCALAR, SCALAR, SCALAR)

Check if the use of long double should be generalized to other fluxes.

### Member `Fr_Darcy_Weisbach::calc` (SCALAR, SCALAR, SCALAR)

For future evolutions: the friction coefficient should be added as in 2D as a parameter of `Fr_Darcy_Weisbach::calc`.

### Member `Fr_Manning::calc` (SCALAR, SCALAR, SCALAR)

For future evolutions: the friction coefficient should be added as in 2D as a parameter of `Fr_Manning::calc`.

### Member `Friction::set_c` (SCALAR)

For future evolutions: `Friction::set_c` will not be necessary when the friction coefficient will be read as in 2D.

### Member `Gnuplot::Gnuplot` (Parameters &)

Exception should be treated.

### Member `Hu_read::initialization` (VECT &, VECT &)

Exception should be treated.

### Member `Initialization_topo::Initialization_topo` (Parameters &)

Exception should be treated.

### Member `MUSCL::calc` (VECT, VECT, VECT, VECT &, VECT &, VECT &, VECT &, VECT &, VECT &)

Check if the use of long double should be generalized to other reconstructions.

### Member `No_Friction::calc` (SCALAR, SCALAR, SCALAR)

For future evolutions: the friction coefficient should be added as in 2D as a parameter of `Fr_Manning::calc`.

**Member `Order2::Order2` (`Parameters &`)**

Exception should be treated.

**Member `Output::initial` (`VECT, VECT, VECT`)**

Exception should be treated.

**Member `Output::Output` (`Parameters &`)**

Exception should be treated.

**Member `Output::result` (`SCALAR, clock_t, SCALAR, SCALAR, SCALAR, SCALAR, SCALAR`)**

Exception should be treated.

**Member `Output::save` (`VECT, VECT, VECT`)**

Exception should be treated.

**Member `Parameters::setparameters` (`const char *`)**

Exception should be treated.

**Member `Parser::GetValue` (`const char *`)**

Exception should be treated.

**Member `Parser::Parser` (`const char *`)**

Exception should be treated.

**Member `Reconstruction::Reconstruction` (`Parameters &, VECT`)**

Exception should be treated.

**Member `Scheme::allocation` ()**

Exception should be treated.

**Member `Scheme::maincalc` (`VECT, VECT, SCALAR, VECT &, VECT &, VECT &, SCALAR &, SCALAR &, VECT &`)**

Improve the treatment of numerical errors.

**Member `Topo_read::initialization` (`VECT &`)**

Exception should be treated.

## Chapter 2

# Hierarchical Index

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## Chapter 5

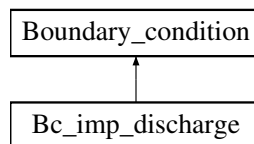
# Class Documentation

### 5.1 Bc\_imp\_discharge Class Reference

Imposed discharge.

```
#include <bc_imp_discharge.hpp>
```

Inheritance diagram for Bc\_imp\_discharge:



#### Public Member Functions

- [Bc\\_imp\\_discharge](#) ([Parameters](#) &, [VECT](#) &, int)  
*Constructor.*
- void [calc](#) ([SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), int)  
*Calculates the boundary condition.*
- [SCALAR NewtonSolver](#) (const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), int) const  
*Solves the equation with Newton iterative method.*
- [SCALAR ValPoly](#) (const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), int) const  
*Gives the value of the function that must vanish.*
- [SCALAR ValDerPoly](#) (const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), int) const  
*Gives the value of the derivative of the function that must vanish.*
- virtual [~Bc\\_imp\\_discharge](#) ()  
*Destructor.*

#### Additional Inherited Members

##### 5.1.1 Detailed Description

Imposed discharge.

Class that computes the boundary condition where the discharge is imposed. For supercritical flows, the water height is imposed too.

Definition at line 72 of file bc\_imp\_discharge.hpp.

## 5.1.2 Constructor & Destructor Documentation

### 5.1.2.1 Bc\_imp\_discharge::Bc\_imp\_discharge ( Parameters & *par*, VECT & *z*, int *normal* )

Constructor.

#### Parameters

in	<i>par</i>	parameter, contains all the values from the parameters file (unused).
in	<i>normal</i>	integer to specify whether it is the left (-1) or the right (1) boundary.
in, out	<i>z</i>	vector that represents the topography with suitable values on the fictive cells.

Definition at line 60 of file bc\_imp\_discharge.cpp.

### 5.1.2.2 Bc\_imp\_discharge::~~Bc\_imp\_discharge ( ) [virtual]

Destructor.

Definition at line 203 of file bc\_imp\_discharge.cpp.

## 5.1.3 Member Function Documentation

### 5.1.3.1 void Bc\_imp\_discharge::calc ( SCALAR *hin*, SCALAR *uin*, SCALAR *hfix*, SCALAR *qfix*, SCALAR *hin\_oppbound*, SCALAR *uin\_oppbound*, SCALAR *time*, int *normal* ) [virtual]

Calculates the boundary condition.

Two cases are considered: subcritical and supercritical flows.

#### Parameters

in	<i>hin</i>	water height of the first cell inside the domain.
in	<i>uin</i>	velocity of the first cell inside the domain.
in	<i>hfix</i>	fixed (imposed) value of the water height (only for the supercritical case).
in	<i>qfix</i>	fixed (imposed) value of the discharge.
in	<i>hin_oppbound</i>	value of the water height of the first cell inside the domain at the opposite bound (unused).
in	<i>uin_oppbound</i>	value of the velocity of the first cell inside the domain at the opposite bound (unused).
in	<i>time</i>	current time (unused).
in	<i>normal</i>	integer to specify whether it is the left (-1) or the right (1) boundary.

#### Warning

Warning in the method [Bc\\_imp\\_discharge::calc\(\)](#) The water height at the inflow is zero ... continuing!

#### Modifies

[Boundary\\_condition::hbound](#) water height on the fictive cell.

[Boundary\\_condition::ubound](#) velocity on the fictive cell.

Implements [Boundary\\_condition](#).

Definition at line 86 of file bc\_imp\_discharge.cpp.

5.1.3.2 **SCALAR** Bc\_imp\_discharge::NewtonSolver ( const **SCALAR** *HIN*, const **SCALAR** *UIN*, const **SCALAR** *QFIX*, const **SCALAR** *H\_INIT*, int *normal* ) const

Solves the equation with Newton iterative method.

Finds the root of the polynomial function corresponding to the imposed discharge. Needs the evaluation of the function and of its derivative.

#### Parameters

in	<i>HIN</i>	water height of the first cell inside the domain.
in	<i>UIN</i>	velocity of the first cell inside the domain.
in	<i>QFIX</i>	fixed (imposed) value of the discharge.
in	<i>H_INIT</i>	initialisation of the Newton solver.
in	<i>normal</i>	integer to specify whether it is the left (-1) or the right (1) boundary.

#### Warning

Warning: Newton bc did not converge.

#### Returns

**h**: water height that satisfies Riemann invariants.

Definition at line 135 of file bc\_imp\_discharge.cpp.

5.1.3.3 **SCALAR** Bc\_imp\_discharge::ValDerPoly ( const **SCALAR** *HIN*, const **SCALAR** *UIN*, const **SCALAR** *H*, int *normal* ) const

Gives the value of the derivative of the function that must vanish.

Computes  $3\sqrt{gH} - n(UIN + 2n\sqrt{gHIN})$  where *n* is the normal.

#### Parameters

in	<i>HIN</i>	water height of the first cell inside the domain.
in	<i>UIN</i>	velocity of the first cell inside the domain.
in	<i>H</i>	value for the variable of the polynomial function.
in	<i>normal</i>	integer to specify whether it is the left (-1) or the right (1) boundary.

#### Returns

The value of derivative of the polynomial function defined in [Bc\\_imp\\_discharge::ValPoly\(\)](#).

Definition at line 187 of file bc\_imp\_discharge.cpp.

5.1.3.4 **SCALAR** Bc\_imp\_discharge::ValPoly ( const **SCALAR** *HIN*, const **SCALAR** *UIN*, const **SCALAR** *QFIX*, const **SCALAR** *H*, int *normal* ) const

Gives the value of the function that must vanish.

Computes  $2H\sqrt{gH} - n(UIN + 2n\sqrt{gHIN})H - |QFIX|$  where *n* is the normal.

**Parameters**

in	<i>HIN</i>	water height of the first cell inside the domain.
in	<i>UIN</i>	velocity of the first cell inside the domain.
in	<i>QFIX</i>	fixed (imposed) value of the discharge.
in	<i>H</i>	value for the variable of the polynomial function.
in	<i>normal</i>	integer to specify whether it is the left (-1) or the right (1) boundary.

**Returns**

The value of the polynomial function.

Definition at line 171 of file `bc_imp_discharge.cpp`.

The documentation for this class was generated from the following files:

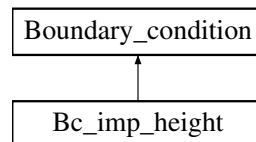
- [Headers/libboundaryconditions/bc\\_imp\\_discharge.hpp](#)
- [Sources/libboundaryconditions/bc\\_imp\\_discharge.cpp](#)

**5.2 Bc\_imp\_height Class Reference**

Imposed water height.

```
#include <bc_imp_height.hpp>
```

Inheritance diagram for `Bc_imp_height`:

**Public Member Functions**

- [Bc\\_imp\\_height](#) ([Parameters](#) &, [VECT](#) &, int)  
*Constructor.*
- void [calc](#) ([SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), int)  
*Calculates the boundary condition.*
- virtual [~Bc\\_imp\\_height](#) ()  
*Destructor.*

**Additional Inherited Members****5.2.1 Detailed Description**

Imposed water height.

Class that computes the boundary condition where the water height is imposed, thanks to the modified method of characteristics. For supercritical flows, the discharge is imposed too.

Definition at line 76 of file `bc_imp_height.hpp`.

## 5.2.2 Constructor & Destructor Documentation

### 5.2.2.1 Bc\_imp\_height::Bc\_imp\_height ( Parameters & *par*, VECT & *z*, int *normal* )

Constructor.

#### Parameters

in	<i>par</i>	parameter, contains all the values from the parameters file (unused).
in	<i>normal</i>	integer to specify whether it is the left (-1) or the right (1) boundary.
in, out	<i>z</i>	vector that represents the topography with suitable values on the fictive cells.

Definition at line 63 of file bc\_imp\_height.cpp.

### 5.2.2.2 Bc\_imp\_height::~Bc\_imp\_height ( ) [virtual]

Destructor.

Definition at line 135 of file bc\_imp\_height.cpp.

## 5.2.3 Member Function Documentation

### 5.2.3.1 void Bc\_imp\_height::calc ( SCALAR *hin*, SCALAR *uin*, SCALAR *hfix*, SCALAR *qfix*, SCALAR *hin\_oppbound*, SCALAR *uin\_oppbound*, SCALAR *time*, int *normal* ) [virtual]

Calculates the boundary condition.

Two cases are considered: subcritical and supercritical flows. In each case, the values to be imposed depend on the flow (inflow or outflow).

#### Parameters

in	<i>hin</i>	water height of the first cell inside the domain.
in	<i>uin</i>	velocity of the first cell inside the domain.
in	<i>hfix</i>	fixed (imposed) value of the water height.
in	<i>qfix</i>	fixed (imposed) value of the discharge.
in	<i>hin_oppbound</i>	value of the water height of the first cell inside the domain at the opposite bound (unused).
in	<i>uin_oppbound</i>	value of the velocity of the first cell inside the domain at the opposite bound (unused).
in	<i>time</i>	current time (unused).
in	<i>normal</i>	integer to specify whether it is the left (-1) or the right (1) boundary.

#### Modifies

[Boundary\\_condition::hbound](#) water height on the fictive cell.

[Boundary\\_condition::ubound](#) velocity on the fictive cell.

Implements [Boundary\\_condition](#).

Definition at line 85 of file bc\_imp\_height.cpp.

The documentation for this class was generated from the following files:

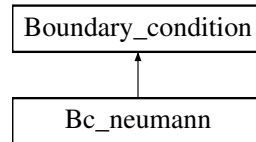
- Headers/libboundaryconditions/bc\_imp\_height.hpp
- Sources/libboundaryconditions/bc\_imp\_height.cpp

## 5.3 Bc\_neumann Class Reference

Neumann condition.

```
#include <bc_neumann.hpp>
```

Inheritance diagram for Bc\_neumann:



### Public Member Functions

- [Bc\\_neumann](#) ([Parameters](#) &, [VECT](#) &, int)  
*Constructor.*
- void [calc](#) ([SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), int)  
*Calculates the boundary condition.*
- virtual [~Bc\\_neumann](#) ()  
*Destructor.*

### Additional Inherited Members

#### 5.3.1 Detailed Description

Neumann condition.

Class that computes the boundary condition with Neumann condition (the normal derivative is null).

Definition at line 71 of file bc\_neumann.hpp.

#### 5.3.2 Constructor & Destructor Documentation

##### 5.3.2.1 Bc\_neumann::Bc\_neumann ( Parameters & par, VECT & z, int normal )

Constructor.

##### Parameters

in	<i>par</i>	parameter, contains all the values from the parameters file (unused).
in	<i>normal</i>	integer to specify whether it is the left (-1) or the right (1) boundary.
in, out	<i>z</i>	vector that represents the topography with suitable values on the fictive cells.

Definition at line 60 of file bc\_neumann.cpp.

##### 5.3.2.2 Bc\_neumann::~~Bc\_neumann ( ) [virtual]

Destructor.

Definition at line 104 of file bc\_neumann.cpp.

### 5.3.3 Member Function Documentation

5.3.3.1 void `Bc_neumann::calc` ( SCALAR *hin*, SCALAR *uin*, SCALAR *hfix*, SCALAR *qfix*, SCALAR *hin\_oppbound*, SCALAR *uin\_oppbound*, SCALAR *time*, int *normal* ) [virtual]

Calculates the boundary condition.

Two cases are considered: subcritical and supercritical flows.

#### Parameters

in	<i>hin</i>	water height of the first cell inside the domain.
in	<i>uin</i>	velocity of the first cell inside the domain.
in	<i>hfix</i>	fixed (imposed) value of the water height (unused).
in	<i>qfix</i>	fixed (imposed) value of the discharge (unused).
in	<i>hin_oppbound</i>	value of the water height of the first cell inside the domain at the opposite bound (unused).
in	<i>uin_oppbound</i>	value of the velocity of the first cell inside the domain at the opposite bound (unused).
in	<i>time</i>	current time (unused).
in	<i>normal</i>	integer to specify whether it is the left (-1) or the right (1) boundary (unused).

#### Modifies

[Boundary\\_condition::hbound](#) water height on the fictive cell.

[Boundary\\_condition::ubound](#) velocity on the fictive cell.

Implements [Boundary\\_condition](#).

Definition at line 82 of file `bc_neumann.cpp`.

The documentation for this class was generated from the following files:

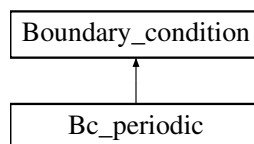
- Headers/libboundaryconditions/[bc\\_neumann.hpp](#)
- Sources/libboundaryconditions/[bc\\_neumann.cpp](#)

## 5.4 Bc\_periodic Class Reference

Periodic condition.

```
#include <bc_periodic.hpp>
```

Inheritance diagram for `Bc_periodic`:



#### Public Member Functions

- [Bc\\_periodic](#) (Parameters &, VECT &, int)  
*Constructor.*
- void [calc](#) (SCALAR, SCALAR, SCALAR, SCALAR, SCALAR, SCALAR, SCALAR, SCALAR, int)

*Calculates boundary condition.*

- virtual `~Bc_periodic ()`

*Destructor.*

## Additional Inherited Members

### 5.4.1 Detailed Description

Periodic condition.

Class that computes the periodic boundary condition

Definition at line 71 of file `bc_periodic.hpp`.

### 5.4.2 Constructor & Destructor Documentation

#### 5.4.2.1 `Bc_periodic::Bc_periodic ( Parameters & par, VECT & z, int normal )`

Constructor.

#### Parameters

<code>in</code>	<code>par</code>	parameter, contains all the values from the parameters file (unused).
<code>in</code>	<code>normal</code>	integer to specify whether it is the left (-1) or the right (1) boundary.
<code>in, out</code>	<code>z</code>	vector that represents the topography with suitable values on the fictive cells.

Definition at line 59 of file `bc_periodic.cpp`.

#### 5.4.2.2 `Bc_periodic::~~Bc_periodic ( ) [virtual]`

Destructor.

Definition at line 104 of file `bc_periodic.cpp`.

### 5.4.3 Member Function Documentation

#### 5.4.3.1 `void Bc_periodic::calc ( SCALAR hin, SCALAR uin, SCALAR hfix, SCALAR qfix, SCALAR hin_oppbound, SCALAR uin_oppbound, SCALAR time, int normal ) [virtual]`

Calculates boundary condition.

The velocity and water height are fixed to have the same behavior at each bound of the domain.

#### Parameters

<code>in</code>	<code>hin</code>	water height of the first cell inside the domain (unused).
<code>in</code>	<code>uin</code>	velocity of the first cell inside the domain (unused).
<code>in</code>	<code>hfix</code>	fixed (imposed) value of the water height (unused).
<code>in</code>	<code>qfix</code>	fixed (imposed) value of the discharge (unused).
<code>in</code>	<code>hin_oppbound</code>	value of the water height of the first cell inside the domain at the opposite bound.
<code>in</code>	<code>uin_oppbound</code>	value of the velocity of the first cell inside the domain at the opposite bound.
<code>in</code>	<code>time</code>	current time (unused).
<code>in</code>	<code>normal</code>	integer to specify whether it is the left (-1) or the right (1) boundary (unused).



**Modifies**

[Boundary\\_condition::hbound](#) water height on the fictive cell.

[Boundary\\_condition::ubound](#) velocity on the fictive cell.

Implements [Boundary\\_condition](#).

Definition at line 82 of file bc\_periodic.cpp.

The documentation for this class was generated from the following files:

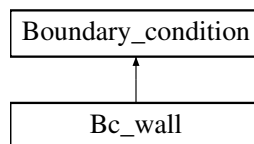
- Headers/libboundaryconditions/bc\_periodic.hpp
- Sources/libboundaryconditions/bc\_periodic.cpp

## 5.5 Bc\_wall Class Reference

Wall condition.

```
#include <bc_wall.hpp>
```

Inheritance diagram for Bc\_wall:



### Public Member Functions

- [Bc\\_wall](#) ([Parameters](#) &, [VECT](#) &, int)  
*Constructor.*
- void [calc](#) ([SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), int)  
*Calculates the boundary condition.*
- virtual [~Bc\\_wall](#) ()  
*Destructor.*

### Additional Inherited Members

#### 5.5.1 Detailed Description

Wall condition.

Class that computes the wall boundary condition.

Definition at line 71 of file bc\_wall.hpp.

#### 5.5.2 Constructor & Destructor Documentation

##### 5.5.2.1 Bc\_wall::Bc\_wall ( [Parameters](#) & *par*, [VECT](#) & *z*, int *normal* )

Constructor.

**Parameters**

in	<i>par</i>	parameter, contains all the values from the parameters file (unused).
in	<i>normal</i>	integer to specify whether it is the left (-1) or the right (1) boundary.
in, out	<i>z</i>	vector that represents the topography with suitable values on the fictive cells.

Definition at line 59 of file bc\_wall.cpp.

**5.5.2.2 Bc\_wall::~~Bc\_wall( ) [virtual]**

Destructor.

Definition at line 103 of file bc\_wall.cpp.

**5.5.3 Member Function Documentation****5.5.3.1 void Bc\_wall::calc ( SCALAR hin, SCALAR uin, SCALAR hfix, SCALAR qfix, SCALAR hin\_oppbound, SCALAR uin\_oppbound, SCALAR time, int normal ) [virtual]**

Calculates the boundary condition.

The water height (on the fictive cell) is the same as inside the domain and the velocity is the opposite. This gives a null discharge at the boundary.

**Parameters**

in	<i>hin</i>	water height of the first cell inside the domain.
in	<i>uin</i>	velocity of the first cell inside the domain.
in	<i>hfix</i>	fixed (imposed) value of the water height (only for the supercritical case) (unused).
in	<i>qfix</i>	fixed (imposed) value of the discharge (unused).
in	<i>hin_oppbound</i>	value of the water height of the first cell inside the domain at the opposite bound (unused).
in	<i>uin_oppbound</i>	value of the velocity of the first cell inside the domain at the opposite bound (unused).
in	<i>time</i>	current time (unused).
in	<i>normal</i>	integer to specify whether it is the left (-1) or the right (1) boundary (unused).

**Modifies**

[Boundary\\_condition::hbound](#) water height on the fictive cell.

[Boundary\\_condition::ubound](#) velocity on the fictive cell.

Implements [Boundary\\_condition](#).

Definition at line 80 of file bc\_wall.cpp.

The documentation for this class was generated from the following files:

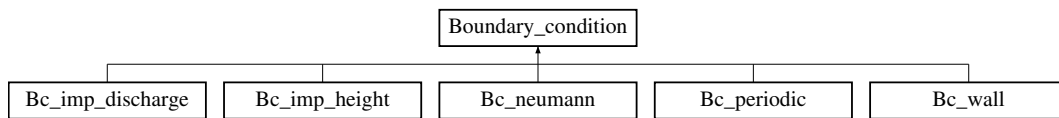
- Headers/libboundaryconditions/bc\_wall.hpp
- Sources/libboundaryconditions/bc\_wall.cpp

**5.6 Boundary\_condition Class Reference**

Boundary condition.

```
#include <boundary_condition.hpp>
```

Inheritance diagram for Boundary\_condition:



## Public Member Functions

- [Boundary\\_condition](#) ([Parameters](#) &)  
*Constructor.*
- virtual void [calc](#) ([SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), int)=0  
*Function to be specified in each boundary condition.*
- [SCALAR](#) [get\\_hbound](#) () const  
*Gives the water height on the fictive cell.*
- [SCALAR](#) [get\\_ubound](#) () const  
*Gives the velocity of the flow on the fictive cell.*
- virtual [~Boundary\\_condition](#) ()  
*Destructor.*

## Protected Attributes

- [SCALAR](#) [hbound](#)
- [SCALAR](#) [ubound](#)
- [SCALAR](#) [ufix](#)
- const int [NXCELL](#)

### 5.6.1 Detailed Description

Boundary condition.

Class that contains all the common declarations for the boundary conditions.

**Todo** Improve boundary conditions at the second order for the wall and periodic conditions.

Take into account source terms (friction and topography) in the boundary conditions, see

[Le Roux \[2001\]](#), [Bristeau and Coussin \[2001\]](#).

Definition at line 71 of file `boundary_condition.hpp`.

### 5.6.2 Constructor & Destructor Documentation

#### 5.6.2.1 `Boundary_condition::Boundary_condition ( Parameters & par )`

Constructor.

Defines the number of cells.

## Parameters

<i>in</i>	<i>par</i>	parameter, contains all the values from the parameters file.
-----------	------------	--------------------------------------------------------------

Definition at line 58 of file `boundary_condition.cpp`.

### 5.6.2.2 `Boundary_condition::~~Boundary_condition ( )` `[virtual]`

Destructor.

Definition at line 87 of file `boundary_condition.cpp`.

## 5.6.3 Member Function Documentation

### 5.6.3.1 `virtual void Boundary_condition::calc ( SCALAR , SCALAR , SCALAR , SCALAR , SCALAR , SCALAR , SCALAR , int )` `[pure virtual]`

Function to be specified in each boundary condition.

Implemented in [Bc\\_imp\\_height](#), [Bc\\_imp\\_discharge](#), [Bc\\_neumann](#), [Bc\\_periodic](#), and [Bc\\_wall](#).

### 5.6.3.2 `SCALAR Boundary_condition::get_hbound ( ) const`

Gives the water height on the fictive cell.

#### Returns

[Boundary\\_condition::hbound](#) water height on the fictive cell.

Definition at line 67 of file `boundary_condition.cpp`.

### 5.6.3.3 `SCALAR Boundary_condition::get_ubound ( ) const`

Gives the velocity of the flow on the fictive cell.

#### Returns

[Boundary\\_condition::ubound](#) velocity on the fictive cell.

Definition at line 77 of file `boundary_condition.cpp`.

## 5.6.4 Member Data Documentation

### 5.6.4.1 `SCALAR Boundary_condition::hbound` `[protected]`

Water height on the fictive cell, to be specified in each boundary condition.

Definition at line 93 of file `boundary_condition.hpp`.

### 5.6.4.2 `const int Boundary_condition::NXCELL` `[protected]`

Number of cells (in space).

Definition at line 99 of file `boundary_condition.hpp`.

#### 5.6.4.3 SCALAR Boundary\_condition::ubound [protected]

Velocity on the fictive cell, to be specified in each boundary condition.

Definition at line 95 of file boundary\_condition.hpp.

#### 5.6.4.4 SCALAR Boundary\_condition::ufix [protected]

Imposed value of the velocity from [Parameters::L\\_imp\\_q](#) (or [Parameters::R\\_imp\\_q](#)) and [Parameters::L\\_imp\\_h](#) (or [Parameters::R\\_imp\\_h](#)).

Definition at line 97 of file boundary\_condition.hpp.

The documentation for this class was generated from the following files:

- [Headers/libboundaryconditions/boundary\\_condition.hpp](#)
- [Sources/libboundaryconditions/boundary\\_condition.cpp](#)

## 5.7 Choice\_condition Class Reference

Choice of boundary condition.

```
#include <choice_condition.hpp>
```

### Public Member Functions

- [Choice\\_condition](#) (int, [Parameters](#) &, [VECT](#) &, int)  
*Constructor.*
- void [calc](#) ([SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), int)  
*Calculates the boundary condition.*
- [SCALAR get\\_hbound](#) ()  
*Gives the water height on the fictive cell.*
- [SCALAR get\\_ubound](#) ()  
*Gives the velocity of the flow on the fictive cell.*
- virtual [~Choice\\_condition](#) ()  
*Destructor.*

### 5.7.1 Detailed Description

Choice of boundary condition.

Class that calls the boundary condition chosen in the parameters file.

Definition at line 90 of file choice\_condition.hpp.

### 5.7.2 Constructor & Destructor Documentation

#### 5.7.2.1 Choice\_condition::Choice\_condition ( int choice, Parameters & par, VECT & z, int normal )

Constructor.

Defines the boundary condition from the value given in the parameters file.

## Parameters

in	<i>choice</i>	integer that correspond to the chosen boundary condition.
in	<i>par</i>	parameter, contains all the values from the parameters file.
in	<i>z</i>	vector that represents the topography.
in	<i>normal</i>	integer to specify whether it is the left (-1) or the right (1) boundary.

Definition at line 59 of file choice\_condition.cpp.

### 5.7.2.2 Choice\_condition::~~Choice\_condition ( ) [virtual]

Destructor.

Definition at line 130 of file choice\_condition.cpp.

### 5.7.3 Member Function Documentation

#### 5.7.3.1 void Choice\_condition::calc ( SCALAR hin, SCALAR uin, SCALAR hfix, SCALAR qfix, SCALAR hin\_oppbound, SCALAR uin\_oppbound, SCALAR time, int normal )

Calculates the boundary condition.

Calls the calculation of the boundary condition.

## Parameters

in	<i>hin</i>	water height of the first cell inside the domain.
in	<i>uin</i>	velocity of the first cell inside the domain.
in	<i>hfix</i>	fixed (imposed) value of the water height.
in	<i>qfix</i>	fixed (imposed) value of the discharge.
in	<i>hin_oppbound</i>	value of the water height of the first cell inside the domain at the opposite bound.
in	<i>uin_oppbound</i>	value of the velocity of the first cell inside the domain at the opposite bound.
in	<i>time</i>	current time (unused, for the moment).
in	<i>normal</i>	integer to specify whether it is the left (-1) or the right (1) boundary.

**Todo** Add time dependance in the boundary conditions.

Definition at line 89 of file choice\_condition.cpp.

#### 5.7.3.2 SCALAR Choice\_condition::get\_hbound ( )

Gives the water height on the fictive cell.

Calls the function to get the water height on the fictive cell.

## Returns

[Boundary\\_condition::hbound](#) water height on the fictive cell for the chosen boundary condition.

Definition at line 108 of file choice\_condition.cpp.

### 5.7.3.3 SCALAR Choice\_condition::get\_ubound ( )

Gives the velocity of the flow on the fictive cell.

Calls the function to get the velocity on the fictive cell.

#### Returns

[Boundary\\_condition::ubound](#) velocity on the fictive cell for the chosen boundary condition.

Definition at line 119 of file choice\_condition.cpp.

The documentation for this class was generated from the following files:

- Headers/libboundaryconditions/[choice\\_condition.hpp](#)
- Sources/libboundaryconditions/[choice\\_condition.cpp](#)

## 5.8 Choice\_flux Class Reference

Choice of numerical flux.

```
#include <choice_flux.hpp>
```

### Public Member Functions

- [Choice\\_flux](#) (int)  
*Constructor.*
- void [calc](#) (SCALAR, SCALAR, SCALAR, SCALAR)  
*Calculates the numerical flux.*
- void [set\\_tx](#) (SCALAR)  
*Sets the variable `Flux::tx`.*
- [SCALAR get\\_f1](#) ()  
*Gives the first component of the numerical flux.*
- [SCALAR get\\_f2](#) ()  
*Gives the second component of the numerical flux.*
- [SCALAR get\\_cfl](#) ()  
*Gives the CFL value.*
- virtual [~Choice\\_flux](#) ()  
*Destructor.*

### 5.8.1 Detailed Description

Choice of numerical flux.

Class that calls the numerical flux chosen in the parameters file.

Definition at line 92 of file choice\_flux.hpp.

## 5.8.2 Constructor & Destructor Documentation

### 5.8.2.1 Choice\_flux::Choice\_flux ( int *choice* )

Constructor.

Defines the numerical flux from the value given in the parameters file.

#### Parameters

in	<i>choice</i>	integer that correspond to the chosen numerical flux.
----	---------------	-------------------------------------------------------

Definition at line 59 of file choice\_flux.cpp.

### 5.8.2.2 Choice\_flux::~~Choice\_flux ( ) [virtual]

Destructor.

Definition at line 144 of file choice\_flux.cpp.

## 5.8.3 Member Function Documentation

### 5.8.3.1 void Choice\_flux::calc ( SCALAR *h\_L*, SCALAR *u\_L*, SCALAR *h\_R*, SCALAR *u\_R* )

Calculates the numerical flux.

Calls the calculation of the numerical flux.

#### Parameters

in	<i>h_L</i>	water height at the left of the interface where the flux is calculated.
in	<i>u_L</i>	velocity at the left of the interface where the flux is calculated.
in	<i>h_R</i>	water height at the right of the interface where the flux is calculated.
in	<i>u_R</i>	velocity at the right of the interface where the flux is calculated.

Definition at line 86 of file choice\_flux.cpp.

### 5.8.3.2 SCALAR Choice\_flux::get\_cfl ( )

Gives the CFL value.

Calls the function to get the value of the CFL.

#### Returns

[Flux::cfl](#) value of the CFL.

Definition at line 133 of file choice\_flux.cpp.

### 5.8.3.3 SCALAR Choice\_flux::get\_f1 ( )

Gives the first component of the numerical flux.

Calls the function to get the first component of the numerical flux.



**Returns**

[Flux::f1](#) first component of the numerical flux.

Definition at line 111 of file choice\_flux.cpp.

**5.8.3.4 SCALAR Choice\_flux::get\_f2( )**

Gives the second component of the numerical flux.

Calls the function to get the second component of the numerical flux.

**Returns**

[Flux::f2](#) second component of the numerical flux.

Definition at line 122 of file choice\_flux.cpp.

**5.8.3.5 void Choice\_flux::set\_tx ( SCALAR tx )**

Sets the variable [Flux::tx](#).

Calls the setting of the value given in parameter to the variable **tx**.

**Parameters**

in	tx	value of dt/dx.
----	----	-----------------

Definition at line 100 of file choice\_flux.cpp.

The documentation for this class was generated from the following files:

- [Headers/libflux/choice\\_flux.hpp](#)
- [Sources/libflux/choice\\_flux.cpp](#)

**5.9 Choice\_friction Class Reference**

Choice of friction law.

```
#include <choice_friction.hpp>
```

**Public Member Functions**

- [Choice\\_friction](#) (int)  
*Constructor.*
- void [calc](#) (SCALAR, SCALAR, SCALAR)  
*Calculates the friction term.*
- SCALAR [get\\_qmod](#) ()  
*Gives the discharge modified by the friction term.*
- void [set\\_c](#) (SCALAR)  
*Sets the variable [Friction::c](#).*
- void [set\\_dt](#) (SCALAR)

Sets the variable *Friction::dt*.

- virtual `~Choice_friction ()`

Destructor.

### 5.9.1 Detailed Description

Choice of friction law.

Class that calls the friction law chosen in the parameters file.

Definition at line 82 of file `choice_friction.hpp`.

### 5.9.2 Constructor & Destructor Documentation

#### 5.9.2.1 `Choice_friction::Choice_friction ( int choice )`

Constructor.

Defines the friction law from the value given in the parameters file.

#### Parameters

in	<i>choice</i>	integer that correspond to the chosen friction law.
----	---------------	-----------------------------------------------------

Definition at line 59 of file `choice_friction.cpp`.

#### 5.9.2.2 `Choice_friction::~~Choice_friction ( ) [virtual]`

Destructor.

Definition at line 131 of file `choice_friction.cpp`.

### 5.9.3 Member Function Documentation

#### 5.9.3.1 `void Choice_friction::calc ( SCALAR uold, SCALAR hnew, SCALAR qnew )`

Calculates the friction term.

Calls the calculation of the friction law.

#### Parameters

in	<i>uold</i>	velocity at the previous time ( <i>n</i> if you are calculating the <i>n</i> + 1th time step).
in	<i>hnew</i>	water height after the Shallow-Water computation (without friction).
in	<i>qnew</i>	discharge after the Shallow-Water computation (without friction).

#### Note

The friction only affects the discharge.

Definition at line 83 of file `choice_friction.cpp`.

### 5.9.3.2 SCALAR Choice\_friction::get\_qmod ( )

Gives the discharge modified by the friction term.

Calls the function to get the discharge modified by the friction term.

#### Returns

[Friction::qmod](#) discharge modified by the friction term.

Definition at line 97 of file choice\_friction.cpp.

### 5.9.3.3 void Choice\_friction::set\_c ( SCALAR c )

Sets the variable [Friction::c](#).

Calls the setting of the value given in parameter to the variable **c**.

#### Parameters

in	c	value of the friction coefficient.
----	---	------------------------------------

**Todo** For future evolutions: [Friction::set\\_c](#) will not be necessary when the friction coefficient will be read as in 2D.

Definition at line 108 of file choice\_friction.cpp.

### 5.9.3.4 void Choice\_friction::set\_dt ( SCALAR dt )

Sets the variable [Friction::dt](#).

Calls the setting of the value given in parameter to the variable **dt**.

#### Parameters

in	dt	value of the time step.
----	----	-------------------------

Definition at line 120 of file choice\_friction.cpp.

The documentation for this class was generated from the following files:

- Headers/libfrictions/[choice\\_friction.hpp](#)
- Sources/libfrictions/[choice\\_friction.cpp](#)

## 5.10 Choice\_infiltration Class Reference

Choice of infiltration law.

```
#include <choice_infiltration.hpp>
```

#### Public Member Functions

- [Choice\\_infiltration](#) ([Parameters](#) &)

*Constructor.*

- void `calc` (const `VECT` &, const `VECT` &, const `SCALAR`)

*Performs the computation of the modified water height and the infiltrated volume.*

- virtual `~Choice_infiltration` ()

*Destructor.*

- `VECT` `get_hmod` ()

*Gives the value of the modified water height.*

- `VECT` `get_Vin` ()

*Gives the value of the infiltrated volume.*

### 5.10.1 Detailed Description

Choice of infiltration law.

Class that calls the infiltration chosen in the parameters file.

Definition at line 80 of file `choice_infiltration.hpp`.

### 5.10.2 Constructor & Destructor Documentation

#### 5.10.2.1 `Choice_infiltration::Choice_infiltration ( Parameters & par )`

Constructor.

Defines the friction law from the value given in the parameters file.

#### Parameters

<code>in</code>	<code>par</code>	parameter, contains all the values from the parameters file.
-----------------	------------------	--------------------------------------------------------------

Definition at line 59 of file `choice_infiltration.cpp`.

#### 5.10.2.2 `Choice_infiltration::~~Choice_infiltration ( )` [virtual]

Destructor.

Definition at line 109 of file `choice_infiltration.cpp`.

### 5.10.3 Member Function Documentation

#### 5.10.3.1 `void Choice_infiltration::calc ( const VECT & h, const VECT & Vin, const SCALAR dt )`

Performs the computation of the modified water height and the infiltrated volume.

Calls the computation of infiltration.

#### Parameters

<code>in</code>	<code>h</code>	water height.
<code>in</code>	<code>Vin_tot</code>	total infiltrated volume.
<code>in</code>	<code>dt</code>	time step.

Definition at line 77 of file `choice_infiltration.cpp`.

### 5.10.3.2 VECT Choice\_infiltration::get\_hmod ( )

Gives the value of the modified water height.

#### Returns

The value hmod [Infiltration::hmod](#).

Definition at line 89 of file choice\_infiltration.cpp.

### 5.10.3.3 VECT Choice\_infiltration::get\_Vin ( )

Gives the value of the infiltrated volume.

#### Returns

The value Vin [Infiltration::Vin](#).

Definition at line 99 of file choice\_infiltration.cpp.

The documentation for this class was generated from the following files:

- Headers/librain\_infiltration/[choice\\_infiltration.hpp](#)
- Sources/librain\_infiltration/[choice\\_infiltration.cpp](#)

## 5.11 Choice\_init\_hu Class Reference

Choice of initialization for h and u.

```
#include <choice_init_hu.hpp>
```

### Public Member Functions

- [Choice\\_init\\_hu](#) ([Parameters](#) &)  
*Constructor.*
- void [initialization](#) ([VECT](#) &, [VECT](#) &)  
*Performs the initialization.*
- virtual [~Choice\\_init\\_hu](#) ()  
*Destructor.*

### 5.11.1 Detailed Description

Choice of initialization for h and u.

Class that calls the initialization of the water height and of the velocity chosen in the parameters file.

Definition at line 96 of file choice\_init\_hu.hpp.

### 5.11.2 Constructor & Destructor Documentation

#### 5.11.2.1 Choice\_init\_hu::Choice\_init\_hu ( Parameters & par )

Constructor.

Defines the initialization of the water height and of the velocity from the value given in the parameters file.

##### Parameters

in	par	parameter, contains all the values from the parameters file.
----	-----	--------------------------------------------------------------

Definition at line 59 of file choice\_init\_hu.cpp.

#### 5.11.2.2 Choice\_init\_hu::~Choice\_init\_hu ( ) [virtual]

Destructor.

Definition at line 103 of file choice\_init\_hu.cpp.

### 5.11.3 Member Function Documentation

#### 5.11.3.1 void Choice\_init\_hu::initialization ( VECT & h, VECT & u )

Performs the initialization.

Calls the initialization of the water height and of the velocity.

##### Parameters

in	h	water height.
in	u	velocity.

Definition at line 91 of file choice\_init\_hu.cpp.

The documentation for this class was generated from the following files:

- Headers/libinitializations/[choice\\_init\\_hu.hpp](#)
- Sources/libinitializations/[choice\\_init\\_hu.cpp](#)

## 5.12 Choice\_init\_topo Class Reference

Choice of initialization for the topography.

```
#include <choice_init_topo.hpp>
```

### Public Member Functions

- [Choice\\_init\\_topo \(Parameters &\)](#)  
*Constructor.*
- void [initialization \(VECT &\)](#)  
*Performs the initialization.*

- virtual [~Choice\\_init\\_topo\(\)](#)

*Destructor.*

### 5.12.1 Detailed Description

Choice of initialization for the topography.

Class that calls the initialization of the topography chosen in the parameters file.

Definition at line 87 of file choice\_init\_topo.hpp.

### 5.12.2 Constructor & Destructor Documentation

#### 5.12.2.1 Choice\_init\_topo::Choice\_init\_topo ( Parameters & par )

Constructor.

Defines the initialization of the topography from the value given in the parameters file.

#### Parameters

in	par	parameter, contains all the values from the parameters file.
----	-----	--------------------------------------------------------------

Definition at line 59 of file choice\_init\_topo.cpp.

#### 5.12.2.2 Choice\_init\_topo::~~Choice\_init\_topo ( ) [virtual]

Destructor.

Definition at line 97 of file choice\_init\_topo.cpp.

### 5.12.3 Member Function Documentation

#### 5.12.3.1 void Choice\_init\_topo::initialization ( VECT & z )

Performs the initialization.

Calls the initialization of the topography.

#### Parameters

in	z	topography.
----	---	-------------

Definition at line 86 of file choice\_init\_topo.cpp.

The documentation for this class was generated from the following files:

- Headers/libinitializations/[choice\\_init\\_topo.hpp](#)
- Sources/libinitializations/[choice\\_init\\_topo.cpp](#)

## 5.13 Choice\_limiter Class Reference

Choice of slope limiter.

```
#include <choice_limiter.hpp>
```

## Public Member Functions

- [Choice\\_limiter](#) (int)  
*Constructor.*
- void [calc](#) (SCALAR, SCALAR)  
*Calculates the slope limiter.*
- SCALAR [get\\_rec](#) () const  
*Gives the reconstructed value.*
- virtual [~Choice\\_limiter](#) ()  
*Destructor.*

### 5.13.1 Detailed Description

Choice of slope limiter.

Class that calls the slope limiter chosen in the parameters file.

Definition at line 83 of file choice\_limiter.hpp.

### 5.13.2 Constructor & Destructor Documentation

#### 5.13.2.1 Choice\_limiter::Choice\_limiter ( int *choice* )

Constructor.

Defines the slope limiter from the value given in the parameters file.

#### Parameters

in	<i>choice</i>	integer that correspond to the chosen slope limiter.
----	---------------	------------------------------------------------------

Definition at line 59 of file choice\_limiter.cpp.

#### 5.13.2.2 Choice\_limiter::~~Choice\_limiter ( ) [virtual]

Destructor.

Definition at line 103 of file choice\_limiter.cpp.

### 5.13.3 Member Function Documentation

#### 5.13.3.1 void Choice\_limiter::calc ( SCALAR *a*, SCALAR *b* )

Calculates the slope limiter.

Calls the calculation of the slope limiter.

#### Parameters

in	<i>a</i>	slope on the left of the cell.
in	<i>b</i>	slope on the right of the cell.



Definition at line 80 of file choice\_limiter.cpp.

### 5.13.3.2 SCALAR Choice\_limiter::get\_rec ( ) const

Gives the reconstructed value.

Calls the function to get the reconstructed value.

#### Returns

[Limiter::rec](#) reconstructed value for the chosen slope limiter.

Definition at line 92 of file choice\_limiter.cpp.

The documentation for this class was generated from the following files:

- Headers/liblimitations/[choice\\_limiter.hpp](#)
- Sources/liblimitations/[choice\\_limiter.cpp](#)

## 5.14 Choice\_output Class Reference

Choice of output format.

```
#include <choice_output.hpp>
```

### Public Member Functions

- [Choice\\_output](#) ([Parameters](#) &)  
*Constructor.*
- void [write](#) ([VECT](#), [VECT](#), [VECT](#), int)  
*Save the current time.*
- void [initial](#) ([VECT](#), [VECT](#), [VECT](#))  
*Saves the initial time.*
- void [bound\\_flux](#) (int, [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#))  
*Saves the flux and the cumulative flux on the boundaries.*
- void [check\\_vol](#) (int, [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#))  
*Saves the infiltrated and rain volumes.*
- void [result](#) ([SCALAR](#), [clock\\_t](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#))  
*Saves global values.*
- void [save](#) ([VECT](#), [VECT](#), [VECT](#))  
*Saves the final time.*
- virtual [~Choice\\_output](#) ()  
*Destructor.*

### 5.14.1 Detailed Description

Choice of output format.

From the value of the corresponding parameter, calls the savings in the chosen format.

Definition at line 74 of file choice\_output.hpp.

### 5.14.2 Constructor & Destructor Documentation

#### 5.14.2.1 Choice\_output::Choice\_output ( Parameters & par )

Constructor.

Defines the output format from the value given in the parameters file.

##### Parameters

in	<i>par</i>	parameter, contains all the values from the parameters file.
----	------------	--------------------------------------------------------------

Definition at line 58 of file choice\_output.cpp.

#### 5.14.2.2 Choice\_output::~Choice\_output ( ) [virtual]

Destructor.

Definition at line 159 of file choice\_output.cpp.

### 5.14.3 Member Function Documentation

#### 5.14.3.1 void Choice\_output::bound\_flux ( int time, SCALAR f\_l, SCALAR f\_r, SCALAR cum\_f\_l, SCALAR cum\_f\_r )

Saves the flux and the cumulative flux on the boundaries.

Calls the saving of the flux and the cumulative flux on the boundaries.

##### Parameters

in	<i>time</i>	current time (number of iteration).
in	<i>f_l</i>	flux on the left boundary.
in	<i>f_r</i>	flux on the right boundary.
in	<i>cum_f_l</i>	cumulative flux on the left boundary.
in	<i>cum_f_r</i>	cumulative flux on the right boundary.

Definition at line 100 of file choice\_output.cpp.

#### 5.14.3.2 void Choice\_output::check\_vol ( int time, SCALAR Vol\_rain\_tot, SCALAR Vol\_inf\_tot, SCALAR Vol\_of\_tot, SCALAR bound\_flux\_tot )

Saves the infiltrated and rain volumes.

Calls the saving of the infiltrated and rain volumes.

##### Parameters

in	<i>time</i>	current time (number of iteration).
in	<i>Vol_rain_tot</i>	total rain volume.
in	<i>Vol_inf_tot</i>	total volume of infiltrated water.
in	<i>Vol_of_tot</i>	total volume of overland flow.
in	<i>bound_flux_tot</i>	total boundary flux.

Definition at line 115 of file choice\_output.cpp.

5.14.3.3 void Choice\_output::initial ( VECT *z*, VECT *h*, VECT *u* )

Saves the initial time.

Calls the saving of the initial time.

## Parameters

in	<i>h</i>	water height.
in	<i>u</i>	velocity.
in	<i>z</i>	topography.

Definition at line 87 of file choice\_output.cpp.

5.14.3.4 void Choice\_output::result ( SCALAR *t*, clock.t *cpu*, SCALAR *froude*, SCALAR *Vol\_rain\_tot*, SCALAR *Vol\_inf\_tot*, SCALAR *Vol\_of\_tot*, SCALAR *bound\_flux\_tot* )

Saves global values.

Calls the saving of the global values.

## Parameters

in	<i>t</i>	elapsed time.
in	<i>cpu</i>	CPU time.
in	<i>froude</i>	mean Froude number (in space) at the final time.
in	<i>Vol_rain_tot</i>	total rain volume.
in	<i>Vol_inf_tot</i>	total volume of infiltrated water.
in	<i>Vol_of_tot</i>	total volume of overland flow.
in	<i>bound_flux_tot</i>	total boundary flux.

Definition at line 130 of file choice\_output.cpp.

5.14.3.5 void Choice\_output::save ( VECT *z*, VECT *h*, VECT *q* )

Saves the final time.

Calls the saving of the final time.

## Parameters

in	<i>z</i>	topography.
in	<i>h</i>	water height.
in	<i>q</i>	discharge.

Definition at line 146 of file choice\_output.cpp.

5.14.3.6 void Choice\_output::write ( VECT *h*, VECT *q*, VECT *z*, int *n* )

Save the current time.

Calls the saving of the current time.

**Parameters**

in	<i>h</i>	water height.
in	<i>q</i>	discharge.
in	<i>z</i>	topography.
in	<i>n</i>	index of the current time.

Definition at line 73 of file choice\_output.cpp.

The documentation for this class was generated from the following files:

- Headers/libsave/[choice\\_output.hpp](#)
- Sources/libsave/[choice\\_output.cpp](#)

**5.15 Choice\_rain Class Reference**

Choice of initialization for the rain.

```
#include <choice_rain.hpp>
```

**Public Member Functions**

- [Choice\\_rain](#) ([Parameters](#) &)  
*Constructor.*
- void [rain\\_func](#) ([SCALAR](#), [VECT](#) &)  
*Performs the initialization filling up the table of the rain intensity.*
- virtual [~Choice\\_rain](#) ()  
*Destructor.*

**5.15.1 Detailed Description**

Choice of initialization for the rain.

Class that calls the initialization of the rain chosen in the parameters file.

Definition at line 83 of file choice\_rain.hpp.

**5.15.2 Constructor & Destructor Documentation****5.15.2.1 Choice\_rain::Choice\_rain ( [Parameters](#) & *par* )**

Constructor.

Defines the initialization of the rain from the value given in the parameters file.

**Parameters**

in	<i>par</i>	parameter, contains all the values from the parameters file.
----	------------	--------------------------------------------------------------

Definition at line 58 of file choice\_rain.cpp.

### 5.15.2.2 Choice\_rain::~~Choice\_rain ( ) [virtual]

Destructor.

Definition at line 92 of file choice\_rain.cpp.

## 5.15.3 Member Function Documentation

### 5.15.3.1 void Choice\_rain::rain\_func ( SCALAR time, VECT & Tab\_rain )

Performs the initialization filling up the table of the rain intensity.

Calls the initialization of the rain.

#### Parameters

in	<i>time</i>	current time.
in	<i>Tab_rain</i>	rain.

Definition at line 81 of file choice\_rain.cpp.

The documentation for this class was generated from the following files:

- Headers/librain\_infiltration/[choice\\_rain.hpp](#)
- Sources/librain\_infiltration/[choice\\_rain.cpp](#)

## 5.16 Choice\_reconstruction Class Reference

Choice of reconstruction.

```
#include <choice_reconstruction.hpp>
```

### Public Member Functions

- [Choice\\_reconstruction](#) (Parameters &, VECT)  
*Constructor.*
- void [calc](#) (VECT, VECT, VECT, VECT &, VECT &, VECT &, VECT &, VECT &, VECT &)  
*Calculates the second order reconstruction in space.*
- virtual [~Choice\\_reconstruction](#) ()  
*Destructor.*

### 5.16.1 Detailed Description

Choice of reconstruction.

Class that calls the reconstruction chosen in the parameters file.

Definition at line 82 of file choice\_reconstruction.hpp.

### 5.16.2 Constructor & Destructor Documentation

### 5.16.2.1 Choice\_reconstruction::Choice\_reconstruction ( Parameters & *par*, VECT *z* )

Constructor.

Defines the reconstruction from the value given in the parameters file.

#### Parameters

in	<i>par</i>	parameter, contains all the values from the parameters file.
in	<i>z</i>	vector that represents the topography.

Definition at line 59 of file choice\_reconstruction.cpp.

### 5.16.2.2 Choice\_reconstruction::~~Choice\_reconstruction ( ) [virtual]

Destructor.

Definition at line 100 of file choice\_reconstruction.cpp.

## 5.16.3 Member Function Documentation

### 5.16.3.1 void Choice\_reconstruction::calc ( VECT *h*, VECT *u*, VECT *z*, VECT & *hr*, VECT & *hl*, VECT & *delz*, VECT & *ur*, VECT & *ul*, VECT & *dzi* )

Calculates the second order reconstruction in space.

Calls the calculation of the second order reconstruction in space.

#### Parameters

in	<i>h</i>	water height.
in	<i>u</i>	velocity of the flow.
in	<i>z</i>	topography.
out	<i>hr</i>	reconstructed water height on the right of the cell.
out	<i>hl</i>	reconstructed water height on the left of the cell.
out	<i>delz</i>	difference between two reconstructed topographies on the same boundary (from two adjacent cells).
out	<i>ur</i>	reconstructed velocity on the right of the cell.
out	<i>ul</i>	reconstructed velocity on the left of the cell.
out	<i>dzi</i>	difference between the reconstructed topographies on the left and on the right boundary of a cell.

Definition at line 81 of file choice\_reconstruction.cpp.

The documentation for this class was generated from the following files:

- Headers/libreconstructions/[choice\\_reconstruction.hpp](#)
- Sources/libreconstructions/[choice\\_reconstruction.cpp](#)

## 5.17 Choice\_scheme Class Reference

Choice of numerical scheme.

```
#include <choice_scheme.hpp>
```

## Public Member Functions

- [Choice\\_scheme](#) ([Parameters](#) &)  
*Constructor.*
- void [calc](#) ()  
*Performs the scheme.*
- virtual [~Choice\\_scheme](#) ()  
*Destructor.*

### 5.17.1 Detailed Description

Choice of numerical scheme.

Class that calls the numerical scheme chosen in the parameters file.

Definition at line 78 of file choice\_scheme.hpp.

### 5.17.2 Constructor & Destructor Documentation

#### 5.17.2.1 Choice\_scheme::Choice\_scheme ( [Parameters](#) & *par* )

Constructor.

Defines the numerical scheme from the value given in the parameters file.

#### Parameters

<i>in</i>	<i>par</i>	parameter, contains all the values from the parameters file.
-----------	------------	--------------------------------------------------------------

Definition at line 59 of file choice\_scheme.cpp.

#### 5.17.2.2 Choice\_scheme::~Choice\_scheme ( ) [[virtual](#)]

Destructor.

Definition at line 88 of file choice\_scheme.cpp.

### 5.17.3 Member Function Documentation

#### 5.17.3.1 void Choice\_scheme::calc ( )

Performs the scheme.

Calls the computation of the solution.

Definition at line 77 of file choice\_scheme.cpp.

The documentation for this class was generated from the following files:

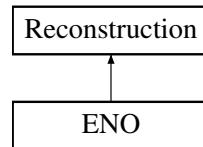
- Headers/libschemas/[choice\\_scheme.hpp](#)
- Sources/libschemas/[choice\\_scheme.cpp](#)

## 5.18 ENO Class Reference

ENO recontruction

```
#include <eno.hpp>
```

Inheritance diagram for ENO:



### Public Member Functions

- [ENO \(Parameters &, VECT\)](#)  
*Constructor.*
- void [calc \(VECT, VECT, VECT, VECT &, VECT &, VECT &, VECT &, VECT &, VECT &\)](#)  
*Calculates the reconstruction in space.*
- [~ENO \(\)](#)  
*Destructor.*

### Additional Inherited Members

#### 5.18.1 Detailed Description

ENO recontruction

Class that computes ENO reconstruction in space.

Definition at line 69 of file eno.hpp.

#### 5.18.2 Constructor & Destructor Documentation

##### 5.18.2.1 ENO::ENO ( Parameters & *par*, VECT *z* )

Constructor.

Initializations.

##### Parameters

<i>in</i>	<i>par</i>	parameter, contains all the values from the parameters file.
<i>in</i>	<i>z</i>	topography.

### Warning

Problem: allocation of som\_z failed.



**Note**

If `som_z` cannot be allocated, the code will exit with failure termination code.

**Todo** Exception should be treated.

Definition at line 59 of file `eno.cpp`.

**5.18.2.2 ENO::~~ENO ( )**

Destructor.

Definition at line 199 of file `eno.cpp`.

**5.18.3 Member Function Documentation**

**5.18.3.1** `void ENO::calc ( VECT h, VECT u, VECT z, VECT & hr, VECT & hl, VECT & delz, VECT & ur, VECT & ul, VECT & dzi )` `[virtual]`

Calculates the reconstruction in space.

Calls the calculation of the second order reconstruction in space with ENO formulation, see [Harten et al. \[1986\]](#), [Harten et al. \[1987\]](#), [Shu and Osher \[1988\]](#), [Bouchut \[2004\]](#), [Bouchut \[2007\]](#).

**Parameters**

in	<i>h</i>	water height.
in	<i>u</i>	velocity of the flow.
in	<i>z</i>	topography.
out	<i>hr</i>	reconstructed water height on the right of the cell.
out	<i>hl</i>	reconstructed water height on the left of the cell.
out	<i>delz</i>	difference between two reconstructed topographies on the same boundary (from two adjacent cells).
out	<i>ur</i>	reconstructed velocity on the right of the cell.
out	<i>ul</i>	reconstructed velocity on the left of the cell.
out	<i>dzi</i>	difference between the reconstructed topographies on the left and on the right boundary of a cell.

Implements [Reconstruction](#).

Definition at line 83 of file `eno.cpp`.

The documentation for this class was generated from the following files:

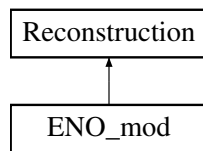
- Headers/libreconstructions/[eno.hpp](#)
- Sources/libreconstructions/[eno.cpp](#)

**5.19 ENO\_mod Class Reference**

Modified ENO recontruction.

```
#include <eno_mod.hpp>
```

Inheritance diagram for ENO\_mod:



## Public Member Functions

- [ENO\\_mod \(Parameters &, VECT\)](#)  
*Constructor.*
- void [calc \(VECT, VECT, VECT, VECT &, VECT &, VECT &, VECT &, VECT &, VECT &\)](#)  
*Calculates the reconstruction in space.*
- [~ENO\\_mod \(\)](#)  
*Destructor.*

## Additional Inherited Members

### 5.19.1 Detailed Description

Modified ENO reconstruction.

Class that computes the modified ENO reconstruction in space.

Definition at line 69 of file eno\_mod.hpp.

### 5.19.2 Constructor & Destructor Documentation

#### 5.19.2.1 ENO\_mod::ENO\_mod ( Parameters & par, VECT z )

Constructor.

Initializations.

#### Parameters

<code>in</code>	<code>par</code>	parameter, contains all the values from the parameters file.
<code>in</code>	<code>z</code>	topography.

#### Warning

Problem: allocation of som\_z failed.

#### Note

If som\_z cannot be allocated, the code will exit with failure termination code.

**Todo** Exception should be treated.

Definition at line 58 of file eno\_mod.cpp.

## 5.19.2.2 ENO\_mod::~~ENO\_mod ( )

Destructor.

Definition at line 214 of file eno\_mod.cpp.

## 5.19.3 Member Function Documentation

5.19.3.1 void ENO\_mod::calc ( VECT *h*, VECT *u*, VECT *z*, VECT & *hr*, VECT & *hl*, VECT & *delz*, VECT & *ur*, VECT & *ul*, VECT & *dzi* ) [virtual]

Calculates the reconstruction in space.

Calls the calculation of the second order reconstruction in space, with a modified ENO formulation, see [Bouchut \[2004\]](#), [Bouchut \[2007\]](#).

## Parameters

in	<i>h</i>	water height.
in	<i>u</i>	velocity of the flow.
in	<i>z</i>	topography.
out	<i>hr</i>	reconstructed water height on the right of the cell.
out	<i>hl</i>	reconstructed water height on the left of the cell.
out	<i>delz</i>	difference between two reconstructed topographies on the same boundary (from two adjacent cells).
out	<i>ur</i>	reconstructed velocity on the right of the cell.
out	<i>ul</i>	reconstructed velocity on the left of the cell.
out	<i>dzi</i>	difference between the reconstructed topographies on the left and on the right boundary of a cell.

Implements [Reconstruction](#).

Definition at line 82 of file eno\_mod.cpp.

The documentation for this class was generated from the following files:

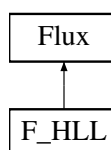
- Headers/libreconstructions/[eno\\_mod.hpp](#)
- Sources/libreconstructions/[eno\\_mod.cpp](#)

## 5.20 F\_HLL Class Reference

HLL flux.

```
#include <f_hll.hpp>
```

Inheritance diagram for F\_HLL:



## Public Member Functions

- `F_HLL ()`  
*Constructor.*
- `void calc (SCALAR, SCALAR, SCALAR, SCALAR)`  
*Calculates the numerical flux.*
- `virtual ~F_HLL ()`  
*Destructor.*

## Additional Inherited Members

### 5.20.1 Detailed Description

HLL flux.

Class that computes HLL numerical flux.

Definition at line 69 of file `f_hll.hpp`.

### 5.20.2 Constructor & Destructor Documentation

#### 5.20.2.1 F\_HLL::F\_HLL ( )

Constructor.

Definition at line 58 of file `f_hll.cpp`.

#### 5.20.2.2 F\_HLL::~~F\_HLL ( ) [virtual]

Destructor.

Definition at line 120 of file `f_hll.cpp`.

### 5.20.3 Member Function Documentation

#### 5.20.3.1 void F\_HLL::calc ( SCALAR h\_L, SCALAR u\_L, SCALAR h\_R, SCALAR u\_R ) [virtual]

Calculates the numerical flux.

If the water heights on the two sides are small or  $c_1 \approx c_2 \approx 0$ , there is no water. Else, HLL formulation is used (see [Bouchut \[2004\]](#)):

$$\mathcal{F}(U_L, U_R) = \begin{cases} F(U_L) & \text{if } 0 < c_1 (\leq c_2), \\ \frac{c_2 F(U_L) - c_1 F(U_R)}{c_2 - c_1} + \frac{c_1 c_2}{c_2 - c_1} (U_R - U_L) & \text{if } c_1 < 0 < c_2, \\ F(U_R) & \text{if } (c_1 \leq) c_2 < 0, \end{cases}$$

with

$$c_1 = \inf_{U=U_L, U_R} \left( \inf_{j \in \{1,2\}} |\lambda_j(U)| \right) \text{ and } c_2 = \sup_{U=U_L, U_R} \left( \sup_{j \in \{1,2\}} |\lambda_j(U)| \right),$$

where  $\lambda_1(U) = u - \sqrt{gh}$  and  $\lambda_2(U) = u + \sqrt{gh}$  are the eigenvalues of the Shallow Water system,  $U = {}^t(h, hu)$  and  $F(U) = {}^t(hu, hu^2 + gh^2/2)$ .

## Parameters

in	$h_L$	water height at the left of the interface where the flux is calculated.
in	$u_L$	velocity at the left of the interface where the flux is calculated.
in	$h_R$	water height at the right of the interface where the flux is calculated.
in	$u_R$	velocity at the right of the interface where the flux is calculated.

## Modifies

[Flux::f1](#) first component of the numerical flux.

[Flux::f2](#) second component of the numerical flux.

[Flux::cfl](#) value of the CFL.

## Note

Long double are used locally in the computation to avoid numerical approximations.

**Todo** Check if the use of long double should be generalized to other fluxes.

Implements [Flux](#).

Definition at line 61 of file `f_hll.cpp`.

The documentation for this class was generated from the following files:

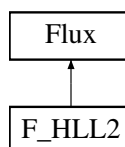
- [Headers/libflux/f\\_hll.hpp](#)
- [Sources/libflux/f\\_hll.cpp](#)

## 5.21 F\_HLL2 Class Reference

HLL flux.

```
#include <f_hll2.hpp>
```

Inheritance diagram for F\_HLL2:



## Public Member Functions

- [F\\_HLL2 \(\)](#)  
*Constructor.*
- void [calc \(SCALAR, SCALAR, SCALAR, SCALAR\)](#)  
*Calculates the numerical flux.*
- virtual [~F\\_HLL2 \(\)](#)  
*Destructor.*

## Additional Inherited Members

### 5.21.1 Detailed Description

HLL flux.

Class that computes HLL numerical flux with a reduced formulation.

Definition at line 70 of file f\_hll2.hpp.

### 5.21.2 Constructor & Destructor Documentation

#### 5.21.2.1 F\_HLL2::F\_HLL2 ( )

Constructor.

Definition at line 58 of file f\_hll2.cpp.

#### 5.21.2.2 F\_HLL2::~~F\_HLL2( ) [virtual]

Destructor.

Definition at line 106 of file f\_hll2.cpp.

### 5.21.3 Member Function Documentation

#### 5.21.3.1 void F\_HLL2::calc ( SCALAR h\_L, SCALAR u\_L, SCALAR h\_R, SCALAR u\_R ) [virtual]

Calculates the numerical flux.

If the water heights on the two sides are small, there is no water. Else, HLL reduced formulation is used (see [Bouchut \[2004\]](#)):

$$\mathcal{F}(U_L, U_R) = t_1 F(U_R) + t_2 F(U_L) - t_3 (U_R - U_L),$$

with

$$t_1 = \frac{\min(c_2, 0) - \min(c_1, 0)}{c_2 - c_1}, \quad t_2 = 1 - t_1, \quad t_3 = \frac{c_2 |c_1| - c_1 |c_2|}{2(c_2 - c_1)},$$

$$c_1 = \inf_{U=U_L, U_R} \left( \inf_{j \in \{1, 2\}} |\lambda_j(U)| \right) \quad \text{and} \quad c_2 = \sup_{U=U_L, U_R} \left( \sup_{j \in \{1, 2\}} |\lambda_j(U)| \right),$$

where  $\lambda_1(U) = u - \sqrt{gh}$  and  $\lambda_2(U) = u + \sqrt{gh}$  are the eigenvalues of the Shallow Water system,  $U = {}^t(h, hu)$  and  $F(U) = {}^t(hu, hu^2 + gh^2/2)$ .

#### Parameters

in	$h\_L$	water height at the left of the interface where the flux is calculated.
in	$u\_L$	velocity at the left of the interface where the flux is calculated.
in	$h\_R$	water height at the right of the interface where the flux is calculated.
in	$u\_R$	velocity at the right of the interface where the flux is calculated.

#### Modifies

**Flux::f1** first component of the numerical flux.

**Flux::f2** second component of the numerical flux.

**Flux::cfl** value of the CFL.

Implements [Flux](#).

Definition at line 61 of file `f_hll2.cpp`.

The documentation for this class was generated from the following files:

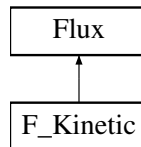
- `Headers/libflux/f_hll2.hpp`
- `Sources/libflux/f_hll2.cpp`

## 5.22 F\_Kinetic Class Reference

Kinetic flux.

```
#include <f_kinetic.hpp>
```

Inheritance diagram for F\_Kinetic:



### Public Member Functions

- [F\\_Kinetic \(\)](#)  
*Constructor.*
- void [calc \(SCALAR, SCALAR, SCALAR, SCALAR\)](#)  
*Calculates the numerical flux.*
- virtual [~F\\_Kinetic \(\)](#)  
*Destructor.*

### Additional Inherited Members

#### 5.22.1 Detailed Description

Kinetic flux.

Class that computes the kinetic numerical flux.

Definition at line 70 of file `f_kinetic.hpp`.

#### 5.22.2 Constructor & Destructor Documentation

##### 5.22.2.1 F\_Kinetic::F\_Kinetic ( )

Constructor.

Definition at line 58 of file `f_kinetic.cpp`.

### 5.22.2.2 F\_Kinetic::~~F\_Kinetic ( ) [virtual]

Destructor.

Definition at line 123 of file f\_kinetic.cpp.

### 5.22.3 Member Function Documentation

#### 5.22.3.1 void F\_Kinetic::calc ( SCALAR h\_L, SCALAR u\_L, SCALAR h\_R, SCALAR u\_R ) [virtual]

Calculates the numerical flux.

If the water heights on the two sides are small, there is no water. Else, the kinetic formulation is used (see [Audusse et al. \[2000\]](#)):

$$\mathcal{F}(U_L, U_R) = F_+(U_L) + F_-(U_R)$$

$$F_+(U_L) = \frac{h_L}{2\sqrt{3T_L}} \begin{pmatrix} \frac{M_+^2 - M_-^2}{2} \\ \frac{M_+^3 - M_-^3}{3} \end{pmatrix}, \quad F_-(U_R) = \frac{h_R}{2\sqrt{3T_R}} \begin{pmatrix} \frac{m_+^2 - m_-^2}{2} \\ \frac{m_+^3 - m_-^3}{3} \end{pmatrix},$$

where

$$M_+ = \max(0, u_L + \sqrt{3T_L}), \quad m_+ = \min(0, u_R + \sqrt{3T_R}),$$

$$M_- = \max(0, u_L - \sqrt{3T_L}), \quad m_- = \min(0, u_R - \sqrt{3T_R}),$$

with  $T_L = gh_L/2$ ,  $T_R = gh_R/2$ ,  $U = {}^t(h, hu)$  and  $F(U) = {}^t(hu, hu^2 + gh^2/2)$ .

#### Parameters

in	$h_L$	water height at the left of the interface where the flux is calculated.
in	$u_L$	velocity at the left of the interface where the flux is calculated.
in	$h_R$	water height at the right of the interface where the flux is calculated.
in	$u_R$	velocity at the right of the interface where the flux is calculated.

#### Modifies

- [Flux::f1](#) first component of the numerical flux.
- [Flux::f2](#) second component of the numerical flux.
- [Flux::cfl](#) value of the CFL.

Implements [Flux](#).

Definition at line 64 of file f\_kinetic.cpp.

The documentation for this class was generated from the following files:

- [Headers/libflux/f\\_kinetic.hpp](#)
- [Sources/libflux/f\\_kinetic.cpp](#)

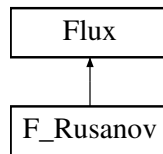
## 5.23 F\_Rusanov Class Reference

Rusanov flux.

```
#include <f_rusanov.hpp>
```

Inheritance diagram for F\_Rusanov:





## Public Member Functions

- [F\\_Rusanov \(\)](#)  
*Constructor.*
- void [calc \(SCALAR, SCALAR, SCALAR, SCALAR\)](#)  
*Calculates the numerical flux.*
- virtual [~F\\_Rusanov \(\)](#)  
*Destructor.*

## Additional Inherited Members

### 5.23.1 Detailed Description

Rusanov flux.

Class that computes Rusanov numerical flux.

Definition at line 69 of file `f_rusanov.hpp`.

### 5.23.2 Constructor & Destructor Documentation

#### 5.23.2.1 F\_Rusanov::F\_Rusanov ( )

Constructor.

Definition at line 58 of file `f_rusanov.cpp`.

#### 5.23.2.2 F\_Rusanov::~~F\_Rusanov ( ) [virtual]

Destructor.

Definition at line 97 of file `f_rusanov.cpp`.

### 5.23.3 Member Function Documentation

#### 5.23.3.1 void F\_Rusanov::calc ( SCALAR h\_L, SCALAR u\_L, SCALAR h\_R, SCALAR u\_R ) [virtual]

Calculates the numerical flux.

If the water heights on the two sides are small, there is no water. Else, Rusanov formulation is used (see [Bouchut \[2004\]](#)):

$$\mathcal{F}(U_L, U_R) = \frac{F(U_L) + F(U_R)}{2} - c \frac{U_R - U_L}{2},$$

with  $c = \max(|u_L| + \sqrt{gh_L}, |u_R| + \sqrt{gh_R})$ ,  $U = {}^t(h, hu)$  and  $F(U) = {}^t(hu, hu^2 + gh^2/2)$ .

## Parameters

in	$h_L$	water height at the left of the interface where the flux is calculated.
in	$u_L$	velocity at the left of the interface where the flux is calculated.
in	$h_R$	water height at the right of the interface where the flux is calculated.
in	$u_R$	velocity at the right of the interface where the flux is calculated.

## Modifies

- [Flux::f1](#) first component of the numerical flux.
- [Flux::f2](#) second component of the numerical flux.
- [Flux::cfl](#) value of the CFL.

Implements [Flux](#).

Definition at line 61 of file `f_rusanov.cpp`.

The documentation for this class was generated from the following files:

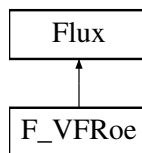
- [Headers/libflux/f\\_rusanov.hpp](#)
- [Sources/libflux/f\\_rusanov.cpp](#)

## 5.24 F\_VFRoe Class Reference

VFRoe flux.

```
#include <f_vfroe.hpp>
```

Inheritance diagram for F\_VFRoe:



### Public Member Functions

- [F\\_VFRoe \(\)](#)  
*Constructor.*
- void [calc \(SCALAR, SCALAR, SCALAR, SCALAR\)](#)  
*Calculates the numerical flux.*
- virtual [~F\\_VFRoe \(\)](#)  
*Destructor.*

### Additional Inherited Members

#### 5.24.1 Detailed Description

VFRoe flux.

Class that computes the VFRoe-ncv numerical flux.

Definition at line 70 of file `f_vfroe.hpp`.

## 5.24.2 Constructor & Destructor Documentation

### 5.24.2.1 F\_VFRoe::F\_VFRoe ( )

Constructor.

Definition at line 58 of file f\_vfroe.cpp.

### 5.24.2.2 F\_VFRoe::~F\_VFRoe ( ) [virtual]

Destructor.

Definition at line 149 of file f\_vfroe.cpp.

## 5.24.3 Member Function Documentation

### 5.24.3.1 void F\_VFRoe::calc ( SCALAR h\_L, SCALAR u\_L, SCALAR h\_R, SCALAR u\_R ) [virtual]

Calculates the numerical flux.

The VFRoe-ncv formulation is used (see [Gallouët et al. \[2003\]](#)):

$$\mathcal{F}(U_L, U_R) = \begin{cases} F(U_L) & \text{if } 0 < \lambda_1(\tilde{U}), \\ F(U_*) & \text{if } \lambda_1(\tilde{U}) < 0 < \lambda_2(\tilde{U}), \\ F(U_R) & \text{if } \lambda_2(\tilde{U}) < 0, \end{cases}$$

with  $U = \begin{pmatrix} h \\ hu \end{pmatrix}$ ,  $F(U) = \begin{pmatrix} hu \\ hu^2 + gh^2/2 \end{pmatrix}$  and  $\lambda_1(U) = u - \sqrt{gh}$ ,  $\lambda_2(U) = u + \sqrt{gh}$  are the eigenvalues of the Shallow Water system. The mean state  $\tilde{W}$  is defined by

$$\tilde{W} = \begin{pmatrix} 2\sqrt{gh} \\ \tilde{u} \end{pmatrix} = \begin{pmatrix} 2\tilde{c} \\ \tilde{u} \end{pmatrix} = \begin{pmatrix} \frac{\sqrt{gh_L} + \sqrt{gh_R}}{2} \\ \tilde{u} \end{pmatrix},$$

and the mean Roe states  $h_*$  and  $u_*$  are given by  $\begin{cases} \sqrt{gh_*} = c_* = \tilde{c} - (u_R - u_L)/4, \\ u_* = \tilde{u} - (\sqrt{gh_R} - \sqrt{gh_L}). \end{cases}$

If the eigenvalues satisfy  $\lambda_1(U_L) < 0 < \lambda_1(U_R)$  or  $\lambda_2(U_L) < 0 < \lambda_2(U_R)$ , we can get non-entropic solutions. Then the entropy is corrected thanks to the Rusanov flux.

### Parameters

in	$h_L$	water height at the left of the interface where the flux is calculated.
in	$u_L$	velocity at the left of the interface where the flux is calculated.
in	$h_R$	water height at the right of the interface where the flux is calculated.
in	$u_R$	velocity at the right of the interface where the flux is calculated.

### Modifies

[Flux::f1](#) first component of the numerical flux.

[Flux::f2](#) second component of the numerical flux.

[Flux::cfl](#) value of the CFL.

Implements [Flux](#).

Definition at line 74 of file f\_vfroe.cpp.

The documentation for this class was generated from the following files:

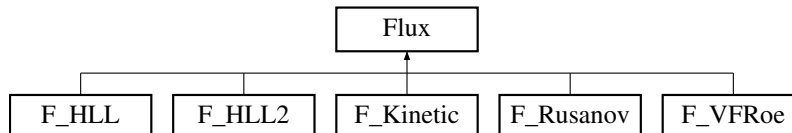
- [Headers/libflux/f\\_vfroe.hpp](#)
- [Sources/libflux/f\\_vfroe.cpp](#)

## 5.25 Flux Class Reference

Numerical flux.

```
#include <flux.hpp>
```

Inheritance diagram for Flux:



### Public Member Functions

- [Flux \(\)](#)  
*Constructor.*
- virtual void [calc \(SCALAR, SCALAR, SCALAR, SCALAR\)=0](#)  
*Function to be specified in each numerical flux.*
- void [set\\_tx \(SCALAR\)](#)  
*Sets the variable Flux::tx.*
- [SCALAR get\\_f1 \(\) const](#)  
*Gives the first component of the numerical flux.*
- [SCALAR get\\_f2 \(\) const](#)  
*Gives the second component of the numerical flux.*
- [SCALAR get\\_cfl \(\) const](#)  
*Gives the CFL value.*
- virtual [~Flux \(\)](#)  
*Destructor.*

### Protected Attributes

- [SCALAR f1](#)
- [SCALAR f2](#)
- [SCALAR cfl](#)
- [SCALAR tx](#)

#### 5.25.1 Detailed Description

Numerical flux.

Class that contains all the common declarations for the numerical fluxes.

Definition at line 71 of file flux.hpp.

## 5.25.2 Constructor & Destructor Documentation

### 5.25.2.1 Flux::Flux ( )

Constructor.

Definition at line 58 of file flux.cpp.

### 5.25.2.2 Flux::~Flux( ) [virtual]

Destructor.

Definition at line 106 of file flux.cpp.

## 5.25.3 Member Function Documentation

### 5.25.3.1 virtual void Flux::calc ( SCALAR , SCALAR , SCALAR , SCALAR ) [pure virtual]

Function to be specified in each numerical flux.

Implemented in [F\\_HLL2](#), [F\\_Kinetic](#), [F\\_VFRoe](#), [F\\_HLL](#), and [F\\_Rusanov](#).

### 5.25.3.2 SCALAR Flux::get\_cfl ( ) const

Gives the CFL value.

Returns

[Flux::cfl](#) value of the CFL.

Definition at line 96 of file flux.cpp.

### 5.25.3.3 SCALAR Flux::get\_f1 ( ) const

Gives the first component of the numerical flux.

Returns

[Flux::f1](#) first component of the numerical flux.

Definition at line 76 of file flux.cpp.

### 5.25.3.4 SCALAR Flux::get\_f2 ( ) const

Gives the second component of the numerical flux.

Returns

[Flux::f2](#) second component of the numerical flux.

Definition at line 86 of file flux.cpp.

### 5.25.3.5 void Flux::set\_tx ( SCALAR tx )

Sets the variable `Flux::tx`.

Sets the value given in parameter to the variable `tx`.

#### Parameters

in	<code>tx</code>	value of dt/dx.
----	-----------------	-----------------

Definition at line 65 of file flux.cpp.

## 5.25.4 Member Data Documentation

### 5.25.4.1 SCALAR Flux::cfl [protected]

CFL value.

Definition at line 103 of file flux.hpp.

### 5.25.4.2 SCALAR Flux::f1 [protected]

First component of the numerical flux.

Definition at line 99 of file flux.hpp.

### 5.25.4.3 SCALAR Flux::f2 [protected]

Second component of the numerical flux.

Definition at line 101 of file flux.hpp.

### 5.25.4.4 SCALAR Flux::tx [protected]

Value of dt/dx.

Definition at line 105 of file flux.hpp.

The documentation for this class was generated from the following files:

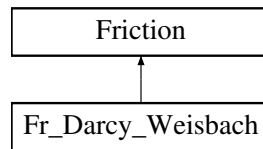
- [Headers/libflux/flux.hpp](#)
- [Sources/libflux/flux.cpp](#)

## 5.26 Fr\_Darcy\_Weisbach Class Reference

Darcy-Weisbach law.

```
#include <fr_darcy_weisbach.hpp>
```

Inheritance diagram for Fr\_Darcy\_Weisbach:



## Public Member Functions

- [Fr\\_Darcy\\_Weisbach](#) ()  
*Constructor.*
- void [calc](#) (SCALAR, SCALAR, SCALAR)  
*Calculates the friction term.*
- virtual [~Fr\\_Darcy\\_Weisbach](#) ()  
*Destructor.*

## Additional Inherited Members

### 5.26.1 Detailed Description

Darcy-Weisbach law.

General formulation:  $S_f = \frac{fu|u|}{gh}$ . This term is integrated in the code thanks to a semi-implicit method.

Definition at line 70 of file `fr_darcy_weisbach.hpp`.

### 5.26.2 Constructor & Destructor Documentation

#### 5.26.2.1 `Fr_Darcy_Weisbach::Fr_Darcy_Weisbach ( )`

Constructor.

Definition at line 58 of file `fr_darcy_weisbach.cpp`.

#### 5.26.2.2 `Fr_Darcy_Weisbach::~~Fr_Darcy_Weisbach ( )` [virtual]

Destructor.

Definition at line 81 of file `fr_darcy_weisbach.cpp`.

### 5.26.3 Member Function Documentation

#### 5.26.3.1 `void Fr_Darcy_Weisbach::calc ( SCALAR uold, SCALAR hnew, SCALAR qnew )` [virtual]

Calculates the friction term.

General formulation (see [Smith et al. \[2007\]](#)):  $S_f = \frac{fu|u|}{gh}$ . This term is integrated in the code thanks to a semi-implicit method:

$$q_i^{n+1} = \frac{q_i^*}{1 + dt \frac{f|u_i^n|}{8h_i^{n+1}}}$$

where  $f$  is the friction coefficient.

## Parameters

in	<i>uold</i>	velocity at the previous time ( $n$ if you are calculating the $n + 1$ th time step), denoted by $u_i^n$ in the above formula.
in	<i>hnew</i>	water height after the Shallow-Water computation (without friction), denoted by $h_i^{n+1}$ in the above formula.
in	<i>qnew</i>	discharge after the Shallow-Water computation (without friction), denoted by $q_i^*$ in the above formula.

## Modifies

friction::qmod discharge modified by the friction term.

## Note

The friction only affects the discharge (  $h^{n+1} = h^*$  ).

**Todo** For future evolutions: the friction coefficient should be added as in 2D as a parameter of [Fr\\_Darcy\\_Weisbach::calc](#).

Implements [Friction](#).

Definition at line 61 of file `fr_darcy_weisbach.cpp`.

The documentation for this class was generated from the following files:

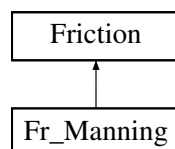
- Headers/libfrictions/[fr\\_darcy\\_weisbach.hpp](#)
- Sources/libfrictions/[fr\\_darcy\\_weisbach.cpp](#)

## 5.27 Fr\_Manning Class Reference

Manning law.

```
#include <fr_manning.hpp>
```

Inheritance diagram for Fr\_Manning:



## Public Member Functions

- [Fr\\_Manning](#) ()  
*Constructor.*
- void [calc](#) (SCALAR, SCALAR, SCALAR)  
*Calculates the Manning friction term.*
- virtual [~Fr\\_Manning](#) ()  
*Destructor.*



## Additional Inherited Members

### 5.27.1 Detailed Description

Manning law.

General formulation:  $S_f = \frac{u|u|}{K^2 h^{4/3}}$ . This term is integrated in the code thanks to a semi-implicit method.

Definition at line 71 of file `fr_manning.hpp`.

### 5.27.2 Constructor & Destructor Documentation

#### 5.27.2.1 Fr\_Manning::Fr\_Manning ( )

Constructor.

Definition at line 58 of file `fr_manning.cpp`.

#### 5.27.2.2 Fr\_Manning::~Fr\_Manning ( ) [virtual]

Destructor.

Definition at line 81 of file `fr_manning.cpp`.

### 5.27.3 Member Function Documentation

#### 5.27.3.1 void Fr\_Manning::calc ( SCALAR uold, SCALAR hnew, SCALAR qnew ) [virtual]

Calculates the Manning friction term.

General formulation (see [Smith et al. \[2007\]](#)):  $S_f = \frac{u|u|}{K^2 h^{4/3}}$ . This term is integrated in the code thanks to a semi-implicit method:

$$q_i^{n+1} = \frac{q_i^*}{1 + dt \frac{g|u_i^n|}{K^2 (h_i^{n+1})^{4/3}}}$$

where  $K$  is the friction coefficient.

#### Parameters

in	<i>uold</i>	velocity at the previous time ( $n$ if you are calculating the $n + 1$ th time step), denoted by $u_i^n$ in the above formula.
in	<i>hnew</i>	water height after the Shallow-Water computation (without friction), denoted by $h_i^{n+1}$ in the above formula.
in	<i>qnew</i>	discharge after the Shallow-Water computation (without friction), denoted by $q_i^*$ in the above formula.

#### Modifies

`friction::qmod` discharge modified by the friction term.

#### Note

The friction only affects the discharge ( $h^{n+1} = h^*$ ).

**Todo** For future evolutions: the friction coefficient should be added as in 2D as a parameter of `Fr_Manning::calc`.

Implements [Friction](#).

Definition at line 61 of file `fr_manning.cpp`.

The documentation for this class was generated from the following files:

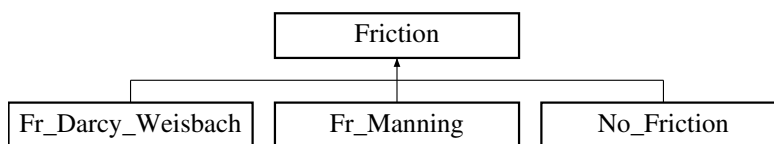
- Headers/libfrictions/[fr\\_manning.hpp](#)
- Sources/libfrictions/[fr\\_manning.cpp](#)

## 5.28 Friction Class Reference

Friction law

```
#include <friction.hpp>
```

Inheritance diagram for Friction:



### Public Member Functions

- [Friction](#) ()  
*Constructor.*
- virtual void [calc](#) (SCALAR, SCALAR, SCALAR)=0  
*Function to be specified in each friction law.*
- SCALAR [get\\_qmod](#) () const  
*Gives the discharge modified by the friction term.*
- void [set\\_c](#) (SCALAR)  
*Sets the friction coefficient `Friction::c`.*
- void [set\\_dt](#) (SCALAR)  
*Sets the time step `Friction::dt`.*
- virtual [~Friction](#) ()  
*Destructor.*

### Protected Attributes

- SCALAR [qmod](#)
- SCALAR [c](#)
- SCALAR [dt](#)

#### 5.28.1 Detailed Description

Friction law

Class that contains all the common declarations for the friction law. The friction is computed with a semi-implicit method.

Definition at line 71 of file `friction.hpp`.

## 5.28.2 Constructor & Destructor Documentation

### 5.28.2.1 Friction::Friction ( )

Constructor.

Definition at line 59 of file friction.cpp.

### 5.28.2.2 Friction::~~Friction ( ) [virtual]

Destructor.

Definition at line 96 of file friction.cpp.

## 5.28.3 Member Function Documentation

### 5.28.3.1 virtual void Friction::calc ( SCALAR , SCALAR , SCALAR ) [pure virtual]

Function to be specified in each friction law.

Implemented in [Fr\\_Manning](#), [Fr\\_Darcy\\_Weisbach](#), and [No\\_Friction](#).

### 5.28.3.2 SCALAR Friction::get\_qmod ( ) const

Gives the discharge modified by the friction term.

#### Returns

[Friction::qmod](#) discharge modified by the friction term.

Definition at line 62 of file friction.cpp.

### 5.28.3.3 void Friction::set\_c ( SCALAR c )

Sets the friction coefficient [Friction::c](#).

Sets the value given in parameter to the variable **c**.

#### Parameters

in	c	value of the friction coefficient.
----	---	------------------------------------

**Todo** For future evolutions: [Friction::set\\_c](#) will not be necessary when the friction coefficient will be read as in 2D.

Definition at line 72 of file friction.cpp.

### 5.28.3.4 void Friction::set\_dt ( SCALAR dt )

Sets the time step [Friction::dt](#).

Sets the value given in parameter to the variable **dt**.

## Parameters

<code>in</code>	<code>dt</code>	value of the time step.
-----------------	-----------------	-------------------------

Definition at line 84 of file friction.cpp.

### 5.28.4 Member Data Documentation

#### 5.28.4.1 SCALAR Friction::c [protected]

Friction coefficient.

Definition at line 98 of file friction.hpp.

#### 5.28.4.2 SCALAR Friction::dt [protected]

Time step.

Definition at line 100 of file friction.hpp.

#### 5.28.4.3 SCALAR Friction::qmod [protected]

Discharge modified by the friction term.

Definition at line 96 of file friction.hpp.

The documentation for this class was generated from the following files:

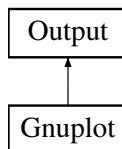
- Headers/libfrictions/[friction.hpp](#)
- Sources/libfrictions/[friction.cpp](#)

## 5.29 Gnuplot Class Reference

Gnuplot output

```
#include <gnuplot.hpp>
```

Inheritance diagram for Gnuplot:



### Public Member Functions

- [Gnuplot](#) ([Parameters](#) &)  
*Constructor.*
- void [write](#) ([VECT](#), [VECT](#), [VECT](#), int)  
*Saves one time step.*
- virtual [~Gnuplot](#) ()  
*Destructor.*

## Additional Inherited Members

### 5.29.1 Detailed Description

Gnuplot output

Class that writes the result in the output file with a structure optimized for Gnuplot.

Definition at line 70 of file gnuplot.hpp.

### 5.29.2 Constructor & Destructor Documentation

#### 5.29.2.1 Gnuplot::Gnuplot ( Parameters & par )

Constructor.

Writes the header of the file 'huz\_evolution.dat' if [Parameters::nbtimes](#) is (strictly) positive.

#### Parameters

in	<i>par</i>	parameter, contains all the values from the parameters file.
----	------------	--------------------------------------------------------------

#### Warning

Impossible to open the \*\*\* file. Verify if the directory \*\*\* exists.

#### Note

If huz\_evolution.dat cannot be opened, the code will exit with failure termination code.

**Todo** Exception should be treated.

Definition at line 58 of file gnuplot.cpp.

#### 5.29.2.2 Gnuplot::~Gnuplot ( ) [virtual]

Destructor.

Definition at line 123 of file gnuplot.cpp.

### 5.29.3 Member Function Documentation

#### 5.29.3.1 void Gnuplot::write ( VECT *h*, VECT *q*, VECT *z*, int *n* ) [virtual]

Saves one time step.

Writes the values of [Scheme::h](#), [Scheme::u](#) (=q/h), [Scheme::z](#), [Scheme::q](#), [Scheme::h](#)+ [Scheme::z](#) (free surface), and the Froude number  $\frac{q}{h\sqrt{gh}}$  at the current time in huz\_evolution.dat.

If the water height is too small, we replace it by 0, the velocity is null and the Froude number does not exist.

#### Parameters

in	<i>h</i>	the water height.
in	<i>q</i>	the discharge.
in	<i>z</i>	the topography.
in	<i>n</i>	the index of the current time step (the time is n <a href="#">Parameters::dt</a> ).

Implements [Output](#).

Definition at line 92 of file `gnuplot.cpp`.

The documentation for this class was generated from the following files:

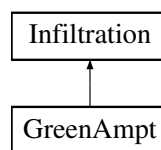
- [Headers/libsave/gnuplot.hpp](#)
- [Sources/libsave/gnuplot.cpp](#)

## 5.30 GreenAmpt Class Reference

[GreenAmpt](#) law.

```
#include <greenampt.hpp>
```

Inheritance diagram for `GreenAmpt`:



### Public Member Functions

- [GreenAmpt \(Parameters &\)](#)  
*Constructor.*
- [SCALAR capacity](#) (const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), const [SCALAR](#) Kc, const [SCALAR](#) Ks, const [SCALAR](#) dtheta, const [SCALAR](#) Psi, const [SCALAR](#) zcrust)  
*Calculates infiltration capacity.*
- void [calc](#) (const [VECT](#) &, const [VECT](#) &, const [SCALAR](#))  
*Calculates infiltrated volum.*
- virtual [~GreenAmpt \(\)](#)  
*Destructor.*

### Additional Inherited Members

#### 5.30.1 Detailed Description

[GreenAmpt](#) law.

Class that computes the infiltrated volume and modified water height with Green-Ampt 1d law.

Definition at line 69 of file `greenampt.hpp`.

#### 5.30.2 Constructor & Destructor Documentation

##### 5.30.2.1 GreenAmpt::GreenAmpt ( Parameters & par )

Constructor.

Defines the space step and initializes the values for Green-Ampt infiltration.

## Parameters

in	<i>par</i>	parameter, contains all the values from the parameters file.
----	------------	--------------------------------------------------------------

Definition at line 57 of file greenampt.cpp.

## 5.30.2.2 GreenAmpt::~GreenAmpt( ) [virtual]

Destructor.

Definition at line 282 of file greenampt.cpp.

## 5.30.3 Member Function Documentation

5.30.3.1 void GreenAmpt::calc ( const VECT & *h*, const VECT & *Vin\_tot*, const SCALAR *dt* ) [virtual]

Calculates infiltrated volum.

## Parameters

in	<i>h</i>	water height.
in	<i>Vin_tot</i>	total infiltrated volume.
in	<i>dt</i>	time step.

## Modifies

[Infiltration::hmod](#) modified water height.

[Infiltration::Vin](#) total infiltrated volume containing the current time step.

Implements [Infiltration](#).

Definition at line 242 of file greenampt.cpp.

5.30.3.2 SCALAR GreenAmpt::capacity ( const SCALAR *h*, const SCALAR *Vin\_tot*, const SCALAR *dt*, const SCALAR *Kc*, const SCALAR *Ks*, const SCALAR *dtheta*, const SCALAR *Psi*, const SCALAR *zcrust* )

Calculates infiltration capacity.

The infiltration capacity is given by:

$$I_C = \begin{cases} K_s \left(1 + \frac{Psi + h}{Z_f}\right) & \text{if } z_{crust} = 0 \\ K_c \left(1 + \frac{Psi + h}{Z_f}\right) & \text{if } Z_f \leq z_{crust} \\ K_e \left(1 + \frac{Psi + h}{Z_f}\right) & \end{cases}$$

with the effective hydraulic conductivity

$$K_e = \frac{1}{\frac{1}{K_s} * \left(1 - \frac{z_{crust} * dtheta}{Vin_{tot}}\right) + z_{crust} * \frac{dtheta}{Vin_{tot}} * \frac{1}{K_c}}$$

## Parameters

in	<i>h</i>	water height.
in	<i>Vin_tot</i>	total infiltrated volume.
in	<i>dt</i>	time step.
in	<i>Kc</i>	hydraulic conductivity of the (upper) crust.
in	<i>Ks</i>	hydraulic conductivity of the (lower) surface.
in	<i>dtheta</i>	water content.
in	<i>Psi</i>	load pressure.
in	<i>zcrust</i>	thickness of the (upper) crust.

## Returns

**ic**: infiltration capacity.

Definition at line 202 of file greenampt.cpp.

The documentation for this class was generated from the following files:

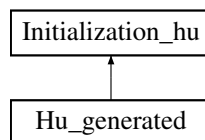
- Headers/librain\_infiltration/[greenampt.hpp](#)
- Sources/librain\_infiltration/[greenampt.cpp](#)

## 5.31 Hu\_generated Class Reference

No water configuration.

```
#include <hu_generated.hpp>
```

Inheritance diagram for Hu\_generated:



## Public Member Functions

- [Hu\\_generated](#) ([Parameters](#) &)  
*Constructor.*
- void [initialization](#) ([VECT](#) &, [VECT](#) &)  
*Performs the initialization.*
- virtual [~Hu\\_generated](#) ()  
*Destructor.*

## Additional Inherited Members

### 5.31.1 Detailed Description

No water configuration.

Class that initializes the water height and of the velocity for a wet domain.

Definition at line 72 of file hu\_generated.hpp.



### 5.31.2 Constructor & Destructor Documentation

#### 5.31.2.1 Hu\_generated::Hu\_generated ( Parameters & *par* )

Constructor.

##### Parameters

<i>in</i>	<i>par</i>	parameter, contains all the values from the parameters file (unused).
-----------	------------	-----------------------------------------------------------------------

Definition at line 59 of file hu\_generated.cpp.

#### 5.31.2.2 Hu\_generated::~~Hu\_generated ( ) [virtual]

Destructor.

Definition at line 66 of file hu\_generated.cpp.

### 5.31.3 Member Function Documentation

#### 5.31.3.1 void Hu\_generated::initialization ( VECT & *h*, VECT & *u* ) [virtual]

Performs the initialization.

Initializes the water height and the velocity at 0.

##### Parameters

<i>in, out</i>	<i>h</i>	water height.
<i>in, out</i>	<i>u</i>	velocity.

Implements [Initialization\\_hu](#).

Definition at line 69 of file hu\_generated.cpp.

The documentation for this class was generated from the following files:

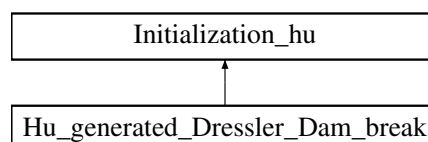
- Headers/libinitializations/hu\_generated.hpp
- Sources/libinitializations/hu\_generated.cpp

## 5.32 Hu\_generated\_Dressler\_Dam\_break Class Reference

Dressler dam break configuration.

```
#include <hu_generated_dressler_dam_break.hpp>
```

Inheritance diagram for Hu\_generated\_Dressler\_Dam\_break:



## Public Member Functions

- [Hu\\_generated\\_Dressler\\_Dam\\_break](#) ([Parameters](#) &)  
*Constructor.*
- void [initialization](#) ([VECT](#) &, [VECT](#) &)  
*Performs the initialization.*
- virtual [~Hu\\_generated\\_Dressler\\_Dam\\_break](#) ()  
*Destructor.*

## Additional Inherited Members

### 5.32.1 Detailed Description

Dressler dam break configuration.

Class that initializes the water height and of the velocity for a dam break as studied by Dressler (with friction).

Definition at line 71 of file `hu_generated_dressler_dam_break.hpp`.

### 5.32.2 Constructor & Destructor Documentation

#### 5.32.2.1 `Hu_generated_Dressler_Dam_break::Hu_generated_Dressler_Dam_break ( Parameters & par )`

Constructor.

Defines the position of the dam (half of the domain), the water height before the dam (6 meters), the water height after the dam (0 meters) and the velocity (0 m/s), see [Dressler \[1952\]](#).

#### Parameters

<code>in</code>	<code>par</code>	parameter, contains all the values from the parameters file (unused).
-----------------	------------------	-----------------------------------------------------------------------

Definition at line 58 of file `hu_generated_dressler_dam_break.cpp`.

#### 5.32.2.2 `Hu_generated_Dressler_Dam_break::~~Hu_generated_Dressler_Dam_break ( )` [virtual]

Destructor.

Definition at line 73 of file `hu_generated_dressler_dam_break.cpp`.

### 5.32.3 Member Function Documentation

#### 5.32.3.1 `void Hu_generated_Dressler_Dam_break::initialization ( VECT & h, VECT & u )` [virtual]

Performs the initialization.

Initializes the water height and the velocity, before and after the dam.

#### Parameters

<code>in, out</code>	<code>h</code>	water height.
<code>in, out</code>	<code>u</code>	velocity.

Implements [Initialization\\_hu](#).

Definition at line 76 of file `hu_generated_dressler_dam_break.cpp`.

The documentation for this class was generated from the following files:

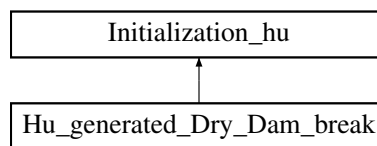
- [Headers/libinitializations/hu\\_generated\\_dressler\\_dam\\_break.hpp](#)
- [Sources/libinitializations/hu\\_generated\\_dressler\\_dam\\_break.cpp](#)

## 5.33 Hu\_generated\_Dry\_Dam\_break Class Reference

Dry dam break configuration.

```
#include <hu_generated_dry_dam_break.hpp>
```

Inheritance diagram for `Hu_generated_Dry_Dam_break`:



### Public Member Functions

- [Hu\\_generated\\_Dry\\_Dam\\_break](#) ([Parameters](#) &)  
*Constructor.*
- void [initialization](#) ([VECT](#) &, [VECT](#) &)  
*Performs the initialization.*
- virtual [~Hu\\_generated\\_Dry\\_Dam\\_break](#) ()  
*Destructor.*

### Additional Inherited Members

#### 5.33.1 Detailed Description

Dry dam break configuration.

Class that initializes the water height and of the velocity for a dam break on a dry domain.

Definition at line 71 of file `hu_generated_dry_dam_break.hpp`.

#### 5.33.2 Constructor & Destructor Documentation

##### 5.33.2.1 Hu\_generated\_Dry\_Dam\_break::Hu\_generated\_Dry\_Dam\_break ( [Parameters](#) & *par* )

Constructor.

Defines the position of the dam (half of the domain), the water height before the dam (5 millimeters), the water height after the dam (0 meters) and the velocity (0 m/s), see [Goutal and Maurel \[1997\]](#), [Audusse et al. \[2000\]](#).

#### Parameters

<code>in</code>	<code>par</code>	parameter, contains all the values from the parameters file (unused).
-----------------	------------------	-----------------------------------------------------------------------

Definition at line 59 of file hu\_generated\_dry\_dam\_break.cpp.

### 5.33.2.2 Hu\_generated\_Dry\_Dam\_break::~Hu\_generated\_Dry\_Dam\_break ( ) [virtual]

Destructor.

Definition at line 74 of file hu\_generated\_dry\_dam\_break.cpp.

### 5.33.3 Member Function Documentation

#### 5.33.3.1 void Hu\_generated\_Dry\_Dam\_break::initialization ( VECT & *h*, VECT & *u* ) [virtual]

Performs the initialization.

Initializes the water height and the velocity, before and after the dam.

#### Parameters

in, out	<i>h</i>	water height.
in, out	<i>u</i>	velocity.

Implements [Initialization\\_hu](#).

Definition at line 77 of file hu\_generated\_dry\_dam\_break.cpp.

The documentation for this class was generated from the following files:

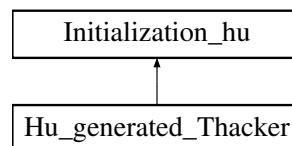
- [Headers/libinitializations/hu\\_generated\\_dry\\_dam\\_break.hpp](#)
- [Sources/libinitializations/hu\\_generated\\_dry\\_dam\\_break.cpp](#)

## 5.34 Hu\_generated\_Thacker Class Reference

Thacker configuration.

```
#include <hu_generated_thacker.hpp>
```

Inheritance diagram for Hu\_generated\_Thacker:



### Public Member Functions

- [Hu\\_generated\\_Thacker](#) (Parameters &)  
*Constructor.*
- void [initialization](#) (VECT &, VECT &)  
*Performs the initialization.*
- virtual [~Hu\\_generated\\_Thacker](#) ()  
*Destructor.*

## Additional Inherited Members

### 5.34.1 Detailed Description

Thacker configuration.

Class that initializes the water height and of the velocity for Thacker's benchmark.

Definition at line 71 of file hu\_generated\_thacker.hpp.

### 5.34.2 Constructor & Destructor Documentation

#### 5.34.2.1 Hu\_generated\_Thacker::Hu\_generated\_Thacker ( Parameters & par )

Constructor.

Defines the position of the wet domain (between x1 and x2) and the value of the topography at the center of the domain (-h0).

#### Parameters

in	par	parameter, contains all the values from the parameters file (unused).
----	-----	-----------------------------------------------------------------------

Definition at line 58 of file hu\_generated\_thacker.cpp.

#### 5.34.2.2 Hu\_generated\_Thacker::~~Hu\_generated\_Thacker ( ) [virtual]

Destructor.

Definition at line 75 of file hu\_generated\_thacker.cpp.

### 5.34.3 Member Function Documentation

#### 5.34.3.1 void Hu\_generated\_Thacker::initialization ( VECT & h, VECT & u ) [virtual]

Performs the initialization.

Initializes the water height in order to have a plane surface between x1 and x2, and the velocity is null, see [Thacker \[1981\]](#).

#### Parameters

in, out	h	water height.
in, out	u	velocity.

Implements [Initialization\\_hu](#).

Definition at line 77 of file hu\_generated\_thacker.cpp.

The documentation for this class was generated from the following files:

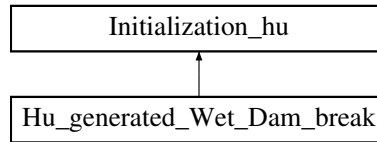
- Headers/libinitializations/hu\_generated\_thacker.hpp
- Sources/libinitializations/hu\_generated\_thacker.cpp

## 5.35 Hu\_generated\_Wet\_Dam\_break Class Reference

Wet dam break configuration.

```
#include <hu_generated_wet_dam_break.hpp>
```

Inheritance diagram for Hu\_generated\_Wet\_Dam\_break:



### Public Member Functions

- [Hu\\_generated\\_Wet\\_Dam\\_break](#) (Parameters &)  
*Constructor.*
- void [initialization](#) (VECT &, VECT &)  
*Performs the initialization.*
- virtual [~Hu\\_generated\\_Wet\\_Dam\\_break](#) ()  
*Destructor.*

### Additional Inherited Members

#### 5.35.1 Detailed Description

Wet dam break configuration.

Class that initializes the water height and of the velocity for a dam break on a wet domain.

Definition at line 70 of file hu\_generated\_wet\_dam\_break.hpp.

#### 5.35.2 Constructor & Destructor Documentation

##### 5.35.2.1 Hu\_generated\_Wet\_Dam\_break::Hu\_generated\_Wet\_Dam\_break ( Parameters & par )

Constructor.

Defines the position of the dam (half of the domain), the water height before the dam (5 millimeters), the water height after the dam (1 millimeter) and the velocity (0 m/s), see [Goutal and Maurel \[1997\]](#).

#### Parameters

in	par	parameter, contains all the values from the parameters file (unused).
----	-----	-----------------------------------------------------------------------

Definition at line 58 of file hu\_generated\_wet\_dam\_break.cpp.

##### 5.35.2.2 Hu\_generated\_Wet\_Dam\_break::~~Hu\_generated\_Wet\_Dam\_break ( ) [virtual]

Destructor.

Definition at line 73 of file hu\_generated\_wet\_dam\_break.cpp.

### 5.35.3 Member Function Documentation

#### 5.35.3.1 void Hu\_generated\_Wet\_Dam\_break::initialization ( VECT & *h*, VECT & *u* ) [virtual]

Performs the initialization.

Initializes the water height and the velocity, before and after the dam.

#### Parameters

<i>in, out</i>	<i>h</i>	water height.
<i>in, out</i>	<i>u</i>	velocity.

Implements [Initialization\\_hu](#).

Definition at line 75 of file hu\_generated\_wet\_dam\_break.cpp.

The documentation for this class was generated from the following files:

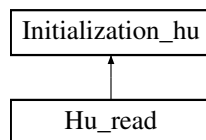
- [Headers/libinitializations/hu\\_generated\\_wet\\_dam\\_break.hpp](#)
- [Sources/libinitializations/hu\\_generated\\_wet\\_dam\\_break.cpp](#)

## 5.36 Hu\_read Class Reference

File configuration.

```
#include <hu_read.hpp>
```

Inheritance diagram for Hu\_read:



### Public Member Functions

- [Hu\\_read \(Parameters &\)](#)  
*Constructor.*
- void [initialization](#) (VECT &, VECT &)  
*Performs the initialization.*
- virtual [~Hu\\_read](#) ()  
*Destructor.*

### Additional Inherited Members

#### 5.36.1 Detailed Description

File configuration.

Class that initializes the water height and of the velocity to the values read in a file.

Definition at line 71 of file hu\_read.hpp.

### 5.36.2 Constructor & Destructor Documentation

#### 5.36.2.1 `Hu_read::Hu_read ( Parameters & par )`

Constructor.

Defines the name of the file for the initialization.

##### Parameters

<code>in</code>	<code>par</code>	parameter, contains all the values from the parameters file.
-----------------	------------------	--------------------------------------------------------------

Definition at line 59 of file `hu_read.cpp`.

#### 5.36.2.2 `Hu_read::~~Hu_read ( ) [virtual]`

Destructor.

Definition at line 70 of file `hu_read.cpp`.

### 5.36.3 Member Function Documentation

#### 5.36.3.1 `void Hu_read::initialization ( VECT & h, VECT & u ) [virtual]`

Performs the initialization.

Initializes the water height and the velocity to the values read in the corresponding file.

##### Parameters

<code>in, out</code>	<code>h</code>	water height.
<code>in, out</code>	<code>u</code>	velocity.

##### Warning

(hu\_namefile): ERROR: cannot open the hu file.  
 (hu\_namefile): ERROR: the number of data in this file is too big  
 (hu\_namefile): ERROR: line \*\*\*.  
 (hu\_namefile): WARNING: line \*\*\*.  
 (hu\_namefile): ERROR: the number of data in this file is too small  
 (hu\_namefile): ERROR: the value for the point x \*\*\* is missing

##### Note

If the file cannot be opened or if the data are not correct, the code will exit with failure termination code.

**Todo** Exception should be treated.

Implements [Initialization\\_hu](#).

Definition at line 73 of file `hu_read.cpp`.

The documentation for this class was generated from the following files:

- [Headers/libinitializations/hu\\_read.hpp](#)
- [Sources/libinitializations/hu\\_read.cpp](#)



## 5.37 Hydrostatic Class Reference

Hydrostatic reconstruction

```
#include <hydrostatic.hpp>
```

### Public Member Functions

- [Hydrostatic \(\)](#)  
*Constructor.*
- void [calc \(SCALAR, SCALAR, SCALAR\)](#)  
*Calculates the hydrostatic reconstruction.*
- [SCALAR get\\_hhydro\\_l \(\) const](#)  
*Gives the reconstructed water height on the left.*
- [SCALAR get\\_hhydro\\_r \(\) const](#)  
*Gives the reconstructed water height on the right.*
- virtual [~Hydrostatic \(\)](#)  
*Destructor.*

### Protected Attributes

- [SCALAR hl\\_rec](#)
- [SCALAR hr\\_rec](#)

#### 5.37.1 Detailed Description

Hydrostatic reconstruction

Class that computes the hydrostatic reconstruction.

Definition at line 68 of file hydrostatic.hpp.

#### 5.37.2 Constructor & Destructor Documentation

##### 5.37.2.1 Hydrostatic::Hydrostatic ( )

Constructor.

Definition at line 57 of file hydrostatic.cpp.

##### 5.37.2.2 Hydrostatic::~Hydrostatic ( ) [virtual]

Destructor.

Definition at line 97 of file hydrostatic.cpp.

#### 5.37.3 Member Function Documentation

##### 5.37.3.1 void Hydrostatic::calc ( SCALAR hl\_0, SCALAR hr\_0, SCALAR dz )

Calculates the hydrostatic reconstruction.

See [Audusse et al. \[2004\]](#) for more details.

#### Parameters

in	$hl\_0$	water height on the cell located at the left of the boundary.
in	$hr\_0$	water height on the cell located at the right of the boundary.
in	$dz$	Difference between the values of the topography of the two adjacent cells.

#### Modifies

[Hydrostatic::hl\\_rec](#), set to  $(hl\_0 - \max(0, dz))_+$ .

[Hydrostatic::hr\\_rec](#), set to  $(hr\_0 - \max(0, -dz))_+$ .

Definition at line 60 of file hydrostatic.cpp.

#### 5.37.3.2 SCALAR Hydrostatic::get\_hhydro\_l( ) const

Gives the reconstructed water height on the left.

#### Returns

[Hydrostatic::hl\\_rec](#) Hydrostatic reconstruction on the left.

Definition at line 77 of file hydrostatic.cpp.

#### 5.37.3.3 SCALAR Hydrostatic::get\_hhydro\_r( ) const

Gives the reconstructed water height on the right.

#### Returns

[Hydrostatic::hr\\_rec](#) Hydrostatic reconstruction on the right.

Definition at line 87 of file hydrostatic.cpp.

### 5.37.4 Member Data Documentation

#### 5.37.4.1 SCALAR Hydrostatic::hl\_rec [protected]

Hydrostatic reconstruction on the left

Definition at line 88 of file hydrostatic.hpp.

#### 5.37.4.2 SCALAR Hydrostatic::hr\_rec [protected]

Hydrostatic reconstruction on the right

Definition at line 90 of file hydrostatic.hpp.

The documentation for this class was generated from the following files:

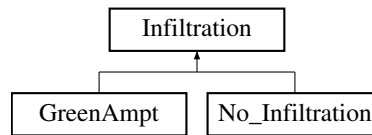
- Headers/libreconstructions/[hydrostatic.hpp](#)
- Sources/libreconstructions/[hydrostatic.cpp](#)

## 5.38 Infiltration Class Reference

Definition of infiltration law.

```
#include <infiltration.hpp>
```

Inheritance diagram for Infiltration:



### Public Member Functions

- [Infiltration \(Parameters &\)](#)  
*Constructor.*
- virtual void [calc](#) (const [VECT](#) &, const [VECT](#) &, const [SCALAR](#))=0  
*Function to be specified in each case.*
- [VECT get\\_hmod](#) () const  
*Gives the modified valued of the water height.*
- [VECT get\\_Vin](#) () const  
*Gives the infiltrated volume.*
- virtual [~Infiltration](#) ()  
*Destructor.*

### Protected Attributes

- const int [NXCELL](#)
- [VECT hmod](#)
- [VECT Vin](#)

#### 5.38.1 Detailed Description

Definition of infiltration law.

Class that contains all the common declarations for the infiltration law.

Definition at line 69 of file infiltration.hpp.

#### 5.38.2 Constructor & Destructor Documentation

##### 5.38.2.1 Infiltration::Infiltration ( Parameters & par )

Constructor.

Defines the number of cells and initializes [Infiltration::hmod](#) and [Infiltration::Vin](#).

#### Parameters

in	par	parameter, contains all the values from the parameters file.
----	-----	--------------------------------------------------------------

Definition at line 57 of file infiltration.cpp.

#### 5.38.2.2 Infiltration::~~Infiltration ( ) [virtual]

Destructor.

Definition at line 95 of file infiltration.cpp.

### 5.38.3 Member Function Documentation

#### 5.38.3.1 virtual void Infiltration::calc ( const VECT & , const VECT & , const SCALAR ) [pure virtual]

Function to be specified in each case.

Implemented in [GreenAmpt](#), and [No\\_Infiltration](#).

#### 5.38.3.2 VECT Infiltration::get\_hmod ( ) const

Gives the modified valued of the water height.

##### Returns

The value of [Infiltration::hmod](#).

Definition at line 75 of file infiltration.cpp.

#### 5.38.3.3 VECT Infiltration::get\_Vin ( ) const

Gives the infiltrated volume.

##### Returns

The value of [Infiltration::Vin](#).

Definition at line 85 of file infiltration.cpp.

### 5.38.4 Member Data Documentation

#### 5.38.4.1 VECT Infiltration::hmod [protected]

Modified valued of the water height

Definition at line 91 of file infiltration.hpp.

#### 5.38.4.2 const int Infiltration::NXCELL [protected]

Number of cells in space.

Definition at line 89 of file infiltration.hpp.

## 5.38.4.3 VECT Infiltration::Vin [protected]

Infiltrated volume

Definition at line 93 of file infiltration.hpp.

The documentation for this class was generated from the following files:

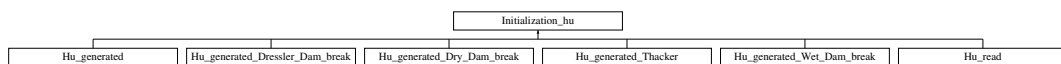
- Headers/librain\_infiltration/infiltration.hpp
- Sources/librain\_infiltration/infiltration.cpp

## 5.39 Initialization\_hu Class Reference

Initialization of h and u.

```
#include <initialization_hu.hpp>
```

Inheritance diagram for Initialization\_hu:



## Public Member Functions

- [Initialization\\_hu \(Parameters &\)](#)  
*Constructor.*
- virtual void [initialization \(VECT &, VECT &\)=0](#)  
*Function to be specified in each initialization.*
- virtual [~Initialization\\_hu \(\)](#)  
*Destructor.*

## Protected Attributes

- const int [NXCELL](#)
- const int [M](#)
- const [SCALAR DX](#)

## 5.39.1 Detailed Description

Initialization of h and u.

Class that contains all the common declarations for the initialization of the water height and of the velocity.

Definition at line 69 of file initialization\_hu.hpp.

## 5.39.2 Constructor &amp; Destructor Documentation

## 5.39.2.1 Initialization\_hu::Initialization\_hu ( Parameters &amp; par )

Constructor.

Defines the number of cells, of time steps and the space step.

## Parameters

<i>in</i>	<i>par</i>	parameter, contains all the values from the parameters file.
-----------	------------	--------------------------------------------------------------

Definition at line 58 of file initialization\_hu.cpp.

### 5.39.2.2 Initialization\_hu::~~Initialization\_hu ( ) [virtual]

Destructor.

Definition at line 70 of file initialization\_hu.cpp.

## 5.39.3 Member Function Documentation

### 5.39.3.1 virtual void Initialization\_hu::initialization ( VECT &, VECT & ) [pure virtual]

Function to be specified in each initialization.

Implemented in [Hu\\_generated](#), [Hu\\_generated\\_Dressler\\_Dam\\_break](#), [Hu\\_generated\\_Dry\\_Dam\\_break](#), [Hu\\_generated\\_Thacker](#), [Hu\\_read](#), and [Hu\\_generated\\_Wet\\_Dam\\_break](#).

## 5.39.4 Member Data Documentation

### 5.39.4.1 const SCALAR Initialization\_hu::DX [protected]

Space step.

Definition at line 88 of file initialization\_hu.hpp.

### 5.39.4.2 const int Initialization\_hu::M [protected]

Number of time steps.

Definition at line 86 of file initialization\_hu.hpp.

### 5.39.4.3 const int Initialization\_hu::NXCELL [protected]

Number of cells in space.

Definition at line 84 of file initialization\_hu.hpp.

The documentation for this class was generated from the following files:

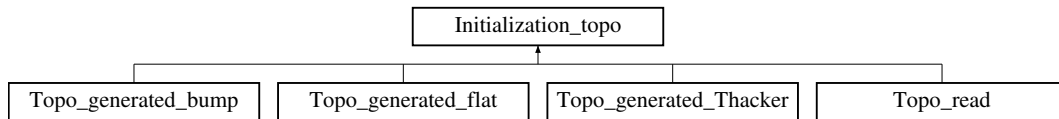
- [Headers/libinitializations/initialization\\_hu.hpp](#)
- [Sources/libinitializations/initialization\\_hu.cpp](#)

## 5.40 Initialization\_topo Class Reference

Initialization of z.

```
#include <initialization_topo.hpp>
```

Inheritance diagram for Initialization\_topo:



## Public Member Functions

- [Initialization\\_topo](#) ([Parameters](#) &)  
*Constructor.*
- virtual void [initialization](#) ([VECT](#) &)=0  
*Function to be specified in each initialization.*
- virtual [~Initialization\\_topo](#) ()  
*Destructor.*

## Protected Attributes

- [VECT](#) z
- const int [NXCELL](#)
- const int [M](#)
- const [SCALAR](#) [DX](#)

### 5.40.1 Detailed Description

Initialization of z.

Class that contains all the common declarations for the initialization of the topography.

Definition at line 69 of file initialization\_topo.hpp.

### 5.40.2 Constructor & Destructor Documentation

#### 5.40.2.1 Initialization\_topo::Initialization\_topo ( [Parameters](#) & *par* )

Constructor.

Defines the number of cells, of time steps and the space step. Creates z the vector for the topography.

#### Parameters

in	<i>par</i>	parameter, contains all the values from the parameters file.
----	------------	--------------------------------------------------------------

#### Warning

Problem: allocation of z failed.

#### Note

If the vector cannot be allocated, the code will exit with failure termination code.

**Todo** Exception should be treated.

Definition at line 58 of file initialization\_topo.cpp.

#### 5.40.2.2 Initialization\_topo::~~Initialization\_topo ( ) [virtual]

Destructor.

Definition at line 78 of file initialization\_topo.cpp.

### 5.40.3 Member Function Documentation

#### 5.40.3.1 virtual void Initialization\_topo::initialization ( VECT & ) [pure virtual]

Function to be specified in each initialization.

Implemented in [Topo\\_read](#), [Topo\\_generated\\_flat](#), [Topo\\_generated\\_Thacker](#), and [Topo\\_generated\\_bump](#).

### 5.40.4 Member Data Documentation

#### 5.40.4.1 const SCALAR Initialization\_topo::DX [protected]

Space step.

Definition at line 91 of file initialization\_topo.hpp.

#### 5.40.4.2 const int Initialization\_topo::M [protected]

Number of time steps.

Definition at line 89 of file initialization\_topo.hpp.

#### 5.40.4.3 const int Initialization\_topo::NXCELL [protected]

Number of cells in space.

Definition at line 87 of file initialization\_topo.hpp.

#### 5.40.4.4 VECT Initialization\_topo::z [protected]

Definition at line 85 of file initialization\_topo.hpp.

The documentation for this class was generated from the following files:

- Headers/libinitializations/[initialization\\_topo.hpp](#)
- Sources/libinitializations/[initialization\\_topo.cpp](#)

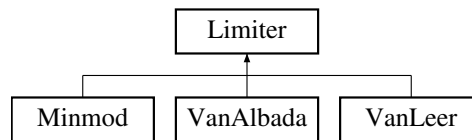
## 5.41 Limiter Class Reference

Slope limiter.

```
#include <limiter.hpp>
```

Inheritance diagram for Limiter:





## Public Member Functions

- [Limiter](#) ()  
*Constructor.*
- virtual void [calc](#) (SCALAR, SCALAR)=0  
*Function to be specified in each slope limiter.*
- [SCALAR get\\_rec](#) () const  
*Gives the reconstructed value.*
- virtual [~Limiter](#) ()  
*Destructor.*

## Protected Attributes

- [SCALAR rec](#)  
*Reconstructed value.*

### 5.41.1 Detailed Description

Slope limiter.

Class that contains all the common declarations for the slope limiters.

Definition at line 69 of file limiter.hpp.

### 5.41.2 Constructor & Destructor Documentation

#### 5.41.2.1 `Limiter::Limiter ( )`

Constructor.

Definition at line 58 of file limiter.cpp.

#### 5.41.2.2 `Limiter::~~Limiter ( )` [virtual]

Destructor.

Definition at line 72 of file limiter.cpp.

### 5.41.3 Member Function Documentation

#### 5.41.3.1 `virtual void Limiter::calc ( SCALAR , SCALAR )` [pure virtual]

Function to be specified in each slope limiter.

Implemented in [VanLeer](#), [Minmod](#), and [VanAlbada](#).

### 5.41.3.2 SCALAR Limiter::get\_rec ( ) const

Gives the reconstructed value.

#### Returns

[Limiter::rec](#) reconstructed value.

Definition at line 62 of file limiter.cpp.

### 5.41.4 Member Data Documentation

#### 5.41.4.1 SCALAR Limiter::rec [protected]

Reconstructed value.

Definition at line 88 of file limiter.hpp.

The documentation for this class was generated from the following files:

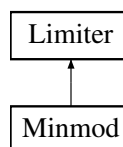
- Headers/liblimitations/[limiter.hpp](#)
- Sources/liblimitations/[limiter.cpp](#)

## 5.42 Minmod Class Reference

Minmod slope limiter

```
#include <minmod.hpp>
```

Inheritance diagram for Minmod:



### Public Member Functions

- [Minmod \( \)](#)  
*Constructor.*
- void [calc \(SCALAR, SCALAR\)](#)  
*Calculates the value of the slope limiter.*
- virtual [~Minmod \( \)](#)  
*Destructor.*

### Additional Inherited Members

#### 5.42.1 Detailed Description

Minmod slope limiter

Class that calculates the minmod slope limiter.

Definition at line 69 of file minmod.hpp.

### 5.42.2 Constructor & Destructor Documentation

#### 5.42.2.1 Minmod::Minmod ( )

Constructor.

Definition at line 58 of file minmod.cpp.

#### 5.42.2.2 Minmod::~~Minmod ( ) [virtual]

Destructor.

Definition at line 85 of file minmod.cpp.

### 5.42.3 Member Function Documentation

#### 5.42.3.1 void Minmod::calc ( SCALAR a, SCALAR b ) [virtual]

Calculates the value of the slope limiter.

Minmod function:

$$\text{minmod}(x,y) = \begin{cases} \min(x,y) & \text{if } x,y \geq 0, \\ \max(x,y) & \text{if } x,y \leq 0, \\ 0 & \text{else.} \end{cases}$$

#### Parameters

in	<i>a</i>	slope on the left of the cell.
in	<i>b</i>	slope on the right of the cell.

#### Modifies

[Limiter::rec](#) reconstructed value.

Implements [Limiter](#).

Definition at line 61 of file minmod.cpp.

The documentation for this class was generated from the following files:

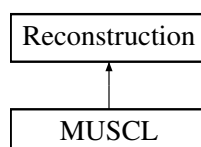
- Headers/liblimitations/[minmod.hpp](#)
- Sources/liblimitations/[minmod.cpp](#)

## 5.43 MUSCL Class Reference

MUSCL reconstruction

```
#include <muscl.hpp>
```

Inheritance diagram for MUSCL:



## Public Member Functions

- [MUSCL](#) ([Parameters](#) &, [VECT](#))  
*Constructor.*
- void [calc](#) ([VECT](#), [VECT](#), [VECT](#), [VECT](#) &, [VECT](#) &, [VECT](#) &, [VECT](#) &, [VECT](#) &, [VECT](#) &)
- [~MUSCL](#) ()  
*Destructor.*

## Additional Inherited Members

### 5.43.1 Detailed Description

MUSCL reconstruction

Class that computes MUSCL reconstruction in space.

Definition at line 70 of file muscl.hpp.

### 5.43.2 Constructor & Destructor Documentation

#### 5.43.2.1 MUSCL::MUSCL ( [Parameters](#) & *par*, [VECT](#) *z* )

Constructor.

Definition at line 58 of file muscl.cpp.

#### 5.43.2.2 MUSCL::~~MUSCL ( )

Destructor.

Definition at line 131 of file muscl.cpp.

### 5.43.3 Member Function Documentation

#### 5.43.3.1 void MUSCL::calc ( [VECT](#) *h*, [VECT](#) *u*, [VECT](#) *z*, [VECT](#) & *hr*, [VECT](#) & *hl*, [VECT](#) & *delz*, [VECT](#) & *ur*, [VECT](#) & *ul*, [VECT](#) & *dzi* ) [[virtual](#)]

Calculates the reconstruction in space.

Calls the calculation of the second order reconstruction in space with MUSCL formulation, see [van Leer \[1979\]](#) [Bouchut \[2007\]](#).

#### Parameters

in	<i>h</i>	water height.
in	<i>u</i>	velocity of the flow.
in	<i>z</i>	topography.
out	<i>hr</i>	reconstructed water height on the right of the cell.
out	<i>hl</i>	reconstructed water height on the left of the cell.
out	<i>delz</i>	difference between two reconstructed topographies on the same boundary (from two adjacent cells).
out	<i>ur</i>	reconstructed velocity on the right of the cell.

out	<i>ul</i>	reconstructed velocity on the left of the cell.
out	<i>dzi</i>	difference between the reconstructed topographies on the left and on the right boundary of a cell.

**Note**

Long double are used locally in the computation to avoid numerical approximations.

**Todo** Check if the use of long double should be generalized to other reconstructions.

Implements [Reconstruction](#).

Definition at line 61 of file muscl.cpp.

The documentation for this class was generated from the following files:

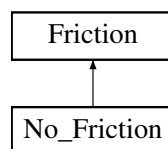
- Headers/libreconstructions/[muscl.hpp](#)
- Sources/libreconstructions/[muscl.cpp](#)

## 5.44 No\_Friction Class Reference

No friction.

```
#include <no_friction.hpp>
```

Inheritance diagram for No\_Friction:



### Public Member Functions

- [No\\_Friction \(\)](#)  
*Constructor.*
- void [calc \(SCALAR, SCALAR, SCALAR\)](#)  
*Does no calculation.*
- virtual [~No\\_Friction \(\)](#)  
*Destructor.*

### Additional Inherited Members

#### 5.44.1 Detailed Description

No friction.

Does no computation.

Definition at line 69 of file no\_friction.hpp.

### 5.44.2 Constructor & Destructor Documentation

#### 5.44.2.1 No\_Friction::No\_Friction ( )

Constructor.

Definition at line 57 of file no\_friction.cpp.

#### 5.44.2.2 No\_Friction::~~No\_Friction ( ) [virtual]

Destructor.

Definition at line 73 of file no\_friction.cpp.

### 5.44.3 Member Function Documentation

#### 5.44.3.1 void No\_Friction::calc ( SCALAR uold, SCALAR hnew, SCALAR qnew ) [virtual]

Does no calculation.

No computation (no friction).

#### Modifies

[Friction::qmod](#) discharge modified by the friction term.

**Todo** For future evolutions: the friction coefficient should be added as in 2D as a parameter of [Fr\\_Manning::calc](#).

Implements [Friction](#).

Definition at line 60 of file no\_friction.cpp.

The documentation for this class was generated from the following files:

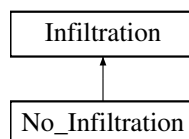
- Headers/libfrictions/[no\\_friction.hpp](#)
- Sources/libfrictions/[no\\_friction.cpp](#)

## 5.45 No Infiltration Class Reference

No infiltration.

```
#include <no_infiltration.hpp>
```

Inheritance diagram for No\_Infiltration:



#### Public Member Functions

- [No\\_Infiltration](#) ([Parameters](#) &)

*Constructor.*

- void `calc` (const `VECT` &, const `VECT` &, const `SCALAR`)

*Does no infiltration.*

- virtual `~No_Infiltration` ()

*Destructor.*

## Additional Inherited Members

### 5.45.1 Detailed Description

No infiltration.

Sets the water height and infiltrated volume remain unchanged.

Definition at line 69 of file `no_infiltration.hpp`.

### 5.45.2 Constructor & Destructor Documentation

#### 5.45.2.1 No\_Infiltration::No\_Infiltration ( Parameters & *par* )

Constructor.

Definition at line 57 of file `no_infiltration.cpp`.

#### 5.45.2.2 No\_Infiltration::~~No\_Infiltration ( ) [virtual]

Destructor.

Definition at line 80 of file `no_infiltration.cpp`.

### 5.45.3 Member Function Documentation

#### 5.45.3.1 void No\_Infiltration::calc ( const `VECT` & *h*, const `VECT` & *Vin\_tot*, const `SCALAR` *dt* ) [virtual]

Does no infiltration.

No computation (water height and infiltrated volume remain unchanged).

#### Parameters

<code>in</code>	<i>h</i>	water height.
<code>in</code>	<i>Vin_tot</i>	total infiltrated volume.
<code>in</code>	<i>dt</i>	time step.

#### Modifies

`Infiltration::hmod` modified water height.

`Infiltration::Vin` total infiltrated volume containing the current time step.

Implements `Infiltration`.

Definition at line 60 of file `no_infiltration.cpp`.

The documentation for this class was generated from the following files:

- Headers/librain\_infiltration/[no\\_infiltration.hpp](#)

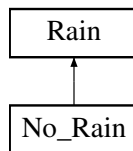
- Sources/librain\_infiltration/no\_infiltration.cpp

## 5.46 No\_Rain Class Reference

No rain.

```
#include <no_rain.hpp>
```

Inheritance diagram for No\_Rain:



### Public Member Functions

- [No\\_Rain \(Parameters &\)](#)  
*Constructor.*
- void [rain\\_func \(SCALAR, VECT &\)](#)  
*Sets the rain intensity to zero.*
- virtual [~No\\_Rain \(\)](#)  
*Destructor.*

### Additional Inherited Members

#### 5.46.1 Detailed Description

No rain.

Sets the rain intensity to zero.

Definition at line 70 of file no\_rain.hpp.

#### 5.46.2 Constructor & Destructor Documentation

##### 5.46.2.1 No\_Rain::No\_Rain ( Parameters & par )

Constructor.

Definition at line 57 of file no\_rain.cpp.

##### 5.46.2.2 No\_Rain::~~No\_Rain ( ) [virtual]

Destructor.

Definition at line 74 of file no\_rain.cpp.



### 5.46.3 Member Function Documentation

#### 5.46.3.1 void No\_Rain::rain\_func ( SCALAR *time*, VECT & *Tab\_rain* ) [virtual]

Sets the rain intensity to zero.

No computation (rain intensity set to zero).

#### Parameters

in	<i>time</i>	current time.
in, out	<i>Tab_rain</i>	rain intensity at the current time on each cell.

Implements [Rain](#).

Definition at line 60 of file no\_rain.cpp.

The documentation for this class was generated from the following files:

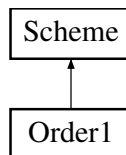
- Headers/librain\_infiltration/no\_rain.hpp
- Sources/librain\_infiltration/no\_rain.cpp

## 5.47 Order1 Class Reference

Order 1 scheme.

```
#include <order1.hpp>
```

Inheritance diagram for Order1:



### Public Member Functions

- [Order1](#) ([Parameters](#) &)  
*Constructor.*
- void [calc](#) ()  
*Performs the numerical scheme.*
- virtual [~Order1](#) ()  
*Destructor.*

### Additional Inherited Members

#### 5.47.1 Detailed Description

Order 1 scheme.

Class that computes the solution with a numerical scheme at order 1.

Definition at line 69 of file order1.hpp.

## 5.47.2 Constructor & Destructor Documentation

### 5.47.2.1 Order1::Order1 ( Parameters & *par* )

Constructor.

Definition at line 58 of file order1.cpp.

### 5.47.2.2 Order1::~~Order1 ( ) [virtual]

Destructor.

Definition at line 159 of file order1.cpp.

## 5.47.3 Member Function Documentation

### 5.47.3.1 void Order1::calc ( ) [virtual]

Performs the numerical scheme.

Performs the first order numerical scheme.

#### Note

In DEBUG mode, the programme will save another file with boundary fluxes.

Implements [Scheme](#).

Definition at line 64 of file order1.cpp.

The documentation for this class was generated from the following files:

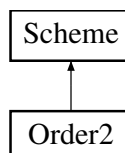
- Headers/lib schemes/order1.hpp
- Sources/lib schemes/order1.cpp

## 5.48 Order2 Class Reference

Order 2 scheme.

```
#include <order2.hpp>
```

Inheritance diagram for Order2:



### Public Member Functions

- [Order2](#) (Parameters &)  
*Constructor.*
- void [calc](#) ()

*Performs the numerical scheme.*

- virtual `~Order2()`

*Destructor.*

## Additional Inherited Members

### 5.48.1 Detailed Description

Order 2 scheme.

Class that computes the solution with a numerical scheme at order 2.

Definition at line 69 of file order2.hpp.

### 5.48.2 Constructor & Destructor Documentation

#### 5.48.2.1 Order2::Order2 ( Parameters & *par* )

Constructor.

Initializations, definition of the reconstruction and creation 3 vectors for this reconstruction.

#### Parameters

<i>in</i>	<i>par</i>	parameter, contains all the values from the parameters file.
-----------	------------	--------------------------------------------------------------

#### Warning

Problem: allocation of \*sa failed.

#### Note

If a vector cannot be allocated, the code will exit with failure termination code.

**Todo** Exception should be treated.

Definition at line 59 of file order2.cpp.

#### 5.48.2.2 Order2::~Order2 ( ) [virtual]

Destructor.

Definition at line 224 of file order2.cpp.

### 5.48.3 Member Function Documentation

#### 5.48.3.1 void Order2::calc ( ) [virtual]

Performs the numerical scheme.

Performs the second order numerical scheme.

**Note**

In DEBUG mode, the programme will save another file with boundary fluxes.

Implements [Scheme](#).

Definition at line 115 of file order2.cpp.

The documentation for this class was generated from the following files:

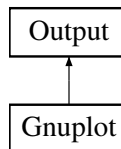
- Headers/lib schemes/order2.hpp
- Sources/lib schemes/order2.cpp

**5.49 Output Class Reference**

Output format

```
#include <output.hpp>
```

Inheritance diagram for Output:

**Public Member Functions**

- [Output](#) ([Parameters](#) &)  
*Constructor.*
- virtual void [write](#) ([VECT](#), [VECT](#), [VECT](#), int)=0  
*Function to be specified in each output format.*
- void [initial](#) ([VECT](#), [VECT](#), [VECT](#))  
*Saves the initial time.*
- void [result](#) ([SCALAR](#), clock\_t, [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#))  
*Saves global values.*
- void [bound\\_flux](#) (int, [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#))  
*Saves the flux and the cumulative flux on the boundaries.*
- void [check\\_vol](#) (int, [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#))  
*Saves the infiltrated and rain volumes.*
- void [save](#) ([VECT](#), [VECT](#), [VECT](#))  
*Saves the final time.*
- virtual [~Output](#) ()  
*Destructor.*

**Protected Attributes**

- const int [NXCELL](#)
- const int [M](#)
- const [SCALAR DX](#)

- const [SCALAR DT](#)
- const int [NBTIMES](#)
- int [nbt](#)
- string [outputDirectory](#)
- string [namefile\\_init](#)
- string [namefile\\_end](#)
- string [namefile\\_res](#)
- string [namefile\\_flux](#)
- string [namefile\\_check\\_volume](#)

### 5.49.1 Detailed Description

Output format

Class that contains all the common declarations for the output formats.

Definition at line 68 of file output.hpp.

### 5.49.2 Constructor & Destructor Documentation

#### 5.49.2.1 Output::Output ( Parameters & *par* )

Constructor.

Defines the names of the outputs.

If run in DEBUG mode, writes the header of the file 'boundary\_flux.dat'.

#### Parameters

<i>in</i>	<i>par</i>	parameter, contains all the values from the parameters file.
-----------	------------	--------------------------------------------------------------

#### Warning

Impossible to open the \*\*\* file. Verify if the directory \*\*\* exists.

#### Note

If boundary\_flux.dat cannot be opened, the code will exit with failure termination code.

**Todo** Exception should be treated.

Definition at line 57 of file output.cpp.

#### 5.49.2.2 Output::~Output ( ) [virtual]

Destructor.

Definition at line 114 of file output.cpp.

### 5.49.3 Member Function Documentation

### 5.49.3.1 void Output::bound\_flux ( int *time*, SCALAR *f\_l*, SCALAR *f\_r*, SCALAR *cum\_f\_l*, SCALAR *cum\_f\_r* )

Saves the flux and the cumulative flux on the boundaries.

#### Parameters

in	<i>time</i>	current time (number of iteration).
in	<i>f_l</i>	flux on the left boundary (m <sup>2</sup> /s).
in	<i>f_r</i>	flux on the right boundary (m <sup>2</sup> /s).
in	<i>cum_f_l</i>	cumulative flux on the left boundary (m <sup>3</sup> ).
in	<i>cum_f_r</i>	cumulative flux on the right boundary (m <sup>3</sup> ).

Definition at line 146 of file output.cpp.

### 5.49.3.2 void Output::check\_vol ( int *time*, SCALAR *Vol\_rain\_tot*, SCALAR *Vol\_inf\_tot*, SCALAR *Vol\_of\_tot*, SCALAR *bound\_flux\_tot* )

Saves the infiltrated and rain volumes.

#### Parameters

in	<i>time</i>	current time (number of iteration).
in	<i>Vol_rain_tot</i>	total rain volume.
in	<i>Vol_inf_tot</i>	total volume of infiltrated water.
in	<i>Vol_of_tot</i>	total volume of overland flow.
in	<i>bound_flux_tot</i>	total boundary flux.

Definition at line 197 of file output.cpp.

### 5.49.3.3 void Output::initial ( VECT *z*, VECT *h*, VECT *u* )

Saves the initial time.

#### Parameters

in	<i>h</i>	water height.
in	<i>u</i>	velocity.
in	<i>z</i>	topography.

#### Warning

Impossible to open the \*\*\* file. Verify if the directory \*\*\* exists.

#### Note

If huz\_initial.dat cannot be opened, the code will exit with failure termination code.

**Todo** Exception should be treated.

Definition at line 117 of file output.cpp.

5.49.3.4 void Output::result ( SCALAR *t*, clock.t *cpu*, SCALAR *froude*, SCALAR *Vol\_rain\_tot*, SCALAR *Vol\_inf\_tot*, SCALAR *Vol\_of\_tot*, SCALAR *bound\_flux\_tot* )

Saves global values.

#### Parameters

in	<i>t</i>	elapsed time.
in	<i>cpu</i>	CPU time.
in	<i>froude</i>	mean Froude number (in space) at the final time.
in	<i>Vol_rain_tot</i>	total rain volume.
in	<i>Vol_inf_tot</i>	total volume of infiltrated water.
in	<i>Vol_of_tot</i>	total volume of overland flow.
in	<i>bound_flux_tot</i>	total boundary flux.

#### Warning

Impossible to open the \*\*\* file. Verify if the directory \*\*\* exists.

#### Note

If results.dat cannot be opened, the code will exit with failure termination code.

**Todo** Exception should be treated.

Definition at line 215 of file output.cpp.

5.49.3.5 void Output::save ( VECT *z*, VECT *h*, VECT *q* )

Saves the final time.

If the water height is too small, we replace it by 0, the velocity and discharge are null and the Froude number does not exist.

#### Parameters

in	<i>z</i>	topography.
in	<i>h</i>	water height.
in	<i>q</i>	discharge.

#### Warning

Impossible to open the \*\*\* file. Verify if the directory \*\*\* exists.

#### Note

If huz\_final.dat cannot be opened, the code will exit with failure termination code.

**Todo** Exception should be treated.

Definition at line 162 of file output.cpp.

5.49.3.6 `virtual void Output::write ( VECT , VECT , VECT , int )` [pure virtual]

Function to be specified in each output format.

Implemented in [Gnuplot](#).

#### 5.49.4 Member Data Documentation

5.49.4.1 `const SCALAR Output::DT` [protected]

Time step.

Definition at line 105 of file `output.hpp`.

5.49.4.2 `const SCALAR Output::DX` [protected]

Space step.

Definition at line 103 of file `output.hpp`.

5.49.4.3 `const int Output::M` [protected]

Number of time steps.

Definition at line 101 of file `output.hpp`.

5.49.4.4 `string Output::namefile_check_volume` [protected]

Name of the file where the infiltrated and rain volumes are saved.

Definition at line 121 of file `output.hpp`.

5.49.4.5 `string Output::namefile_end` [protected]

Name of the file where the final time is saved.

Definition at line 115 of file `output.hpp`.

5.49.4.6 `string Output::namefile_flux` [protected]

Name of the file where the boundary fluxes are saved.

Definition at line 119 of file `output.hpp`.

5.49.4.7 `string Output::namefile_init` [protected]

Name of the file where the initialization is saved.

Definition at line 113 of file `output.hpp`.

5.49.4.8 `string Output::namefile_res` [protected]

Name of the file where the global results are saved.



Definition at line 117 of file output.hpp.

#### 5.49.4.9 int Output::nbt [protected]

Number of times steps between two savings.

Definition at line 109 of file output.hpp.

#### 5.49.4.10 const int Output::NBTIMES [protected]

Number of times saved.

Definition at line 107 of file output.hpp.

#### 5.49.4.11 const int Output::NXCELL [protected]

Number of cells in space.

Definition at line 99 of file output.hpp.

#### 5.49.4.12 string Output::outputDirectory [protected]

Name of the output directory.

Definition at line 111 of file output.hpp.

The documentation for this class was generated from the following files:

- Headers/libsave/output.hpp
- Sources/libsave/output.cpp

## 5.50 Parameters Class Reference

Gets parameters.

```
#include <parameters.hpp>
```

### Public Member Functions

- [Parameters](#) ()  
*Constructor.*
- virtual [~Parameters](#) ()  
*Destructor.*
- void [setparameters](#) (const char \*)  
*Sets the parameters.*
- int [get\\_Nxcell](#) () const  
*Gives the number of cells in space.*
- int [get\\_m](#) () const  
*Gives the number of time steps to attain the final time.*
- int [get\\_nbtimes](#) () const  
*Gives the number of times saved.*

- [SCALAR get\\_dx \(\)](#) const  
*Gives the space step.*
- [SCALAR get\\_dt \(\)](#) const  
*Gives the time step.*
- [SCALAR get\\_tx \(\)](#) const  
*Gives the value of dt/dx.*
- [int get\\_Lbound \(\)](#) const  
*Gives the value corresponding to the left boundary condition.*
- [SCALAR get\\_L\\_imp\\_q \(\)](#) const  
*Gives the value of the imposed discharge in left bc.*
- [SCALAR get\\_L\\_imp\\_h \(\)](#) const  
*Gives the value of the imposed water height in left bc.*
- [int get\\_Rbound \(\)](#) const  
*Gives the value corresponding to the right boundary condition.*
- [SCALAR get\\_R\\_imp\\_q \(\)](#) const  
*Gives the value of the imposed discharge in right bc.*
- [SCALAR get\\_R\\_imp\\_h \(\)](#) const  
*Gives the value of the imposed water height in right bc.*
- [int get\\_flux \(\)](#) const  
*Gives the value corresponding to the flux.*
- [int get\\_order \(\)](#) const  
*Gives the order of the scheme.*
- [SCALAR get\\_cfl \(\)](#) const  
*Gives the cfl of the scheme.*
- [int get\\_rec \(\)](#) const  
*Gives the value corresponding to the reconstruction.*
- [int get\\_fric \(\)](#) const  
*Gives the value corresponding to the friction law.*
- [SCALAR get\\_friccoef \(\)](#) const  
*Gives the value of the friction coefficient.*
- [int get\\_lim \(\)](#) const  
*Gives the value corresponding to the limiter.*
- [int get\\_topo \(\)](#) const  
*Gives the value corresponding to the topography.*
- [int get\\_hu \(\)](#) const  
*Gives the value corresponding to the initialization of h and u.*
- [int get\\_rain \(\)](#) const  
*Gives the value corresponding to the initialization of the rain.*
- [int get\\_inf \(\)](#) const  
*Gives the value corresponding to the initialization of the infiltration.*
- [int get\\_Kc\\_init \(\)](#) const  
*Gives the value corresponding to the initialization of Kc.*
- [SCALAR get\\_Kc\\_coef \(\)](#) const  
*Gives the value of the Kc coefficient.*
- [int get\\_Ks\\_init \(\)](#) const  
*Gives the value corresponding to the initialization of Ks.*
- [SCALAR get\\_Ks\\_coef \(\)](#) const

- Gives the value of the Ks coefficient.*

  - int `get_dtheta_init` () const  
*Gives the value corresponding to the initialization of dtheta.*
  - SCALAR `get_dtheta_coef` () const  
*Gives the value of the dtheta coefficient.*
  - int `get_Psi_init` () const  
*Gives the value corresponding to the initialization of Psi.*
  - SCALAR `get_Psi_coef` () const  
*Gives the value of the Psi coefficient.*
  - int `get_zcrust_init` () const  
*Gives the value corresponding to the initialization of zcrust.*
  - SCALAR `get_zcrust_coef` () const  
*Gives the value of the zcrust coefficient.*
  - int `get_imax_init` () const  
*Gives the value corresponding to the initialization of imax.*
  - SCALAR `get_imax_coef` () const  
*Gives the value of the imax coefficient.*
  - SCALAR `get_amortENO` () const  
*Gives the value of the amortENO parameter.*
  - SCALAR `get_modifENO` () const  
*Gives the value of the modifENO parameter.*
  - string `get_topographyNameFile` () const  
*Gives the topography path + Input directory.*
  - string `get_huNameFile` (void) const  
*Gives the h and u path for the initialization + Input directory.*
  - string `get_rainNameFile` (void) const  
*Gives the rain path for the initialization + Input directory.*
  - string `get_KcNameFile` (void) const  
*Gives the Kc path for the initialization + Input directory.*
  - string `get_KsNameFile` (void) const  
*Gives the Ks path for the initialization + Input directory.*
  - string `get_dthetaNameFile` (void) const  
*Gives the dtheta path for the initialization + Input directory.*
  - string `get_PsiNameFile` (void) const  
*Gives the Psi path for the initialization + Input directory.*
  - string `get_zcrustNameFile` (void) const  
*Gives the zcrust path for the initialization + Input directory.*
  - string `get_imaxNameFile` (void) const  
*Gives the imax path for the initialization + Input directory.*
  - string `get_topographyNameFileS` () const  
*Gives the topography namefile (inside the Input directory)*
  - string `get_huNameFileS` (void) const  
*Gives the h and u namefile for the initialization (inside the Input directory)*
  - string `get_rainNameFileS` (void) const  
*Gives the rain namefile for the initialization (inside the Input directory)*
  - string `get_KcNameFileS` () const  
*Gives the Kc namefile (inside the Input directory)*

- string [get\\_KsNameFileS](#) () const  
*Gives the Ks namefile (inside the Input directory)*
- string [get\\_dthetaNameFileS](#) () const  
*Gives the dtheta namefile (inside the Input directory)*
- string [get\\_PsiNameFileS](#) () const  
*Gives the Psi namefile (inside the Input directory)*
- string [get\\_zcrustNameFileS](#) () const  
*Gives the zcrust namefile (inside the Input directory)*
- string [get\\_imaxNameFileS](#) () const  
*Gives the imax namefile (inside the Input directory)*
- string [get\\_outputDirectory](#) (void) const  
*Gives the output directory with the suffix.*
- string [get\\_suffix](#) (void) const  
*Gives the suffix.*
- void [fill\\_array](#) (VECT &, const SCALAR) const  
*fills the VECT array with a SCALAR*
- void [fill\\_array](#) (VECT &, string) const  
*fills the VECT array with the values contained in a file*

### Protected Attributes

- int [Nxcell](#)
- int [m](#)
- int [nbtimes](#)
- SCALAR [dx](#)
- SCALAR [dt](#)
- SCALAR [tx](#)
- SCALAR [L](#)
- SCALAR [T](#)
- SCALAR [cfl](#)
- int [Lbound](#)
- int [Rbound](#)
- SCALAR [L\\_imp\\_q](#)
- SCALAR [L\\_imp\\_h](#)
- SCALAR [R\\_imp\\_q](#)
- SCALAR [R\\_imp\\_h](#)
- int [flux](#)
- int [order](#)
- int [rec](#)
- int [fric](#)
- int [lim](#)
- int [topo](#)
- int [hu\\_init](#)
- int [rain](#)
- int [inf](#)
- int [Kc\\_init](#)
- int [Ks\\_init](#)
- int [dtheta\\_init](#)

- int `Psi_init`
- int `zcrust_init`
- int `imax_init`
- SCALAR `amortENO`
- SCALAR `modifENO`
- SCALAR `friccoef`
- SCALAR `Kc_coef`
- SCALAR `Ks_coef`
- SCALAR `dtheta_coef`
- SCALAR `Psi_coef`
- SCALAR `zcrust_coef`
- SCALAR `imax_coef`
- string `topography_namefile`
- string `topo_NF`
- string `hu_namefile`
- string `hu_NF`
- string `rain_namefile`
- string `rain_NF`
- string `Kc_namefile`
- string `Kc_NF`
- string `Ks_namefile`
- string `Ks_NF`
- string `dtheta_namefile`
- string `dtheta_NF`
- string `Psi_namefile`
- string `Psi_NF`
- string `zcrust_namefile`
- string `zcrust_NF`
- string `imax_namefile`
- string `imax_NF`
- string `output_directory`
- string `suffix_o`

### 5.50.1 Detailed Description

Gets parameters.

Class that reads the parameters, checks their values and contains all the common declarations to get the values of the parameters.

Definition at line 74 of file `parameters.hpp`.

### 5.50.2 Constructor & Destructor Documentation

#### 5.50.2.1 Parameters::Parameters ( )

Constructor.

Definition at line 58 of file `parameters.cpp`.

### 5.50.2.2 Parameters::~~Parameters ( ) [virtual]

Destructor.

Definition at line 1048 of file parameters.cpp.

## 5.50.3 Member Function Documentation

### 5.50.3.1 void Parameters::fill\_array ( VECT & *myarray*, const SCALAR *myvalue* ) const

fills the VECT array with a SCALAR

Fills an array with a constant value.

#### Parameters

<i>in, out</i>	<i>myarray</i>	array to fill.
<i>in</i>	<i>myvalue</i>	value.

Definition at line 1622 of file parameters.cpp.

### 5.50.3.2 void Parameters::fill\_array ( VECT & *myarray*, string *namefile* ) const

fills the VECT array with the values contained in a file

Fills an array with the values given in the file

#### Parameters

<i>in, out</i>	<i>myarray</i>	array to fill.
<i>in</i>	<i>namefile</i>	name of the file containing the values to be inserted into the array.

Definition at line 1634 of file parameters.cpp.

### 5.50.3.3 SCALAR Parameters::get\_amortENO ( ) const

Gives the value of the amortENO parameter.

#### Returns

The value of the amortENO parameter [Parameters::amortENO](#).

Definition at line 1241 of file parameters.cpp.

### 5.50.3.4 SCALAR Parameters::get\_cfl ( ) const

Gives the cfl of the scheme.

#### Returns

The cfl of the scheme [Parameters::cfl](#).

Definition at line 1191 of file parameters.cpp.

### 5.50.3.5 SCALAR Parameters::get\_dt ( ) const

Gives the time step.

#### Returns

The time step [Parameters::dt](#).

Definition at line 1091 of file parameters.cpp.

### 5.50.3.6 SCALAR Parameters::get\_dtheta\_coef ( ) const

Gives the value of the dtheta coefficient.

#### Returns

The value of dtheta [Parameters::dtheta\\_coef](#).

Definition at line 1451 of file parameters.cpp.

### 5.50.3.7 int Parameters::get\_dtheta\_init ( ) const

Gives the value corresponding to the initialization of dtheta.

#### Returns

The value corresponding to the initialization of dtheta [Parameters::dtheta\\_init](#).

Definition at line 1441 of file parameters.cpp.

### 5.50.3.8 string Parameters::get\_dthetaNameFile ( void ) const

Gives the dtheta path for the initialization + Input directory.

#### Returns

The dtheta path for the initialization + Input directory [Parameters::dtheta\\_namefile](#).

Definition at line 1461 of file parameters.cpp.

### 5.50.3.9 string Parameters::get\_dthetaNameFileS ( ) const

Gives the dtheta namefile (inside the Input directory)

#### Returns

The dtheta namefile for the initialization (inside the Input directory) [Parameters::dtheta\\_NF](#).

Definition at line 1471 of file parameters.cpp.

#### 5.50.3.10 SCALAR Parameters::get\_dx ( ) const

Gives the space step.

##### Returns

The space step [Parameters::dx](#).

Definition at line 1071 of file parameters.cpp.

#### 5.50.3.11 int Parameters::get\_flux ( ) const

Gives the value corresponding to the flux.

##### Returns

The value corresponding to the flux [Parameters::flux](#).

Definition at line 1171 of file parameters.cpp.

#### 5.50.3.12 int Parameters::get\_fric ( ) const

Gives the value corresponding to the friction law.

##### Returns

The value corresponding to the friction law [Parameters::fric](#).

Definition at line 1211 of file parameters.cpp.

#### 5.50.3.13 SCALAR Parameters::get\_friccoef ( ) const

Gives the value of the friction coefficient.

##### Returns

The value of the friction coefficient [Parameters::friccoef](#).

Definition at line 1221 of file parameters.cpp.

#### 5.50.3.14 int Parameters::get\_hu ( ) const

Gives the value corresponding to the initialization of h and u.

##### Returns

The value corresponding to the initialization of h and u [Parameters::hu\\_init](#).

Definition at line 1311 of file parameters.cpp.



**5.50.3.15** `string Parameters::get_huNameFile ( void ) const`

Gives the h and u path for the initialization + Input directory.

**Returns**

The h and u path for the initialization + Input directory [Parameters::hu\\_namefile](#).

Definition at line 1291 of file parameters.cpp.

**5.50.3.16** `string Parameters::get_huNameFileS ( void ) const`

Gives the h and u namefile for the initialization (inside the Input directory)

**Returns**

The h and u namefile for the initialization (inside the Input directory) [Parameters::hu\\_NF](#).

Definition at line 1301 of file parameters.cpp.

**5.50.3.17** `SCALAR Parameters::get_imax_coef ( ) const`

Gives the value of the imax coefficient.

**Returns**

The value of imax [Parameters::imax\\_coef](#).

Definition at line 1571 of file parameters.cpp.

**5.50.3.18** `int Parameters::get_imax_init ( ) const`

Gives the value corresponding to the initialization of imax.

**Returns**

The value corresponding to the initialization of imax [Parameters::imax\\_init](#).

Definition at line 1561 of file parameters.cpp.

**5.50.3.19** `string Parameters::get_imaxNameFile ( void ) const`

Gives the imax path for the initialization + Input directory.

**Returns**

The imax path for the initialization + Input directory [Parameters::imax\\_namefile](#).

Definition at line 1581 of file parameters.cpp.

#### 5.50.3.20 string Parameters::get\_imaxNameFileS ( ) const

Gives the imax namefile (inside the Input directory)

##### Returns

The imax namefile for the initialization (inside the Input directory) [Parameters::imax\\_NF](#).

Definition at line 1591 of file parameters.cpp.

#### 5.50.3.21 int Parameters::get\_inf ( ) const

Gives the value corresponding to the initialization of the infiltration.

##### Returns

The value corresponding to the infiltration [Parameters::inf](#).

Definition at line 1351 of file parameters.cpp.

#### 5.50.3.22 SCALAR Parameters::get\_Kc\_coef ( ) const

Gives the value of the Kc coefficient.

##### Returns

The value of Kc [Parameters::Kc\\_coef](#).

Definition at line 1371 of file parameters.cpp.

#### 5.50.3.23 int Parameters::get\_Kc\_init ( ) const

Gives the value corresponding to the initialization of Kc.

##### Returns

The value corresponding to the initialization of Kc [Parameters::Kc\\_init](#).

Definition at line 1361 of file parameters.cpp.

#### 5.50.3.24 string Parameters::get\_KcNameFile ( void ) const

Gives the Kc path for the initialization + Input directory.

##### Returns

The Kc path for the initialization + Input directory [Parameters::Kc\\_namefile](#).

Definition at line 1381 of file parameters.cpp.

**5.50.3.25** `string Parameters::get_KcNameFileS ( ) const`

Gives the Kc namefile (inside the Input directory)

**Returns**

The Kc namefile for the initialization (inside the Input directory) [Parameters::Kc\\_NF](#).

Definition at line 1391 of file parameters.cpp.

**5.50.3.26** `SCALAR Parameters::get_Ks_coef ( ) const`

Gives the value of the Ks coefficient.

**Returns**

The value of Ks [Parameters::Ks\\_coef](#).

Definition at line 1411 of file parameters.cpp.

**5.50.3.27** `int Parameters::get_Ks_init ( ) const`

Gives the value corresponding to the initialization of Ks.

**Returns**

The value corresponding to the initialization of Ks [Parameters::Ks\\_init](#).

Definition at line 1401 of file parameters.cpp.

**5.50.3.28** `string Parameters::get_KsNameFile ( void ) const`

Gives the Ks path for the initialization + Input directory.

**Returns**

The Ks path for the initialization + Input directory [Parameters::Ks\\_namefile](#).

Definition at line 1421 of file parameters.cpp.

**5.50.3.29** `string Parameters::get_KsNameFileS ( ) const`

Gives the Ks namefile (inside the Input directory)

**Returns**

The Ks namefile for the initialization (inside the Input directory) [Parameters::Ks\\_NF](#).

Definition at line 1431 of file parameters.cpp.

#### 5.50.3.30 SCALAR Parameters::get\_L\_imp\_h ( ) const

Gives the value of the imposed water height in left bc.

##### Returns

The value of the imposed water height in the left boundary condition [Parameters::L\\_imp\\_h](#).

Definition at line 1131 of file parameters.cpp.

#### 5.50.3.31 SCALAR Parameters::get\_L\_imp\_q ( ) const

Gives the value of the imposed discharge in left bc.

##### Returns

The value of the imposed discharge in the left boundary condition [Parameters::L\\_imp\\_q](#).

Definition at line 1121 of file parameters.cpp.

#### 5.50.3.32 int Parameters::get\_Lbound ( ) const

Gives the value corresponding to the left boundary condition.

##### Returns

The value corresponding to the left boundary condition [Parameters::Lbound](#).

Definition at line 1111 of file parameters.cpp.

#### 5.50.3.33 int Parameters::get\_lim ( ) const

Gives the value corresponding to the limiter.

##### Returns

The value corresponding to the limiter [Parameters::lim](#).

Definition at line 1231 of file parameters.cpp.

#### 5.50.3.34 int Parameters::get\_m ( ) const

Gives the number of time steps to attain the final time.

##### Returns

The number of time steps to attain the final time [Parameters::m](#).

Definition at line 1061 of file parameters.cpp.

#### 5.50.3.35 SCALAR Parameters::get\_modifENO ( ) const

Gives the value of the modifENO parameter.

##### Returns

The value of the modifENO parameter [Parameters::modifENO](#).

Definition at line 1251 of file parameters.cpp.

#### 5.50.3.36 int Parameters::get\_nbtimes ( ) const

Gives the number of times saved.

##### Returns

The number of times saved [Parameters::nbtimes](#).

Definition at line 1081 of file parameters.cpp.

#### 5.50.3.37 int Parameters::get\_Nxcell ( ) const

Gives the number of cells in space.

##### Returns

The number of cells in space [Parameters::Nxcell](#).

Definition at line 1051 of file parameters.cpp.

#### 5.50.3.38 int Parameters::get\_order ( ) const

Gives the order of the scheme.

##### Returns

The order of the scheme [Parameters::order](#).

Definition at line 1181 of file parameters.cpp.

#### 5.50.3.39 string Parameters::get\_outputDirectory ( void ) const

Gives the output directory with the suffix.

##### Returns

The output directory with the suffix [Parameters::output\\_directory](#).

Definition at line 1601 of file parameters.cpp.

#### 5.50.3.40 SCALAR Parameters::get\_Psi\_coef ( ) const

Gives the value of the Psi coefficient.

##### Returns

The value of Psi [Parameters::Psi\\_coef](#).

Definition at line 1491 of file parameters.cpp.

#### 5.50.3.41 int Parameters::get\_Psi\_init ( ) const

Gives the value corresponding to the initialization of Psi.

##### Returns

The value corresponding to the initialization of Psi [Parameters::Psi\\_init](#).

Definition at line 1481 of file parameters.cpp.

#### 5.50.3.42 string Parameters::get\_PsiNameFile ( void ) const

Gives the Psi path for the initialization + Input directory.

##### Returns

The Psi path for the initialization + Input directory [Parameters::Psi\\_namefile](#).

Definition at line 1501 of file parameters.cpp.

#### 5.50.3.43 string Parameters::get\_PsiNameFileS ( ) const

Gives the Psi namefile (inside the Input directory)

##### Returns

The Psi namefile for the initialization (inside the Input directory) [Parameters::Psi\\_NF](#).

Definition at line 1511 of file parameters.cpp.

#### 5.50.3.44 SCALAR Parameters::get\_R\_imp\_h ( ) const

Gives the value of the imposed water height in right bc.

##### Returns

The value of the imposed water height in the right boundary condition [Parameters::R\\_imp\\_h](#).

Definition at line 1161 of file parameters.cpp.

#### 5.50.3.45 SCALAR Parameters::get\_R\_imp\_q ( ) const

Gives the value of the imposed discharge in right bc.

##### Returns

The value of the imposed discharge in the right boundary condition [Parameters::R\\_imp\\_q](#).

Definition at line 1151 of file parameters.cpp.

#### 5.50.3.46 int Parameters::get\_rain ( ) const

Gives the value corresponding to the initialization of the rain.

##### Returns

The value corresponding to the initialization of the rain [Parameters::rain](#).

Definition at line 1341 of file parameters.cpp.

#### 5.50.3.47 string Parameters::get\_rainNameFile ( void ) const

Gives the rain path for the initialization + Input directory.

##### Returns

The rain path for the initialization + Input directory [Parameters::rain\\_namefile](#).

Definition at line 1321 of file parameters.cpp.

#### 5.50.3.48 string Parameters::get\_rainNameFileS ( void ) const

Gives the rain namefile for the initialization (inside the Input directory)

##### Returns

The rain namefile for the initialization (inside the Input directory) [Parameters::rain\\_NF](#).

Definition at line 1331 of file parameters.cpp.

#### 5.50.3.49 int Parameters::get\_Rbound ( ) const

Gives the value corresponding to the right boundary condition.

##### Returns

The value corresponding to the right boundary condition [Parameters::Rbound](#).

Definition at line 1141 of file parameters.cpp.

#### 5.50.3.50 int Parameters::get\_rec ( ) const

Gives the value corresponding to the reconstruction.

##### Returns

The value corresponding to the reconstruction [Parameters::rec](#).

Definition at line 1201 of file parameters.cpp.

#### 5.50.3.51 string Parameters::get\_suffix ( void ) const

Gives the suffix.

##### Returns

The suffix (for the output directory) [Parameters::suffix\\_o](#).

Definition at line 1611 of file parameters.cpp.

#### 5.50.3.52 int Parameters::get\_topo ( ) const

Gives the value corresponding to the topography.

##### Returns

The value corresponding to the topography [Parameters::topo](#).

Definition at line 1281 of file parameters.cpp.

#### 5.50.3.53 string Parameters::get\_topographyNameFile ( void ) const

Gives the topography path + Input directory.

##### Returns

The topography path + Input directory [Parameters::topography\\_namefile](#).

Definition at line 1261 of file parameters.cpp.

#### 5.50.3.54 string Parameters::get\_topographyNameFileS ( void ) const

Gives the topography namefile (inside the Input directory)

##### Returns

The topography namefile (inside the Input directory) [Parameters::topo\\_NF](#).

Definition at line 1271 of file parameters.cpp.



#### 5.50.3.55 SCALAR Parameters::get\_tx ( ) const

Gives the value of dt/dx.

##### Returns

The value of dt/dx [Parameters::tx](#).

Definition at line 1101 of file parameters.cpp.

#### 5.50.3.56 SCALAR Parameters::get\_zcrust\_coef ( ) const

Gives the value of the zcrust coefficient.

##### Returns

The value of zcrust [Parameters::zcrust\\_coef](#).

Definition at line 1531 of file parameters.cpp.

#### 5.50.3.57 int Parameters::get\_zcrust\_init ( ) const

Gives the value corresponding to the initialization of zcrust.

##### Returns

The value corresponding to the initialization of zcrust [Parameters::zcrust\\_init](#).

Definition at line 1521 of file parameters.cpp.

#### 5.50.3.58 string Parameters::get\_zcrustNameFile ( void ) const

Gives the zcrust path for the initialization + Input directory.

##### Returns

The zcrust path for the initialization + Input directory [Parameters::zcrust\\_namefile](#).

Definition at line 1541 of file parameters.cpp.

#### 5.50.3.59 string Parameters::get\_zcrustNameFileS ( ) const

Gives the zcrust namefile (inside the Input directory)

##### Returns

The zcrust namefile for the initialization (inside the Input directory) [Parameters::zcrust\\_NF](#).

Definition at line 1551 of file parameters.cpp.

### 5.50.3.60 void Parameters::setparameters ( const char \* *FILENAME* )

Sets the parameters.

Gets all the parameters from the file *FILENAME*, check and affect them. The values used by FullSWOF\_1D are saved in the file parameters.dat. These values are also printed in the terminal when the code is run.

#### Parameters

in	<i>FILENAME</i>	name of the parameters file.
----	-----------------	------------------------------

#### Warning

```
parameters.txt: ERROR: ***.
parameters.txt: WARNING: ***.
ERROR: the *** file *** does not exists in the directory Inputs.
Impossible to open the *** file. Verify if the directory *** exists.
```

#### Note

If a values cannot be affected correctly, the code will exit with failure termination code.  
If parameters.dat cannot be opened, the code will exit with failure termination code.

**Todo** Exception should be treated.

Definition at line 62 of file parameters.cpp.

## 5.50.4 Member Data Documentation

### 5.50.4.1 SCALAR Parameters::amortENO [protected]

Parameter for eno.

Definition at line 326 of file parameters.hpp.

### 5.50.4.2 SCALAR Parameters::cfl [protected]

CFL value.

Definition at line 282 of file parameters.hpp.

### 5.50.4.3 SCALAR Parameters::dt [protected]

Time step.

Definition at line 274 of file parameters.hpp.

### 5.50.4.4 SCALAR Parameters::dtheta\_coef [protected]

Value of dtheta.

Definition at line 336 of file parameters.hpp.

**5.50.4.5** `int Parameters::dtheta_init` [protected]

Type of initialization of dtheta.

Definition at line 318 of file parameters.hpp.

**5.50.4.6** `string Parameters::dtheta_namefile` [protected]

Name of the file for dtheta: Inputs/file.

Definition at line 364 of file parameters.hpp.

**5.50.4.7** `string Parameters::dtheta_NF` [protected]

Name of the file for dtheta without 'Inputs'.

Definition at line 366 of file parameters.hpp.

**5.50.4.8** **SCALAR** `Parameters::dx` [protected]

Space step.

Definition at line 272 of file parameters.hpp.

**5.50.4.9** `int Parameters::flux` [protected]

Numerical flux.

Definition at line 296 of file parameters.hpp.

**5.50.4.10** `int Parameters::fric` [protected]

Friction.

Definition at line 302 of file parameters.hpp.

**5.50.4.11** **SCALAR** `Parameters::friccoef` [protected]

Friction coefficient.

Definition at line 330 of file parameters.hpp.

**5.50.4.12** `int Parameters::hu_init` [protected]

Type of initial conditions for h and u.

Definition at line 308 of file parameters.hpp.

**5.50.4.13** `string Parameters::hu_namefile` [protected]

Name of the file for the initialization: Inputs/file.

Definition at line 348 of file parameters.hpp.

**5.50.4.14** `string Parameters::hu_NF` [protected]

Name of the file for the initialization without 'Inputs'.

Definition at line 350 of file parameters.hpp.

**5.50.4.15** `SCALAR Parameters::imax_coef` [protected]

Value of imax.

Definition at line 342 of file parameters.hpp.

**5.50.4.16** `int Parameters::imax_init` [protected]

Type of initialization of imax.

Definition at line 324 of file parameters.hpp.

**5.50.4.17** `string Parameters::imax_namefile` [protected]

Name of the file for imax: Inputs/file.

Definition at line 376 of file parameters.hpp.

**5.50.4.18** `string Parameters::imax_NF` [protected]

Name of the file for imax without 'Inputs'.

Definition at line 378 of file parameters.hpp.

**5.50.4.19** `int Parameters::inf` [protected]

Type of infiltration.

Definition at line 312 of file parameters.hpp.

**5.50.4.20** `SCALAR Parameters::Kc_coef` [protected]

Value of Kc.

Definition at line 332 of file parameters.hpp.

**5.50.4.21** `int Parameters::Kc_init` [protected]

Type of initialization of Kc.

Definition at line 314 of file parameters.hpp.

**5.50.4.22** `string Parameters::Kc_namefile` [protected]

Name of the file for Kc: Inputs/file.

Definition at line 356 of file parameters.hpp.

**5.50.4.23** `string Parameters::Kc_NF` [protected]

Name of the file for Kc without 'Inputs'.

Definition at line 358 of file parameters.hpp.

**5.50.4.24** **SCALAR** `Parameters::Ks_coef` [protected]

Value of Ks.

Definition at line 334 of file parameters.hpp.

**5.50.4.25** `int Parameters::Ks_init` [protected]

Type of initialization of Ks.

Definition at line 316 of file parameters.hpp.

**5.50.4.26** `string Parameters::Ks_namefile` [protected]

Name of the file for Ks: Inputs/file.

Definition at line 360 of file parameters.hpp.

**5.50.4.27** `string Parameters::Ks_NF` [protected]

Name of the file for Ks without 'Inputs'.

Definition at line 362 of file parameters.hpp.

**5.50.4.28** **SCALAR** `Parameters::L` [protected]

Length of the domain.

Definition at line 278 of file parameters.hpp.

**5.50.4.29** **SCALAR** `Parameters::L_imp_h` [protected]

Imposed water height on the left boundary.

Definition at line 290 of file parameters.hpp.

**5.50.4.30** **SCALAR** `Parameters::L_imp_q` [protected]

Imposed discharge on the left boundary.

Definition at line 288 of file parameters.hpp.

**5.50.4.31** `int Parameters::Lbound` [protected]

Left boundary condition.

Definition at line 284 of file parameters.hpp.

**5.50.4.32** `int Parameters::lim` [protected]

Slope limiter.

Definition at line 304 of file parameters.hpp.

**5.50.4.33** `int Parameters::m` [protected]

Number of time steps.

Definition at line 268 of file parameters.hpp.

**5.50.4.34** `SCALAR Parameters::modifENO` [protected]

Parameter for eno\_modif.

Definition at line 328 of file parameters.hpp.

**5.50.4.35** `int Parameters::nbtimes` [protected]

Number of times saved.

Definition at line 270 of file parameters.hpp.

**5.50.4.36** `int Parameters::Nxcell` [protected]

Number of cells in space.

Definition at line 266 of file parameters.hpp.

**5.50.4.37** `int Parameters::order` [protected]

Order of the numerical scheme.

Definition at line 298 of file parameters.hpp.

**5.50.4.38** `string Parameters::output_directory` [protected]

Name of the output directory Outputs+suffix.

Definition at line 380 of file parameters.hpp.

**5.50.4.39** `SCALAR Parameters::Psi_coef` [protected]

Value of Psi.

Definition at line 338 of file parameters.hpp.

**5.50.4.40** `int Parameters::Psi_init` [protected]

Type of initialization of Psi.

Definition at line 320 of file parameters.hpp.

**5.50.4.41** `string Parameters::Psi_namefile` [protected]

Name of the file for Psi: Inputs/file.

Definition at line 368 of file parameters.hpp.

**5.50.4.42** `string Parameters::Psi_NF` [protected]

Name of the file for Psi without 'Inputs'.

Definition at line 370 of file parameters.hpp.

**5.50.4.43** `SCALAR Parameters::R_imp_h` [protected]

Imposed water height on the right boundary.

Definition at line 294 of file parameters.hpp.

**5.50.4.44** `SCALAR Parameters::R_imp_q` [protected]

Imposed discharge on the right boundary.

Definition at line 292 of file parameters.hpp.

**5.50.4.45** `int Parameters::rain` [protected]

Type of rain.

Definition at line 310 of file parameters.hpp.

**5.50.4.46** `string Parameters::rain_namefile` [protected]

Name of the file for the rain: Inputs/file.

Definition at line 352 of file parameters.hpp.

**5.50.4.47** `string Parameters::rain_NF` [protected]

Name of the file for the rain without 'Inputs'.

Definition at line 354 of file parameters.hpp.

**5.50.4.48** `int Parameters::Rbound` [protected]

Right boundary condition.

Definition at line 286 of file parameters.hpp.

**5.50.4.49** `int Parameters::rec` [protected]

Reconstruction.

Definition at line 300 of file parameters.hpp.

**5.50.4.50** `string Parameters::suffix_o` [protected]

Suffix for the output directory.

Definition at line 382 of file parameters.hpp.

**5.50.4.51** `SCALAR Parameters::T` [protected]

Final time.

Definition at line 280 of file parameters.hpp.

**5.50.4.52** `int Parameters::topo` [protected]

Type of topography.

Definition at line 306 of file parameters.hpp.

**5.50.4.53** `string Parameters::topo_NF` [protected]

Name of the file for the topography without 'Inputs'.

Definition at line 346 of file parameters.hpp.

**5.50.4.54** `string Parameters::topography_namefile` [protected]

Name of the file for the topography: Inputs/file.

Definition at line 344 of file parameters.hpp.

**5.50.4.55** `SCALAR Parameters::tx` [protected]

Ratio dt/dx.

Definition at line 276 of file parameters.hpp.

**5.50.4.56** `SCALAR Parameters::zcrust_coef` [protected]

Value of zcrust.

Definition at line 340 of file parameters.hpp.

**5.50.4.57** `int Parameters::zcrust_init` [protected]

Type of initialization of zcrust.

Definition at line 322 of file parameters.hpp.

**5.50.4.58** `string Parameters::zcrust_namefile` [protected]

Name of the file for zcrust: Inputs/file.

Definition at line 372 of file parameters.hpp.



## 5.50.4.59 string Parameters::zcrust\_NF [protected]

Name of the file for zcrust without 'Inputs'.

Definition at line 374 of file parameters.hpp.

The documentation for this class was generated from the following files:

- Headers/libparameters/[parameters.hpp](#)
- Sources/libparameters/[parameters.cpp](#)

## 5.51 Parser Class Reference

Parser to read the entries

```
#include <parser.hpp>
```

### Public Member Functions

- [Parser](#) (const char \*)  
*Constructor.*
- string [GetValue](#) (const char \*)  
*Returns the value of the variable.*
- virtual [~Parser](#) ()  
*Destructor.*

### 5.51.1 Detailed Description

Parser to read the entries

Class that reads the input file written as description <variable>:: value # comment and keep the values after the ":" ignoring the comments that begin with a "#".

Definition at line 79 of file parser.hpp.

### 5.51.2 Constructor & Destructor Documentation

#### 5.51.2.1 Parser::Parser ( const char \* FILENAME )

Constructor.

Constructor: reads the input parameter and copy the data in a tabular.

#### Parameters

in	FILENAME	name of the paramters file.
----	----------	-----------------------------

#### Warning

Impossible to open the \*\*\* file.

**Note**

If the parameters file cannot be opened, the code will exit with failure termination code.

**Todo** Exception should be treated.

Definition at line 57 of file parser.cpp.

**5.51.2.2 Parser::~~Parser ( ) [virtual]**

Destructor.

Definition at line 170 of file parser.cpp.

**5.51.3 Member Function Documentation****5.51.3.1 string Parser::GetValue ( const char \* TAG )**

Returns the value of the variable.

Constructor: reads the input parameter and copy the data in a tabular.

**Parameters**

in	<i>TAG</i>	name of the variable with delimiters.
----	------------	---------------------------------------

**Warning**

No entry for the variable \*\*\*.

Bad syntax for \*\*\*. The syntax is: description <variable>:: value

**Returns**

Value of the variable as a string

**Note**

If the value cannot be read correctly, the code will exit with failure termination code.

**Todo** Exception should be treated.

For each variable, returns the value of the variable written in the input tabular Inputs: TAG, the name of the variable with delimiters Outputs: value,

Definition at line 114 of file parser.cpp.

The documentation for this class was generated from the following files:

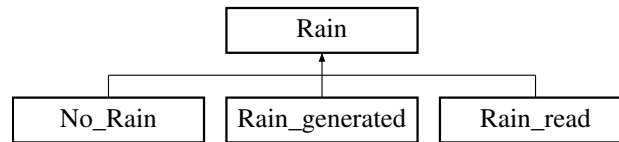
- Headers/libparser/[parser.hpp](#)
- Sources/libparser/[parser.cpp](#)

## 5.52 Rain Class Reference

Initialization of the rain.

```
#include <rain.hpp>
```

Inheritance diagram for Rain:



### Public Member Functions

- [Rain \(Parameters &\)](#)  
*Constructor.*
- virtual void [rain\\_func \(SCALAR, VECT &\)=0](#)  
*Function to be specified in each case.*
- virtual [~Rain \(\)](#)  
*Destructor.*

### Protected Attributes

- const int [NXCELL](#)
- const [SCALAR DX](#)

#### 5.52.1 Detailed Description

Initialization of the rain.

Class that contains all the common declarations for the initialization of the rain.

Definition at line 69 of file rain.hpp.

#### 5.52.2 Constructor & Destructor Documentation

##### 5.52.2.1 Rain::Rain ( Parameters & par )

Constructor.

Defines the number of cells and the space step.

#### Parameters

in	par	parameter, contains all the values from the parameters file.
----	-----	--------------------------------------------------------------

Definition at line 57 of file rain.cpp.

### 5.52.2.2 Rain::~~Rain ( ) [virtual]

Destructor.

Definition at line 68 of file rain.cpp.

## 5.52.3 Member Function Documentation

### 5.52.3.1 virtual void Rain::rain\_func ( SCALAR , VECT & ) [pure virtual]

Function to be specified in each case.

Implemented in [Rain\\_generated](#), [Rain\\_read](#), and [No\\_Rain](#).

## 5.52.4 Member Data Documentation

### 5.52.4.1 const SCALAR Rain::DX [protected]

Space step.

Definition at line 86 of file rain.hpp.

### 5.52.4.2 const int Rain::NXCELL [protected]

Number of cells in space.

Definition at line 84 of file rain.hpp.

The documentation for this class was generated from the following files:

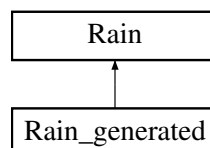
- [Headers/librain\\_infiltration/rain.hpp](#)
- [Sources/librain\\_infiltration/rain.cpp](#)

## 5.53 Rain\_generated Class Reference

Constant rain configuration.

```
#include <rain_generated.hpp>
```

Inheritance diagram for Rain\_generated:



### Public Member Functions

- [Rain\\_generated](#) (Parameters &)  
*Constructor.*
- void [rain\\_func](#) (SCALAR, VECT &)  
*Performs the constant initialization.*

- virtual [~Rain\\_generated](#) ()

*Destructor.*

## Additional Inherited Members

### 5.53.1 Detailed Description

Constant rain configuration.

Class that initializes a constant rain, with value 0.00001 m/s = 36 mm/h.

Definition at line 73 of file rain\_generated.hpp.

### 5.53.2 Constructor & Destructor Documentation

#### 5.53.2.1 Rain\_generated::Rain\_generated ( Parameters & *par* )

Constructor.

#### Parameters

<i>in</i>	<i>par</i>	parameter, contains all the values from the parameters file (unused).
-----------	------------	-----------------------------------------------------------------------

Definition at line 59 of file rain\_generated.cpp.

#### 5.53.2.2 Rain\_generated::~~Rain\_generated ( ) [virtual]

Destructor.

Definition at line 68 of file rain\_generated.cpp.

### 5.53.3 Member Function Documentation

#### 5.53.3.1 void Rain\_generated::rain\_func ( SCALAR *time*, VECT & *Tab\_rain* ) [virtual]

Performs the constant initialization.

Initializes the rain to 0.00001 m/s = 36 mm/h.

#### Parameters

<i>in, out</i>	<i>Tab_rain</i>	rain intensity at the current time on each cell.
----------------	-----------------	--------------------------------------------------

Implements [Rain](#).

Definition at line 70 of file rain\_generated.cpp.

The documentation for this class was generated from the following files:

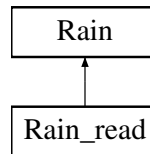
- Headers/librain\_infiltration/[rain\\_generated.hpp](#)
- Sources/librain\_infiltration/[rain\\_generated.cpp](#)

## 5.54 Rain\_read Class Reference

File configuration.

```
#include <rain_read.hpp>
```

Inheritance diagram for Rain\_read:



### Public Member Functions

- [Rain\\_read \(Parameters &\)](#)  
*Constructor.*
- void [rain\\_func \(SCALAR, VECT &\)](#)  
*Performs the initialization.*
- virtual [~Rain\\_read \(\)](#)  
*Destructor.*

### Additional Inherited Members

#### 5.54.1 Detailed Description

File configuration.

Class that initializes the rain to the values read in a file.

Definition at line 71 of file rain\_read.hpp.

#### 5.54.2 Constructor & Destructor Documentation

##### 5.54.2.1 Rain\_read::Rain\_read ( Parameters & par )

Constructor.

Defines the name of the file for the initialization and creates two tables (times and intensity) from the data read in the file.

#### Parameters

in	par	parameter, contains all the values from the parameters file.
----	-----	--------------------------------------------------------------

#### Warning

- (rain\_namefile): ERROR: cannot open the rain file.
- (rain\_namefile): ERROR: line \*\*\*.
- (rain\_namefile): ERROR: the first time must be t = 0.

Definition at line 59 of file rain\_read.cpp.

## 5.54.2.2 Rain\_read::~~Rain\_read( ) [virtual]

Destructor.

Definition at line 132 of file rain\_read.cpp.

## 5.54.3 Member Function Documentation

## 5.54.3.1 void Rain\_read::rain\_func( SCALAR time, VECT &amp; Tab\_rain ) [virtual]

Performs the initialization.

Initializes the rain to the values read in the corresponding file.

## Parameters

in	time	current time.
in, out	Tab_rain	rain intensity at the current time on each cell.

## Note

As the times read in the file must start with  $t = 0$ , Tab\_rain is initialized.

Implements [Rain](#).

Definition at line 135 of file rain\_read.cpp.

The documentation for this class was generated from the following files:

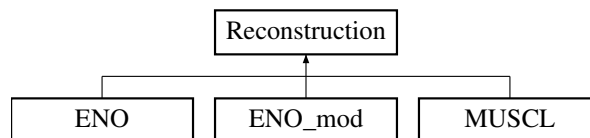
- Headers/librain\_infiltration/rain\_read.hpp
- Sources/librain\_infiltration/rain\_read.cpp

## 5.55 Reconstruction Class Reference

Reconstruction of the variables

```
#include <reconstruction.hpp>
```

Inheritance diagram for Reconstruction:



## Public Member Functions

- [Reconstruction](#) (Parameters &, VECT)  
*Constructor.*
- virtual void [calc](#) (VECT, VECT, VECT, VECT &, VECT &, VECT &, VECT &, VECT &)=0  
*Function to be specified in each reconstruction.*
- virtual [~Reconstruction](#) ()  
*Destructor.*

## Protected Attributes

- const int [NXCELL](#)  
*Number of cells in space.*
- [VECT zr](#)  
*Reconstructed topography on the right boundary.*
- [VECT zl](#)  
*Reconstructed topography on the left boundary.*
- [VECT delta0\\_z](#)  
*Difference between the values of the topography on two adjacent cells (on the right)*
- [Choice\\_limiter](#) \* [limiter](#)  
*Slope limiter.*

### 5.55.1 Detailed Description

Reconstruction of the variables

Class that contains all the common declarations for the second order reconstruction in space.

Definition at line 73 of file reconstruction.hpp.

### 5.55.2 Constructor & Destructor Documentation

#### 5.55.2.1 Reconstruction::Reconstruction ( Parameters & *par*, VECT *z* )

Constructor.

Defines the number of cells, the slope limiter, and initializes [Reconstruction::zl](#), [Reconstruction::zr](#), [Reconstruction::delta0\\_z](#).

#### Parameters

<i>in</i>	<i>par</i>	parameter, contains all the values from the parameters file.
<i>in</i>	<i>z</i>	topography.

#### Warning

Problem: allocation of \*\*\* failed.

#### Note

If a vector cannot be allocated, the code will exit with failure termination code.

**Todo** Exception should be treated.

Definition at line 58 of file reconstruction.cpp.

#### 5.55.2.2 Reconstruction::~Reconstruction ( ) [virtual]

Destructor.

Definition at line 98 of file reconstruction.cpp.



### 5.55.3 Member Function Documentation

5.55.3.1 `virtual void Reconstruction::calc ( VECT , VECT , VECT , VECT & , VECT & , VECT & , VECT & , VECT & , VECT & )` [pure virtual]

Function to be specified in each reconstruction.

Implemented in [ENO](#), [MUSCL](#), and [ENO\\_mod](#).

### 5.55.4 Member Data Documentation

5.55.4.1 `VECT Reconstruction::delta0_z` [protected]

Difference between the values of the topography on two adjacent cells (on the right)

Definition at line 95 of file `reconstruction.hpp`.

5.55.4.2 `Choice_limiter* Reconstruction::limiter` [protected]

Slope limiter.

Definition at line 97 of file `reconstruction.hpp`.

5.55.4.3 `const int Reconstruction::NXCELL` [protected]

Number of cells in space.

Definition at line 89 of file `reconstruction.hpp`.

5.55.4.4 `VECT Reconstruction::zl` [protected]

Reconstructed topography on the left boundary.

Definition at line 93 of file `reconstruction.hpp`.

5.55.4.5 `VECT Reconstruction::zr` [protected]

Reconstructed topography on the right boundary.

Definition at line 91 of file `reconstruction.hpp`.

The documentation for this class was generated from the following files:

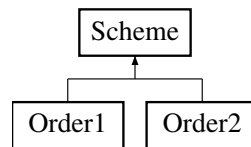
- [Headers/libreconstructions/reconstruction.hpp](#)
- [Sources/libreconstructions/reconstruction.cpp](#)

## 5.56 Scheme Class Reference

Numerical scheme.

```
#include <scheme.hpp>
```

Inheritance diagram for Scheme:



## Public Member Functions

- [Scheme](#) ([Parameters](#) &)  
*Constructor.*
- virtual void [calc](#) ()=0  
*Function to be specified in each numerical scheme.*
- void [allocation](#) ()
- void [deallocation](#) ()
- void [maincalc](#) ([VECT](#), [VECT](#), [SCALAR](#), [VECT](#) &, [VECT](#) &, [VECT](#) &, [SCALAR](#) &, [SCALAR](#) &, [VECT](#) &)  
*Main calculation of the scheme.*
- [SCALAR](#) [froude\\_number](#) ([VECT](#), [VECT](#))  
*Computation of the mean value of the Froude number.*
- void [boundary](#) ([VECT](#) &, [VECT](#) &, const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), [SCALAR](#), const int)  
*Calls the boundary conditions and affects the boundary values.*
- virtual [~Scheme](#) ()  
*Destructor.*

## Protected Attributes

- const int [NXCELL](#)
- const int [M](#)
- const [SCALAR](#) [DX](#)
- const [SCALAR](#) [DT](#)
- const [SCALAR](#) [TX](#)
- const int [NBTIMES](#)
- const [SCALAR](#) [CFL](#)
- const [SCALAR](#) [L\\_IMP\\_Q](#)
- const [SCALAR](#) [L\\_IMP\\_H](#)
- const [SCALAR](#) [R\\_IMP\\_Q](#)
- const [SCALAR](#) [R\\_IMP\\_H](#)
- const int [ORDER](#)
- int [nbt](#)
- [VECT](#) [h](#)
- [VECT](#) [u](#)
- [VECT](#) [q](#)
- [VECT](#) [z](#)
- [VECT](#) [rain](#)
- [VECT](#) [Vin\\_tot](#)
- [VECT](#) [delta\\_z](#)
- [VECT](#) [dzi](#)
- [VECT](#) [f1](#)

- VECT f2
- VECT hs
- VECT us
- VECT qs
- VECT hl
- VECT hr
- VECT ul
- VECT ur
- VECT hleft
- VECT hright
- SCALAR flux\_l
- SCALAR flux\_r
- SCALAR cum\_flux\_l
- SCALAR cum\_flux\_r
- SCALAR Volrain\_tot
- SCALAR Total\_discharge\_outflow
- SCALAR height\_of\_tot
- SCALAR height\_inf\_tot
- SCALAR Vol\_inf\_tot
- SCALAR Vol\_of\_tot
- SCALAR Fr
- int time\_initial
- time\_t start
- time\_t end
- SCALAR elapsed\_time
- clock\_t cpu\_time
- Hydrostatic rec\_hydro
- Choice\_condition \* Lbound
- Choice\_condition \* Rbound
- Choice\_flux \* flux\_num
- Choice\_friction \* fric
- Choice\_init\_topo \* topo
- Choice\_init\_hu \* hu\_init
- Choice\_output \* out
- Choice\_rain \* Prain
- Choice\_infiltration \* I

### 5.56.1 Detailed Description

Numerical scheme.

Class that contains all the common declarations for the numerical schemes.

Definition at line 105 of file scheme.hpp.

## 5.56.2 Constructor & Destructor Documentation

### 5.56.2.1 Scheme::Scheme ( Parameters & *par* )

Constructor.

Initializations and allocations.

#### Parameters

<code>in</code>	<code><i>par</i></code>	parameter, contains all the values from the parameters file.
-----------------	-------------------------	--------------------------------------------------------------

Definition at line 58 of file scheme.cpp.

### 5.56.2.2 Scheme::~~Scheme ( ) [virtual]

Destructor.

Definition at line 248 of file scheme.cpp.

## 5.56.3 Member Function Documentation

### 5.56.3.1 void Scheme::allocation ( )

Allocation of spatialized variables

#### Warning

Problem: allocation of \*\*\* failed.

#### Note

If a vector cannot be allocated, the code will exit with failure termination code.

**Todo** Exception should be treated.

Definition at line 256 of file scheme.cpp.

### 5.56.3.2 void Scheme::boundary ( VECT & *h\_tmp*, VECT & *u\_tmp*, const SCALAR *L\_IMP\_Q*, const SCALAR *L\_IMP\_H*, const SCALAR *R\_IMP\_Q*, const SCALAR *R\_IMP\_H*, SCALAR *time\_tmp*, const int *nodex* )

Calls the boundary conditions and affects the boundary values.

#### Parameters

<code>in, out</code>	<code><i>h_tmp</i></code>	water height.
<code>in, out</code>	<code><i>u_tmp</i></code>	velocity.
<code>in</code>	<code><i>L_IMP_Q</i></code>	left imposed discharge.
<code>in</code>	<code><i>L_IMP_H</i></code>	left imposed water height.
<code>in</code>	<code><i>R_IMP_Q</i></code>	right imposed discharge.
<code>in</code>	<code><i>R_IMP_H</i></code>	right imposed water height.
<code>in</code>	<code><i>time_tmp</i></code>	current time.
<code>in</code>	<code><i>nodex</i></code>	number of space cells.

Definition at line 192 of file scheme.cpp.

### 5.56.3.3 virtual void Scheme::calc ( ) [pure virtual]

Function to be specified in each numerical scheme.

Implemented in [Order1](#), and [Order2](#).

### 5.56.3.4 void Scheme::deallocation ( )

Deallocation of variables

Definition at line 383 of file scheme.cpp.

### 5.56.3.5 SCALAR Scheme::froude\_number ( VECT *h*, VECT *u* )

Computation of the mean value of the Froude number.

Mean value in space of the Froude number at the final time.

#### Parameters

in	<i>h</i>	water height.
in	<i>u</i>	velocity.

#### Returns

The mean Froude number  $\frac{u}{\sqrt{gh}}$ .

Definition at line 217 of file scheme.cpp.

### 5.56.3.6 void Scheme::maincalc ( VECT *he*, VECT *ve*, SCALAR *time*, VECT & *hes*, VECT & *ves*, VECT & *qes*, SCALAR & *flux\_l*, SCALAR & *flux\_r*, VECT & *Vin* )

Main calculation of the scheme.

This calculation is called once at the order 1, and twice at the second order.

#### Parameters

in	<i>he</i>	water height.
in	<i>ve</i>	velocity.
in	<i>time</i>	time to be attained at the end of the loop.
out	<i>hes</i>	water height after one step of the scheme.
out	<i>ves</i>	velocity after one step of the scheme.
out	<i>qes</i>	discharge after one step of the scheme.
out	<i>flux_l</i>	Flux on the left.
out	<i>flux_r</i>	Flux on the right.
in, out	<i>Vin</i>	infiltrated volume.

**Todo** Improve the treatment of numerical errors.

Definition at line 114 of file scheme.cpp.

### 5.56.4 Member Data Documentation

#### 5.56.4.1 `const SCALAR Scheme::CFL` [protected]

CFL value.

Definition at line 148 of file `scheme.hpp`.

#### 5.56.4.2 `clock_t Scheme::cpu_time` [protected]

CPU time.

Definition at line 230 of file `scheme.hpp`.

#### 5.56.4.3 `SCALAR Scheme::cum_flux_l` [protected]

Cumulative flux on the left ( $m^3$ ).

Definition at line 204 of file `scheme.hpp`.

#### 5.56.4.4 `SCALAR Scheme::cum_flux_r` [protected]

Cumulative flux on the right ( $m^3$ ).

Definition at line 206 of file `scheme.hpp`.

#### 5.56.4.5 `VECT Scheme::delta_z` [protected]

Variations of the topography.

Definition at line 174 of file `scheme.hpp`.

#### 5.56.4.6 `const SCALAR Scheme::DT` [protected]

Time step.

Definition at line 142 of file `scheme.hpp`.

#### 5.56.4.7 `const SCALAR Scheme::DX` [protected]

Space step.

Definition at line 140 of file `scheme.hpp`.

#### 5.56.4.8 `VECT Scheme::dzi` [protected]

Difference between the reconstructed topographies on the left and on the right boundary of a cell.

Definition at line 176 of file `scheme.hpp`.

#### 5.56.4.9 `SCALAR Scheme::elapsed_time` [protected]

Duration of the computation.

Definition at line 228 of file scheme.hpp.

#### 5.56.4.10 `time_t Scheme::end` [protected]

End of timer.

Definition at line 226 of file scheme.hpp.

#### 5.56.4.11 `VECT Scheme::f1` [protected]

First component of the numerical flux.

Definition at line 178 of file scheme.hpp.

#### 5.56.4.12 `VECT Scheme::f2` [protected]

Second component of the numerical flux.

Definition at line 180 of file scheme.hpp.

#### 5.56.4.13 `SCALAR Scheme::flux_l` [protected]

Flux on the left (m/s).

Definition at line 200 of file scheme.hpp.

#### 5.56.4.14 `Choice_flux* Scheme::flux_num` [protected]

Definition at line 235 of file scheme.hpp.

#### 5.56.4.15 `SCALAR Scheme::flux_r` [protected]

Flux on the right (m/s).

Definition at line 202 of file scheme.hpp.

#### 5.56.4.16 `SCALAR Scheme::Fr` [protected]

Mean Froude number.

Definition at line 220 of file scheme.hpp.

#### 5.56.4.17 `Choice_friction* Scheme::fric` [protected]

Definition at line 236 of file scheme.hpp.

#### 5.56.4.18 `VECT Scheme::h` [protected]

Water height.

Definition at line 162 of file scheme.hpp.

**5.56.4.19 SCALAR Scheme::height\_inf\_tot** [protected]

Cumulative height of infiltrated volume on the whole of domain

Definition at line 214 of file scheme.hpp.

**5.56.4.20 SCALAR Scheme::height\_of\_tot** [protected]

Cumulative water height on the whole of domain

Definition at line 212 of file scheme.hpp.

**5.56.4.21 VECT Scheme::hl** [protected]

Water height on the cell located at the left of the boundary.

Definition at line 188 of file scheme.hpp.

**5.56.4.22 VECT Scheme::hleft** [protected]

Hydrostatic reconstruction on the left.

Definition at line 196 of file scheme.hpp.

**5.56.4.23 VECT Scheme::hr** [protected]

Water height on the cell located at the right of the boundary.

Definition at line 190 of file scheme.hpp.

**5.56.4.24 VECT Scheme::hright** [protected]

Hydrostatic reconstruction on the right.

Definition at line 198 of file scheme.hpp.

**5.56.4.25 VECT Scheme::hs** [protected]

Water height after one step of the scheme.

Definition at line 182 of file scheme.hpp.

**5.56.4.26 Choice\_init\_hu\* Scheme::hu\_init** [protected]

Definition at line 238 of file scheme.hpp.

**5.56.4.27 Choice\_infiltration\* Scheme::l** [protected]

Definition at line 241 of file scheme.hpp.



**5.56.4.28** `const SCALAR Scheme::L_IMP_H` [protected]

Imposed water height on the left boundary.

Definition at line 152 of file scheme.hpp.

**5.56.4.29** `const SCALAR Scheme::L_IMP_Q` [protected]

Imposed discharge on the left boundary.

Definition at line 150 of file scheme.hpp.

**5.56.4.30** `Choice_condition* Scheme::Lbound` [protected]

Definition at line 233 of file scheme.hpp.

**5.56.4.31** `const int Scheme::M` [protected]

Number of time steps.

Definition at line 138 of file scheme.hpp.

**5.56.4.32** `int Scheme::nbt` [protected]

Number of time steps between two savings.

Definition at line 160 of file scheme.hpp.

**5.56.4.33** `const int Scheme::NBTIMES` [protected]

Number of times saved.

Definition at line 146 of file scheme.hpp.

**5.56.4.34** `const int Scheme::NXCELL` [protected]

Number of cells in space.

Definition at line 136 of file scheme.hpp.

**5.56.4.35** `const int Scheme::ORDER` [protected]

Order of the scheme.

Definition at line 158 of file scheme.hpp.

**5.56.4.36** `Choice_output* Scheme::out` [protected]

Definition at line 239 of file scheme.hpp.

#### 5.56.4.37 **Choice\_rain\*** **Scheme::Prain** [protected]

Definition at line 240 of file scheme.hpp.

#### 5.56.4.38 **VECT Scheme::q** [protected]

Discharge.

Definition at line 166 of file scheme.hpp.

#### 5.56.4.39 **VECT Scheme::qs** [protected]

Discharge after one step of the scheme.

Definition at line 186 of file scheme.hpp.

#### 5.56.4.40 **const SCALAR Scheme::R\_IMP\_H** [protected]

Imposed water height on the right boundary.

Definition at line 156 of file scheme.hpp.

#### 5.56.4.41 **const SCALAR Scheme::R\_IMP\_Q** [protected]

Imposed discharge on the right boundary.

Definition at line 154 of file scheme.hpp.

#### 5.56.4.42 **VECT Scheme::rain** [protected]

[Rain](#).

Definition at line 170 of file scheme.hpp.

#### 5.56.4.43 **Choice\_condition\*** **Scheme::Rbound** [protected]

Definition at line 234 of file scheme.hpp.

#### 5.56.4.44 **Hydrostatic Scheme::rec\_hydro** [protected]

Definition at line 232 of file scheme.hpp.

#### 5.56.4.45 **time\_t Scheme::start** [protected]

Beginning of timer.

Definition at line 224 of file scheme.hpp.

#### 5.56.4.46 **int Scheme::time\_initial** [protected]

Initial time: the initial time is `time_initial * dt`.

Definition at line 222 of file scheme.hpp.

#### 5.56.4.47 **Choice\_init\_topo\*** `Scheme::topo` [protected]

Definition at line 237 of file scheme.hpp.

#### 5.56.4.48 **SCALAR** `Scheme::Total_discharge_outflow` [protected]

Cumulative outflow volume at the boundary

Definition at line 210 of file scheme.hpp.

#### 5.56.4.49 **const SCALAR** `Scheme::TX` [protected]

Ratio dt/dx.

Definition at line 144 of file scheme.hpp.

#### 5.56.4.50 **VECT** `Scheme::u` [protected]

Velocity.

Definition at line 164 of file scheme.hpp.

#### 5.56.4.51 **VECT** `Scheme::ul` [protected]

Velocity on the cell located at the left of the boundary.

Definition at line 192 of file scheme.hpp.

#### 5.56.4.52 **VECT** `Scheme::ur` [protected]

Velocity on the cell located at the right of the boundary.

Definition at line 194 of file scheme.hpp.

#### 5.56.4.53 **VECT** `Scheme::us` [protected]

Velocity after one step of the scheme.

Definition at line 184 of file scheme.hpp.

#### 5.56.4.54 **VECT** `Scheme::Vin_tot` [protected]

Volume of infiltrated water at each point during one time step.

Definition at line 172 of file scheme.hpp.

#### 5.56.4.55 **SCALAR** `Scheme::Vol_inf_tot` [protected]

Cumulative Volume of water infiltrated.

Definition at line 216 of file scheme.hpp.

#### 5.56.4.56 SCALAR Scheme::Vol\_of\_tot [protected]

Cumulative stream volume.

Definition at line 218 of file scheme.hpp.

#### 5.56.4.57 SCALAR Scheme::Volrain\_tot [protected]

Cumulative Volume of rain on the whole of domain.

Definition at line 208 of file scheme.hpp.

#### 5.56.4.58 VECT Scheme::z [protected]

Topography.

Definition at line 168 of file scheme.hpp.

The documentation for this class was generated from the following files:

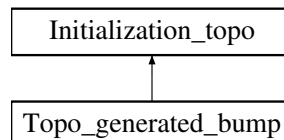
- Headers/libschemas/[scheme.hpp](#)
- Sources/libschemas/[scheme.cpp](#)

## 5.57 Topo\_generated\_bump Class Reference

Bump configuration.

```
#include <topo_generated_bump.hpp>
```

Inheritance diagram for Topo\_generated\_bump:



### Public Member Functions

- [Topo\\_generated\\_bump](#) ([Parameters](#) &)  
*Constructor.*
- void [initialization](#) ([VECT](#) &)  
*Performs the initialization.*
- virtual [~Topo\\_generated\\_bump](#) ()  
*Destructor.*

### Additional Inherited Members

#### 5.57.1 Detailed Description

Bump configuration.

Class that initializes a bump topography.

Definition at line 69 of file topo\_generated\_bump.hpp.

### 5.57.2 Constructor & Destructor Documentation

#### 5.57.2.1 Topo\_generated\_bump::Topo\_generated\_bump ( Parameters & *par* )

Constructor.

##### Parameters

<i>in</i>	<i>par</i>	parameter, contains all the values from the parameters file (unused).
-----------	------------	-----------------------------------------------------------------------

Definition at line 58 of file topo\_generated\_bump.cpp.

#### 5.57.2.2 Topo\_generated\_bump::~~Topo\_generated\_bump ( ) [virtual]

Destructor.

Definition at line 65 of file topo\_generated\_bump.cpp.

### 5.57.3 Member Function Documentation

#### 5.57.3.1 void Topo\_generated\_bump::initialization ( VECT & *z* ) [virtual]

Performs the initialization.

Initializes the topography to  $0.2 - 0.005(x - 10)^2$  if  $x \in [8, 12]$ , and 0 outside the bump, see [Goutal and Maurel \[1997\]](#).

##### Parameters

<i>in, out</i>	<i>z</i>	topography.
----------------	----------	-------------

Implements [Initialization\\_topo](#).

Definition at line 68 of file topo\_generated\_bump.cpp.

The documentation for this class was generated from the following files:

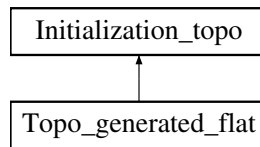
- [Headers/libinitializations/topo\\_generated\\_bump.hpp](#)
- [Sources/libinitializations/topo\\_generated\\_bump.cpp](#)

## 5.58 Topo\_generated\_flat Class Reference

Flat configuration.

```
#include <topo_generated_flat.hpp>
```

Inheritance diagram for Topo\_generated\_flat:



## Public Member Functions

- [Topo\\_generated\\_flat](#) ([Parameters](#) &)  
*Constructor.*
- void [initialization](#) ([VECT](#) &)  
*Performs the initialization.*
- virtual [~Topo\\_generated\\_flat](#) ()  
*Destructor.*

## Additional Inherited Members

### 5.58.1 Detailed Description

Flat configuration.

Class that initializes a flat topography, with value 0.

Definition at line 70 of file `topo_generated_flat.hpp`.

### 5.58.2 Constructor & Destructor Documentation

#### 5.58.2.1 `Topo_generated_flat::Topo_generated_flat ( Parameters & par )`

Constructor.

#### Parameters

<code>in</code>	<code>par</code>	parameter, contains all the values from the parameters file (unused).
-----------------	------------------	-----------------------------------------------------------------------

Definition at line 59 of file `topo_generated_flat.cpp`.

#### 5.58.2.2 `Topo_generated_flat::~~Topo_generated_flat ( )` [virtual]

Destructor.

Definition at line 67 of file `topo_generated_flat.cpp`.

### 5.58.3 Member Function Documentation

#### 5.58.3.1 `void Topo_generated_flat::initialization ( VECT & z )` [virtual]

Performs the initialization.

Initializes the topography to 0.

## Parameters

in, out	z	topography.
---------	---	-------------

Implements [Initialization\\_topo](#).

Definition at line 70 of file topo\_generated\_flat.cpp.

The documentation for this class was generated from the following files:

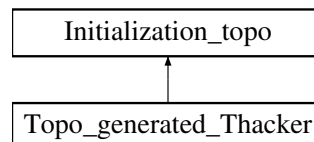
- Headers/libinitializations/[topo\\_generated\\_flat.hpp](#)
- Sources/libinitializations/[topo\\_generated\\_flat.cpp](#)

## 5.59 Topo\_generated\_Thacker Class Reference

Thacker configuration.

```
#include <topo_generated_thacker.hpp>
```

Inheritance diagram for Topo\_generated\_Thacker:



### Public Member Functions

- [Topo\\_generated\\_Thacker](#) ([Parameters](#) &)  
*Constructor.*
- void [initialization](#) ([VECT](#) &)  
*Performs the initialization.*
- virtual [~Topo\\_generated\\_Thacker](#) ()  
*Destructor.*

### Additional Inherited Members

#### 5.59.1 Detailed Description

Thacker configuration.

Class that initializes a parabolic topography for Thacker's benchmark.

Definition at line 70 of file topo\_generated\_thacker.hpp.

#### 5.59.2 Constructor & Destructor Documentation

##### 5.59.2.1 Topo\_generated\_Thacker::Topo\_generated\_Thacker ( [Parameters](#) & *par* )

Constructor.

Defines the parameter h0 and a of the parabola.

## Parameters

<code>in</code>	<code>par</code>	parameter, contains all the values from the parameters file (unused).
-----------------	------------------	-----------------------------------------------------------------------

Definition at line 58 of file `topo_generated_thacker.cpp`.

### 5.59.2.2 `Topo_generated_Thacker::~~Topo_generated_Thacker ( )` [virtual]

Destructor.

Definition at line 70 of file `topo_generated_thacker.cpp`.

## 5.59.3 Member Function Documentation

### 5.59.3.1 `void Topo_generated_Thacker::initialization ( VECT & z )` [virtual]

Performs the initialization.

Initializes the topography to  $h_0 \left( \frac{(x-L/2)^2}{a^2} - 1 \right)$ , see [Thacker \[1981\]](#).

## Parameters

<code>in, out</code>	<code>z</code>	topography.
----------------------	----------------	-------------

Implements [Initialization\\_topo](#).

Definition at line 73 of file `topo_generated_thacker.cpp`.

The documentation for this class was generated from the following files:

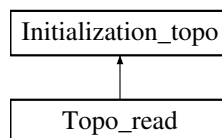
- [Headers/libinitializations/topo\\_generated\\_thacker.hpp](#)
- [Sources/libinitializations/topo\\_generated\\_thacker.cpp](#)

## 5.60 Topo\_read Class Reference

File configuration.

```
#include <topo_read.hpp>
```

Inheritance diagram for `Topo_read`:



### Public Member Functions

- [Topo\\_read \(Parameters &\)](#)  
*Constructor.*
- `void initialization (VECT &)`  
*Performs the initialization.*



- virtual `~Topo_read()`  
*Destructor.*

## Additional Inherited Members

### 5.60.1 Detailed Description

File configuration.

Class that initializes the topography to the values read in a file.

Definition at line 70 of file `topo_read.hpp`.

### 5.60.2 Constructor & Destructor Documentation

#### 5.60.2.1 Topo\_read::Topo\_read ( Parameters & *par* )

Constructor.

Defines the name of the file for the initialization.

#### Parameters

<code>in</code>	<code>par</code>	parameter, contains all the values from the parameters file.
-----------------	------------------	--------------------------------------------------------------

Definition at line 59 of file `topo_read.cpp`.

#### 5.60.2.2 Topo\_read::~~Topo\_read ( ) [virtual]

Destructor.

Definition at line 70 of file `topo_read.cpp`.

### 5.60.3 Member Function Documentation

#### 5.60.3.1 void Topo\_read::initialization ( VECT & *z* ) [virtual]

Performs the initialization.

Initializes the topography to the values read in the corresponding file.

#### Parameters

<code>in, out</code>	<code>z</code>	topography.
----------------------	----------------	-------------

#### Warning

- (topography\_namefile): ERROR: cannot open the topography file.
- (topography\_namefile): ERROR: the number of data in this file is too big
- (topography\_namefile): ERROR: line \*\*\*.
- (topography\_namefile): WARNING: line \*\*\*.
- (topography\_namefile): ERROR: the number of data in this file is too small
- (topography\_namefile): ERROR: the value for the point x \*\*\* is missing

**Note**

If the file cannot be opened or if the data are not correct, the code will exit with failure termination code.

**Todo** Exception should be treated.

Implements [Initialization\\_topo](#).

Definition at line 74 of file `topo_read.cpp`.

The documentation for this class was generated from the following files:

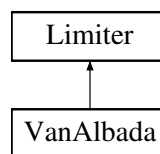
- [Headers/libinitializations/topo\\_read.hpp](#)
- [Sources/libinitializations/topo\\_read.cpp](#)

## 5.61 VanAlbada Class Reference

Van Albada slope limiter.

```
#include <vanalbada.hpp>
```

Inheritance diagram for VanAlbada:



### Public Member Functions

- [VanAlbada \(\)](#)  
*Constructor.*
- void [calc \(SCALAR, SCALAR\)](#)  
*Calculates the value of the slope limiter.*
- virtual [~VanAlbada \(\)](#)  
*Destructor.*

### Additional Inherited Members

#### 5.61.1 Detailed Description

Van Albada slope limiter.

Class that calculates Van Albada slope limiter.

Definition at line 69 of file `vanalbada.hpp`.

#### 5.61.2 Constructor & Destructor Documentation

##### 5.61.2.1 VanAlbada::VanAlbada ( )

Constructor.

Definition at line 58 of file `vanalbada.cpp`.

### 5.61.2.2 VanAlbada::~~VanAlbada ( ) [virtual]

Destructor.

Definition at line 83 of file vanalbada.cpp.

### 5.61.3 Member Function Documentation

#### 5.61.3.1 void VanAlbada::calc ( SCALAR a, SCALAR b ) [virtual]

Calculates the value of the slope limiter.

Van Albada function:

$$VA(x,y) = \begin{cases} 0 & \text{if } \text{sign}(x) \neq \text{sign}(y), \\ \frac{x(y^2 + \varepsilon) + y(x^2 + \varepsilon)}{x^2 + y^2 + 2\varepsilon} & \text{else,} \end{cases}$$

with  $0 \leq \varepsilon \ll 1$ .

#### Parameters

in	<i>a</i>	slope on the left of the cell.
in	<i>b</i>	slope on the right of the cell.

#### Modifies

[Limiter::rec](#) reconstructed value.

Implements [Limiter](#).

Definition at line 61 of file vanalbada.cpp.

The documentation for this class was generated from the following files:

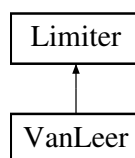
- Headers/liblimitations/[vanalbada.hpp](#)
- Sources/liblimitations/[vanalbada.cpp](#)

## 5.62 VanLeer Class Reference

Van Leer slope limiter.

```
#include <vanleer.hpp>
```

Inheritance diagram for VanLeer:



#### Public Member Functions

- [VanLeer \(\)](#)  
*Constructor.*
- void [calc \(SCALAR, SCALAR\)](#)

*Calculates the value of the slope limiter.*

- virtual `~VanLeer()`

*Destructor.*

## Additional Inherited Members

### 5.62.1 Detailed Description

Van Leer slope limiter.

Class that calculates Van Leer slope limiter.

Definition at line 69 of file `vanleer.hpp`.

### 5.62.2 Constructor & Destructor Documentation

#### 5.62.2.1 VanLeer::VanLeer( )

Constructor.

Definition at line 59 of file `vanleer.cpp`.

#### 5.62.2.2 VanLeer::~VanLeer( ) [virtual]

Destructor.

Definition at line 83 of file `vanleer.cpp`.

### 5.62.3 Member Function Documentation

#### 5.62.3.1 void VanLeer::calc( SCALAR a, SCALAR b ) [virtual]

Calculates the value of the slope limiter.

Van Leer function:

$$VL(x,y) = \begin{cases} 0 & \text{if } xy \leq 0, \\ \frac{2xy}{x+y} & \text{else.} \end{cases}$$

#### Parameters

in	<i>a</i>	slope on the left of the cell.
in	<i>b</i>	slope on the right of the cell.

#### Modifies

`limiter::rec` reconstructed value.

Implements `limiter`.

Definition at line 62 of file `vanleer.cpp`.

The documentation for this class was generated from the following files:

- Headers/liblimitations/[vanleer.hpp](#)

- Sources/liblimitations/[vanleer.cpp](#)



## Chapter 6

# File Documentation

### 6.1 Headers/libboundaryconditions/bc\_imp\_discharge.hpp File Reference

Imposed discharge.

```
#include "boundary_condition.hpp"
```

#### Classes

- class [Bc\\_imp\\_discharge](#)  
*Imposed discharge.*

#### Macros

- #define [BC\\_IMP\\_DISCHARGE\\_HPP](#)

#### 6.1.1 Detailed Description

Imposed discharge.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2011-2012)

#### Version

1.00.00

#### Date

2012-04-25

Boundary condition: imposed discharge (and water height if necessary).

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Definition in file [bc\\_imp\\_discharge.hpp](#).

## 6.1.2 Macro Definition Documentation

### 6.1.2.1 #define BC\_IMP\_DISCHARGE\_HPP

Definition at line 63 of file [bc\\_imp\\_discharge.hpp](#).

## 6.2 Headers/libboundaryconditions/bc\_imp\_height.hpp File Reference

Imposed water height.

```
#include "boundary_condition.hpp"
```

## Classes

- class [Bc\\_imp\\_height](#)  
*Imposed water height.*

### 6.2.1 Detailed Description

Imposed water height.

## Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

## Version

1.00.00

## Date

2012-04-25

Boundary condition: imposed water height (and discharge if necessary), based on the modified method of characteristics and Riemann invariants.

## See Also

Olivier Delestre Ph.D thesis Annexe A [Delestre \[2010\]](#) <http://tel.archives-ouvertes.fr/tel-00587197>



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Definition in file [bc\\_imp\\_height.hpp](#).

## 6.3 Headers/libboundaryconditions/bc\_neumann.hpp File Reference

Neumann condition.

```
#include "boundary_condition.hpp"
```

### Classes

- class [Bc\\_neumann](#)  
*Neumann condition.*

### 6.3.1 Detailed Description

Neumann condition.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

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#### Date

2012-04-25

Boundary condition: Neumann condition (the normal derivative is null).

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Definition in file [bc\\_neumann.hpp](#).

## 6.4 Headers/libboundaryconditions/bc\_periodic.hpp File Reference

Periodic condition.

```
#include "boundary_condition.hpp"
```

## Classes

- class [Bc\\_periodic](#)  
*Periodic condition.*

### 6.4.1 Detailed Description

Periodic condition.

#### Author

Pierre-Antoine Ksinant [pierreantoine.ksinantgarcia@gmail.com](mailto:pierreantoine.ksinantgarcia@gmail.com) (2010)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

1.00.00

#### Date

2012-04-25

Boundary condition: periodic condition.

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Definition in file [bc\\_periodic.hpp](#).

## 6.5 Headers/libboundaryconditions/bc\_wall.hpp File Reference

Wall condition.

```
#include "boundary_condition.hpp"
```

## Classes

- class [Bc\\_wall](#)  
*Wall condition.*

### 6.5.1 Detailed Description

Wall condition.

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

**Version**

1.00.00

**Date**

2012-04-25

Boundary condition: wall condition (the discharge at the boundary is null).

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Definition in file [bc\\_wall.hpp](#).

## 6.6 Headers/libboundaryconditions/boundary\_condition.hpp File Reference

Boundary condition.

```
#include "parameters.hpp"
```

**Classes**

- class [Boundary\\_condition](#)  
*Boundary condition.*

### 6.6.1 Detailed Description

Boundary condition.

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

**Version**

1.00.00

**Date**

2012-04-25

Common part for all the boundary conditions.

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Definition in file [boundary\\_condition.hpp](#).

## 6.7 Headers/libboundaryconditions/choice\_condition.hpp File Reference

Choice of boundary condition.

```
#include "boundary_condition.hpp"
#include "bc_neumann.hpp"
#include "bc_imp_height.hpp"
#include "bc_imp_discharge.hpp"
#include "bc_wall.hpp"
#include "bc_periodic.hpp"
```

**Classes**

- class [Choice\\_condition](#)  
*Choice of boundary condition.*

**Macros**

- #define [CHOICE\\_CONDITION\\_HPP](#)

### 6.7.1 Detailed Description

Choice of boundary condition.

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

**Version**

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**Date**

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From the value of the corresponding parameter, calls the chosen boundary condition.

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Definition in file [choice\\_condition.hpp](#).

**6.7.2 Macro Definition Documentation****6.7.2.1 #define CHOICE\_CONDITION\_HPP**

Definition at line 82 of file [choice\\_condition.hpp](#).

**6.8 Headers/libflux/choice\_flux.hpp File Reference**

Choice of numerical flux.

```
#include "flux.hpp"  
#include "f_rusanov.hpp"  
#include "f_h11.hpp"  
#include "f_h112.hpp"  
#include "f_kinetic.hpp"  
#include "f_vfroe.hpp"
```

**Classes**

- class [Choice\\_flux](#)  
*Choice of numerical flux.*

**Macros**

- #define [CHOICE\\_FLUX\\_HPP](#)

**6.8.1 Detailed Description**

Choice of numerical flux.

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2010)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

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**Date**

2012-04-25

From the value of the corresponding parameter, calls the chosen numerical flux.

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Definition in file [choice\\_flux.hpp](#).

**6.8.2 Macro Definition Documentation****6.8.2.1 #define CHOICE\_FLUX\_HPP**

Definition at line 83 of file choice\_flux.hpp.

**6.9 Headers/libflux/f\_hll.hpp File Reference**

HLL flux.

```
#include "flux.hpp"
```

**Classes**

- class [F\\_HLL](#)

*HLL flux.*

**6.9.1 Detailed Description**

HLL flux.

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

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Numerical flux: Harten, Lax, van Leer formulation.

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Definition in file [f\\_hll.hpp](#).

## 6.10 Headers/libflux/f\_hll2.hpp File Reference

HLL flux.

```
#include "flux.hpp"
```

**Classes**

- class [F\\_HLL2](#)  
*HLL flux.*

### 6.10.1 Detailed Description

HLL flux.

**Author**Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)**Version**

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**Date**

2012-04-25

Numerical flux: Harten, Lax, van Leer reduced formulation.

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Definition in file [f\\_hll2.hpp](#).

## 6.11 Headers/libflux/f\_kinetic.hpp File Reference

Kinetic flux.

```
#include "flux.hpp"
```

### Classes

- class [F\\_Kinetic](#)  
*Kinetic flux.*

### 6.11.1 Detailed Description

Kinetic flux.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2010)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

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Numerical flux: kinetic formulation.

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Definition in file [f\\_kinetic.hpp](#).

## 6.12 Headers/libflux/f\_rusanov.hpp File Reference

Rusanov flux.

```
#include "flux.hpp"
```

### Classes

- class [F\\_Rusanov](#)  
*Rusanov flux.*



### 6.12.1 Detailed Description

Rusanov flux.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

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Numerical flux: Rusanov formulation.

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Definition in file [f\\_rusanov.hpp](#).

## 6.13 Headers/libflux/f\_vfroee.hpp File Reference

VFRoe flux.

```
#include "flux.hpp"
```

#### Classes

- class [F\\_VFRoe](#)  
*VFRoe flux.*

### 6.13.1 Detailed Description

VFRoe flux.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2010)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

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Numerical flux: VFRoe-ncv formulation.

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Definition in file [f\\_vfroe.hpp](#).

## 6.14 Headers/libflux/flux.hpp File Reference

Numerical flux.

```
#include "parameters.hpp"
```

**Classes**

- class [Flux](#)  
*Numerical flux.*

### 6.14.1 Detailed Description

Numerical flux.

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

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**Date**

2012-04-25

Common part for all the numerical fluxes.

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Definition in file [flux.hpp](#).

## 6.15 Headers/libfrictions/choice\_friction.hpp File Reference

Choice of friction law.

```
#include "friction.hpp"  
#include "no_friction.hpp"  
#include "fr_manning.hpp"  
#include "fr_darcy_weisbach.hpp"
```

### Classes

- class [Choice\\_friction](#)  
*Choice of friction law.*

### Macros

- #define [CHOICE\\_FRICTION\\_HPP](#)

#### 6.15.1 Detailed Description

Choice of friction law.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

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#### Date

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From the value of the corresponding parameter, calls the chosen friction law.

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Definition in file [choice\\_friction.hpp](#).

#### 6.15.2 Macro Definition Documentation

##### 6.15.2.1 #define CHOICE\_FRICTION\_HPP

Definition at line 74 of file [choice\\_friction.hpp](#).

## 6.16 Headers/libfrictions/fr\_darcy\_weisbach.hpp File Reference

Darcy-Weisbach law.

```
#include "friction.hpp"
```

### Classes

- class [Fr\\_Darcy\\_Weisbach](#)  
*Darcy-Weisbach law.*

### 6.16.1 Detailed Description

Darcy-Weisbach law.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

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#### Date

2012-04-25

Friction law: Darcy-Weisbach.

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Definition in file [fr\\_darcy\\_weisbach.hpp](#).

## 6.17 Headers/libfrictions/fr\_manning.hpp File Reference

Manning law.

```
#include "friction.hpp"
```

### Classes

- class [Fr\\_Manning](#)  
*Manning law.*

### 6.17.1 Detailed Description

Manning law.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

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#### Date

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Friction law: Manning.

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Definition in file [fr\\_manning.hpp](#).

## 6.18 Headers/libfrictions/friction.hpp File Reference

Friction law

```
#include "parameters.hpp"
```

#### Classes

- class [Friction](#)  
*Friction law*

### 6.18.1 Detailed Description

Friction law

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

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**Date**

2012-04-25

Common part for all the friction laws.

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Definition in file [friction.hpp](#).

## 6.19 Headers/libfrictions/no\_friction.hpp File Reference

No friction.

```
#include "friction.hpp"
```

**Classes**

- class [No\\_Friction](#)  
*No friction.*

### 6.19.1 Detailed Description

No friction.

**Author**

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

1.00.00

**Date**

2012-04-25

Friction law: does no computation.

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Definition in file [no\\_friction.hpp](#).

## 6.20 Headers/libinitializations/choice\_init\_hu.hpp File Reference

Choice of initialization for h and u.

```
#include "initialization_hu.hpp"
#include "hu_read.hpp"
#include "hu_generated.hpp"
#include "hu_generated_wet_dam_break.hpp"
#include "hu_generated_dry_dam_break.hpp"
#include "hu_generated_dressler_dam_break.hpp"
#include "hu_generated_thacker.hpp"
```

### Classes

- class [Choice\\_init\\_hu](#)  
*Choice of initialization for h and u.*

### Macros

- #define [CHOICE\\_INIT\\_HU\\_HPP](#)

### 6.20.1 Detailed Description

Choice of initialization for h and u.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

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From the value of the corresponding parameter, calls the chosen initialization of the water height and of the velocity.

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Definition in file [choice\\_init\\_hu.hpp](#).

## 6.20.2 Macro Definition Documentation

### 6.20.2.1 #define CHOICE\_INIT\_HU\_HPP

Definition at line 87 of file choice\_init\_hu.hpp.

## 6.21 Headers/libinitializations/choice\_init\_topo.hpp File Reference

Choice of initialization for the topography.

```
#include "initialization_topo.hpp"  
#include "topo_read.hpp"  
#include "topo_generated_flat.hpp"  
#include "topo_generated_thacker.hpp"  
#include "topo_generated_bump.hpp"
```

### Classes

- class [Choice\\_init\\_topo](#)  
*Choice of initialization for the topography.*

### Macros

- #define [CHOICE\\_INIT\\_TOPO\\_HPP](#)

### 6.21.1 Detailed Description

Choice of initialization for the topography.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

1.00.00

#### Date

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From the value of the corresponding parameter, calls the chosen initialization of the topography.

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Definition in file [choice\\_init\\_topo.hpp](#).



## 6.21.2 Macro Definition Documentation

### 6.21.2.1 #define CHOICE\_INIT\_TOPO\_HPP

Definition at line 78 of file choice\_init\_topo.hpp.

## 6.22 Headers/libinitializations/hu\_generated.hpp File Reference

No water configuration.

```
#include "initialization_hu.hpp"
```

### Classes

- class [Hu\\_generated](#)  
*No water configuration.*

### 6.22.1 Detailed Description

No water configuration.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

Initialization of the water height and of the velocity: case of a wet domain.

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Definition in file [hu\\_generated.hpp](#).

## 6.23 Headers/libinitializations/hu\_generated\_dressler\_dam\_break.hpp File Reference

Dressler dam break configuration.

```
#include "initialization_hu.hpp"
```

## Classes

- class [Hu\\_generated\\_Dressler\\_Dam\\_break](#)  
*Dressler dam break configuration.*

### 6.23.1 Detailed Description

Dressler dam break configuration.

#### Author

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

1.00.00

#### Date

2012-04-25

Initialization of the water height and of the velocity: case of a dam break as studied by Dressler (with friction).

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Definition in file [hu\\_generated\\_dressler\\_dam\\_break.hpp](#).

## 6.24 Headers/libinitializations/hu\_generated\_dry\_dam\_break.hpp File Reference

Dry dam break configuration.

```
#include "initialization_hu.hpp"
```

## Classes

- class [Hu\\_generated\\_Dry\\_Dam\\_break](#)  
*Dry dam break configuration.*

### 6.24.1 Detailed Description

Dry dam break configuration.

#### Author

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

**Version**

1.00.00

**Date**

2012-04-25

Initialization of the water height and of the velocity: case of a dam break on a dry domain.

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Definition in file [hu\\_generated\\_dry\\_dam\\_break.hpp](#).

## 6.25 Headers/libinitializations/hu\_generated\_thacker.hpp File Reference

Thacker configuration.

```
#include "initialization_hu.hpp"
```

**Classes**

- class [Hu\\_generated\\_Thacker](#)  
*Thacker configuration.*

### 6.25.1 Detailed Description

Thacker configuration.

**Author**

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

**Version**

1.00.00

**Date**

2012-04-25

Initialization of the water height and of the velocity: case of Thacker's benchmark.

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Definition in file [hu\\_generated\\_thacker.hpp](#).

## 6.26 Headers/libinitializations/hu\_generated\_wet\_dam\_break.hpp File Reference

Wet dam break configuration.

```
#include "initialization_hu.hpp"
```

### Classes

- class [Hu\\_generated\\_Wet\\_Dam\\_break](#)  
*Wet dam break configuration.*

### 6.26.1 Detailed Description

Wet dam break configuration.

#### Author

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

1.00.00

#### Date

2012-04-25

Initialization of the water height and of the velocity: case of a dam break on a wet domain.

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Definition in file [hu\\_generated\\_wet\\_dam\\_break.hpp](#).

## 6.27 Headers/libinitializations/hu\_read.hpp File Reference

File configuration.

```
#include "initialization_hu.hpp"
```

### Classes

- class [Hu\\_read](#)  
*File configuration.*

### 6.27.1 Detailed Description

File configuration.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

Initialization of the water height and of the velocity: the values are read in a file.

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Definition in file [hu\\_read.hpp](#).

## 6.28 Headers/libinitializations/initialization\_hu.hpp File Reference

Initialization of h and u

```
#include "parameters.hpp"
```

#### Classes

- class [Initialization\\_hu](#)  
*Initialization of h and u.*

### 6.28.1 Detailed Description

Initialization of h and u

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

**Date**

2012-04-25

Common part for all the initialization of the water height and of the velocity.

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Definition in file [initialization\\_hu.hpp](#).

## 6.29 Headers/libinitializations/initialization\_topo.hpp File Reference

Initialization of z

```
#include "parameters.hpp"
```

**Classes**

- class [Initialization\\_topo](#)  
*Initialization of z.*

### 6.29.1 Detailed Description

Initialization of z

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

1.00.00

**Date**

2012-04-25

Common part for all the initialization of the topography.

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Definition in file [initialization\\_topo.hpp](#).

## 6.30 Headers/libinitializations/topo\_generated\_bump.hpp File Reference

Bump configuration.

```
#include "initialization_topo.hpp"
```

### Classes

- class [Topo\\_generated\\_bump](#)  
*Bump configuration.*

### 6.30.1 Detailed Description

Bump configuration.

#### Author

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2011-2012)

#### Version

1.00.00

#### Date

2012-04-25

Initialization of the topography: the topography is a bump.

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Definition in file [topo\\_generated\\_bump.hpp](#).

## 6.31 Headers/libinitializations/topo\_generated\_flat.hpp File Reference

Flat configuration.

```
#include "initialization_topo.hpp"
```

### Classes

- class [Topo\\_generated\\_flat](#)  
*Flat configuration.*

### 6.31.1 Detailed Description

Flat configuration.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

Initialization of the topography: the topography is flat, its value is 0.

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Definition in file [topo\\_generated\\_flat.hpp](#).

## 6.32 Headers/libinitializations/topo\_generated\_thacker.hpp File Reference

Thacker configuration.

```
#include "initialization_topo.hpp"
```

#### Classes

- class [Topo\\_generated\\_Thacker](#)  
*Thacker configuration.*

### 6.32.1 Detailed Description

Thacker configuration.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

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**Date**

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Initialization of the topography: parabolic topography for Thacker's Benchmark.

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Definition in file [topo\\_generated\\_thacker.hpp](#).

## 6.33 Headers/libinitializations/topo\_read.hpp File Reference

File configuration.

```
#include "initialization_topo.hpp"
```

**Classes**

- class [Topo\\_read](#)  
*File configuration.*

### 6.33.1 Detailed Description

File configuration.

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

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**Date**

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Initialization of the topography: the values are read in a file.

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Definition in file [topo\\_read.hpp](#).

## 6.34 Headers/liblimitations/choice\_limiter.hpp File Reference

Choice of slope limiter.

```
#include "limiter.hpp"  
#include "minmod.hpp"  
#include "vanalbada.hpp"  
#include "vanleer.hpp"
```

### Classes

- class [Choice\\_limiter](#)  
*Choice of slope limiter.*

### Macros

- #define [CHOICE\\_LIMITER\\_HPP](#)

### 6.34.1 Detailed Description

Choice of slope limiter.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2010)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

From the value of the corresponding parameter, calls the chosen slope limiter.

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Definition in file [choice\\_limiter.hpp](#).

### 6.34.2 Macro Definition Documentation

#### 6.34.2.1 #define CHOICE\_LIMITER\_HPP

Definition at line 75 of file [choice\\_limiter.hpp](#).

## 6.35 Headers/liblimitations/limiter.hpp File Reference

Slope limiter.

```
#include "parameters.hpp"
```

### Classes

- class [Limiter](#)  
*Slope limiter.*

### 6.35.1 Detailed Description

Slope limiter.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

Common part for all the slope limiters.

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Definition in file [limiter.hpp](#).

## 6.36 Headers/liblimitations/minmod.hpp File Reference

Minmod limiter

```
#include "limiter.hpp"
```

### Classes

- class [Minmod](#)  
*Minmod slope limiter*

### 6.36.1 Detailed Description

Minmod limiter

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

Slope limiter: minmod.

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Definition in file [minmod.hpp](#).

## 6.37 Headers/liblimitations/vanalbada.hpp File Reference

Van Albada limiter.

```
#include "limiter.hpp"
```

#### Classes

- class [VanAlbada](#)  
*Van Albada slope limiter.*

### 6.37.1 Detailed Description

Van Albada limiter.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

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**Date**

2012-04-25

Slope limiter: Van Albada.

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Definition in file [vanalbada.hpp](#).

## 6.38 Headers/liblimitations/vanleer.hpp File Reference

Van Leer limiter.

```
#include "limiter.hpp"
```

**Classes**

- class [VanLeer](#)  
*Van Leer slope limiter.*

### 6.38.1 Detailed Description

Van Leer limiter.

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

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**Date**

2012-04-25

Slope limiter: Van Leer.

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Definition in file [vanleer.hpp](#).

## 6.39 Headers/libparameters/misc.hpp File Reference

Definitions.

```
#include <iostream>
#include <cstdlib>
#include <string>
#include <fstream>
#include <cmath>
#include <cstring>
#include <cstdio>
#include <iomanip>
#include <vector>
#include <unistd.h>
#include <ctime>
#include <sstream>
#include <cmath>
```

### Macros

- #define [MAX](#)(a, b) (a>=b?a:b)
- #define [MIN](#)(a, b) (a<=b?a:b)
- #define [GRAV](#) 9.81
- #define [GRAV\\_DEM](#) 4.905
- #define [NB\\_CHAR](#) 256
- #define [ZERO](#) 0.
- #define [HE\\_CA](#) 1.e-10
- #define [VE\\_CA](#) 1.e-10
- #define [IE\\_CA](#) 1.e-8
- #define [EPSILON](#) 1.e-13
- #define [RATIO\\_CLOSE\\_CELL](#) 1.e-3
- #define [VERSION](#) "FullSWOF\_1D version 1.01.01, 2014-02-03"
- #define [MAX\\_SCAL](#) DBL\_MAX

### Typedefs

- typedef double [SCALAR](#)
- typedef vector< [SCALAR](#) > [VECT](#)

### 6.39.1 Detailed Description

Definitions.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012-2014)

**Version**

1.01.01

**Date**

2014-02-03

Defines the constants, the types used in the code and contains the 'include'.

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Definition in file [misc.hpp](#).

**6.39.2 Macro Definition Documentation****6.39.2.1 #define EPSILON 1.e-13**

Definition at line 81 of file misc.hpp.

**6.39.2.2 #define GRAV 9.81**

Definition at line 73 of file misc.hpp.

**6.39.2.3 #define GRAV\_DEM 4.905**

Definition at line 74 of file misc.hpp.

**6.39.2.4 #define HE\_CA 1.e-10**

Definition at line 78 of file misc.hpp.

**6.39.2.5 #define IE\_CA 1.e-8**

Definition at line 80 of file misc.hpp.

**6.39.2.6 #define MAX( a, b ) (a>=b?a:b)**

Definition at line 70 of file misc.hpp.

**6.39.2.7 #define MAX\_SCAL DBL\_MAX**

Definition at line 92 of file misc.hpp.

**6.39.2.8** `#define MIN( a, b )(a<=b?a:b)`

Definition at line 71 of file misc.hpp.

**6.39.2.9** `#define NB_CHAR 256`

Definition at line 76 of file misc.hpp.

**6.39.2.10** `#define RATIO_CLOSE_CELL 1.e-3`

Definition at line 83 of file misc.hpp.

**6.39.2.11** `#define VE_CA 1.e-10`

Definition at line 79 of file misc.hpp.

**6.39.2.12** `#define VERSION "FullSWOF_1D version 1.01.01, 2014-02-03"`

Definition at line 85 of file misc.hpp.

**6.39.2.13** `#define ZERO 0.`

Definition at line 77 of file misc.hpp.

### 6.39.3 Typedef Documentation

**6.39.3.1** `typedef double SCALAR`

Definition at line 89 of file misc.hpp.

**6.39.3.2** `typedef vector<SCALAR> VECT`

Definition at line 94 of file misc.hpp.

## 6.40 Headers/libparameters/parameters.hpp File Reference

Gets parameters.

```
#include "misc.hpp"  
#include "parser.hpp"
```

### Classes

- class [Parameters](#)  
*Gets parameters.*



### 6.40.1 Detailed Description

Gets parameters.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2011-2014)

#### Version

1.01.01

#### Date

2014-01-14

Reads the parameters, checks their values.

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Definition in file [parameters.hpp](#).

## 6.41 Headers/libparser/parser.hpp File Reference

### Parser

```
#include "misc.hpp"
```

### Classes

- class [Parser](#)  
*Parser to read the entries*

### 6.41.1 Detailed Description

#### Parser

#### Author

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

1.00.00

**Date**

2012-04-25

Reads the input file.

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Definition in file [parser.hpp](#).

## 6.42 Headers/librain\_infiltration/choice\_infiltration.hpp File Reference

Choice of infiltration law.

```
#include "infiltration.hpp"  
#include "greenampt.hpp"  
#include "no_infiltration.hpp"
```

**Classes**

- class [Choice\\_infiltration](#)  
*Choice of infiltration law.*

**Macros**

- #define [CHOICE\\_INFILTRATION\\_HPP](#)

### 6.42.1 Detailed Description

Choice of infiltration law. author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)**Version**

1.01.00

**Date**

2013-05-14

From the value of the corresponding parameter, calls the chosen infiltration law.

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Definition in file [choice\\_infiltration.hpp](#).

## 6.42.2 Macro Definition Documentation

### 6.42.2.1 #define CHOICE\_INFILTRATION\_HPP

Definition at line 70 of file choice\_infiltration.hpp.

## 6.43 Headers/librain\_infiltration/choice\_rain.hpp File Reference

Choice of initialization for the rain.

```
#include "rain.hpp"  
#include "rain_read.hpp"  
#include "rain_generated.hpp"  
#include "no_rain.hpp"
```

### Classes

- class [Choice\\_rain](#)  
*Choice of initialization for the rain.*

### Macros

- #define [CHOICE\\_RAIN\\_HPP](#)

### 6.43.1 Detailed Description

Choice of initialization for the rain. author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

#### Version

1.01.00

#### Date

2013-05-12

From the value of the corresponding parameter, calls the chosen initialization of the rain.

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Definition in file [choice\\_rain.hpp](#).

## 6.43.2 Macro Definition Documentation

### 6.43.2.1 #define CHOICE\_RAIN\_HPP

Definition at line 73 of file choice\_rain.hpp.

## 6.44 Headers/librain\_infiltration/greenampt.hpp File Reference

Green-Ampt law.

```
#include "infiltration.hpp"
```

### Classes

- class [GreenAmpt](#)  
*GreenAmpt law.*

### 6.44.1 Detailed Description

Green-Ampt law. author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

#### Version

1.01.00

#### Date

2013-05-14

Infiltration law: bi-layer Green-Ampt.

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Definition in file [greenampt.hpp](#).

## 6.45 Headers/librain\_infiltration/infiltration.hpp File Reference

Infiltration

```
#include "parameters.hpp"
```

### Classes

- class [Infiltration](#)  
*Definition of infiltration law.*

### 6.45.1 Detailed Description

Infiltration author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

**Version**

1.01.00

**Date**

2013-05-14

Common part for the infiltration.

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Definition in file [infiltration.hpp](#).

## 6.46 Headers/librain\_infiltration/no\_infiltration.hpp File Reference

No infiltration.

```
#include "infiltration.hpp"
```

**Classes**

- class [No\\_Infiltration](#)  
*No infiltration.*

### 6.46.1 Detailed Description

No infiltration. author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

**Version**

1.01.00

**Date**

2013-05-14

Infiltration: there is no infiltration.

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Definition in file [no\\_infiltration.hpp](#).

## 6.47 Headers/librain\_infiltration/no\_rain.hpp File Reference

No rain.

```
#include "rain.hpp"
```

### Classes

- class [No\\_Rain](#)  
*No rain.*

### 6.47.1 Detailed Description

No rain. author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

#### Version

1.01.00

#### Date

2013-05-12

Rain: there is no rain.

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Definition in file [no\\_rain.hpp](#).

## 6.48 Headers/librain\_infiltration/rain.hpp File Reference

Rain

```
#include "parameters.hpp"
```

### Classes

- class [Rain](#)  
*Initialization of the rain.*

### 6.48.1 Detailed Description

Rain author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

**Version**

1.01.00

**Date**

2013-05-12

Common part for the initialization of the rain.

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Definition in file [rain.hpp](#).

## 6.49 Headers/librain\_infiltration/rain\_generated.hpp File Reference

Constant rain configuration.

```
#include "rain.hpp"
```

**Classes**

- class [Rain\\_generated](#)  
*Constant rain configuration.*

### 6.49.1 Detailed Description

Constant rain configuration. author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

**Version**

1.01.00

**Date**

2013-05-12

Initialization of the rain: the value is equals to 0.00001 m/s = 36 mm/h, constant during the simulation.

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Definition in file [rain\\_generated.hpp](#).

## 6.50 Headers/librain\_infiltration/rain\_read.hpp File Reference

File configuration.

```
#include "rain.hpp"
```

### Classes

- class [Rain\\_read](#)  
*File configuration.*

### 6.50.1 Detailed Description

File configuration. author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

#### Version

1.01.00

#### Date

2013-05-12

Initialization of the rain: the values are read in a file.

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Definition in file [rain\\_read.hpp](#).

## 6.51 Headers/libreconstructions/choice\_reconstruction.hpp File Reference

Choice of reconstruction.

```
#include "reconstruction.hpp"  
#include "muscl.hpp"  
#include "eno.hpp"  
#include "eno_mod.hpp"
```

### Classes

- class [Choice\\_reconstruction](#)  
*Choice of reconstruction.*

### Macros

- #define [CHOICE\\_RECONSTRUCTION\\_HPP](#)



### 6.51.1 Detailed Description

Choice of reconstruction.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

From the value of the corresponding parameter, calls the chosen reconstruction.

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Definition in file [choice\\_reconstruction.hpp](#).

### 6.51.2 Macro Definition Documentation

#### 6.51.2.1 #define CHOICE\_RECONSTRUCTION\_HPP

Definition at line 74 of file choice\_reconstruction.hpp.

## 6.52 Headers/libreconstructions/eno.hpp File Reference

ENO reconstruction

```
#include "reconstruction.hpp"
```

#### Classes

- class [ENO](#)  
*ENO reconstruction*

### 6.52.1 Detailed Description

ENO reconstruction

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

1.00.00

**Date**

2012-04-25

Linear reconstruction: ENO.

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Definition in file [eno.hpp](#).

## 6.53 Headers/libreconstructions/eno\_mod.hpp File Reference

Modified ENO reconstruction.

```
#include "reconstruction.hpp"
```

**Classes**

- class [ENO\\_mod](#)  
*Modified ENO reconstruction.*

### 6.53.1 Detailed Description

Modified ENO reconstruction.

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

1.00.00

**Date**

2012-04-25

Linear reconstruction: modified ENO.

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Definition in file [eno\\_mod.hpp](#).

## 6.54 Headers/libreconstructions/hydrostatic.hpp File Reference

Hydrostatic reconstruction

```
#include "parameters.hpp"
```

### Classes

- class [Hydrostatic](#)  
*Hydrostatic reconstruction*

### 6.54.1 Detailed Description

Hydrostatic reconstruction

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

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Definition in file [hydrostatic.hpp](#).

## 6.55 Headers/libreconstructions/muscl.hpp File Reference

MUSCL reconstruction

```
#include "reconstruction.hpp"
```

## Classes

- class [MUSCL](#)  
*MUSCL reconstruction*

### 6.55.1 Detailed Description

MUSCL reconstruction

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

Linear reconstruction: MUSCL.

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Definition in file [muscl.hpp](#).

## 6.56 Headers/libreconstructions/reconstruction.hpp File Reference

### Reconstruction

```
#include "parameters.hpp"  
#include "choice_limiter.hpp"
```

## Classes

- class [Reconstruction](#)  
*Reconstruction of the variables*

### 6.56.1 Detailed Description

Reconstruction

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

1.00.00

**Date**

2012-04-25

Common part for all the reconstructions.

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Definition in file [reconstruction.hpp](#).

## 6.57 Headers/libsave/choice\_output.hpp File Reference

Choice of output format.

```
#include "output.hpp"  
#include "gnuplot.hpp"
```

**Classes**

- class [Choice\\_output](#)  
*Choice of output format.*

**Macros**

- #define [CHOICE\\_OUTPUT\\_HPP](#)

### 6.57.1 Detailed Description

Choice of output format.

**Author**

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

**Version**

1.00.00

**Date**

2012-04-25

From the value of the corresponding parameter, calls the savings in the chosen format.

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Definition in file [choice\\_output.hpp](#).

**6.57.2 Macro Definition Documentation****6.57.2.1 #define CHOICE\_OUTPUT\_HPP**

Definition at line 65 of file [choice\\_output.hpp](#).

**6.58 Headers/libsave/gnuplot.hpp File Reference**

Gnuplot output

```
#include "output.hpp"
```

**Classes**

- class [Gnuplot](#)  
*Gnuplot output*

**6.58.1 Detailed Description**

Gnuplot output

**Author**

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

**Version**

1.00.00

**Date**

2012-04-25

Output format: optimized for Gnuplot.

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Definition in file [gnuplot.hpp](#).

## 6.59 Headers/libsave/output.hpp File Reference

### Output format

```
#include "parameters.hpp"
```

### Classes

- class [Output](#)  
*Output format*

### 6.59.1 Detailed Description

#### Output format

#### Author

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

1.00.00

#### Date

2012-04-25

Common part for all the output formats.

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Definition in file [output.hpp](#).

## 6.60 Headers/libschemas/choice\_scheme.hpp File Reference

Choice of numerical scheme.

```
#include "scheme.hpp"  
#include "order1.hpp"  
#include "order2.hpp"
```

## Classes

- class [Choice\\_scheme](#)  
*Choice of numerical scheme.*

## Macros

- #define [CHOICE\\_SCHEME\\_HPP](#)

### 6.60.1 Detailed Description

Choice of numerical scheme.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

From the value of the corresponding parameter, calls the chosen numerical scheme.

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Definition in file [choice\\_scheme.hpp](#).

### 6.60.2 Macro Definition Documentation

#### 6.60.2.1 #define CHOICE\_SCHEME\_HPP

Definition at line 70 of file [choice\\_scheme.hpp](#).

## 6.61 Headers/libschemas/order1.hpp File Reference

Order 1 scheme.

```
#include "scheme.hpp"
```



## Classes

- class [Order1](#)  
*Order 1 scheme.*

### 6.61.1 Detailed Description

Order 1 scheme.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

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#### Date

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Numerical scheme: at order 1.

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Definition in file [order1.hpp](#).

## 6.62 Headers/libschemas/order2.hpp File Reference

Order 2 scheme.

```
#include "scheme.hpp"
```

## Classes

- class [Order2](#)  
*Order 2 scheme.*

### 6.62.1 Detailed Description

Order 2 scheme.

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

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**Date**

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Numerical scheme: at order 2.

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Definition in file [order2.hpp](#).

## 6.63 Headers/libschemas/scheme.hpp File Reference

Numerical scheme.

```
#include "hydrostatic.hpp"
#include "choice_condition.hpp"
#include "choice_flux.hpp"
#include "choice_friction.hpp"
#include "choice_init_topo.hpp"
#include "choice_init_hu.hpp"
#include "choice_rain.hpp"
#include "choice_infiltration.hpp"
#include "choice_output.hpp"
#include "choice_reconstruction.hpp"
```

**Classes**

- class [Scheme](#)  
*Numerical scheme.*

### 6.63.1 Detailed Description

Numerical scheme.

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012-2013)

**Version**

1.01.00

**Date**

2013-05-15

Common part for all the numerical schemes.

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Definition in file [scheme.hpp](#).

## 6.64 Sources/FullSWOF\_1D.cpp File Reference

Main function.

```
#include "choice_scheme.hpp"
```

**Functions**

- int [main](#) ()

### 6.64.1 Detailed Description

Main function.

**Author**

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

**Version**

1.00.00

**Date**

2012-04-25

Runs the programm.

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Definition in file [FullSWOF\\_1D.cpp](#).

## 6.64.2 Function Documentation

### 6.64.2.1 int main ( )

Main function

Declare the scheme and executes the program.

#### Returns

0 if the program finished correctly.

#### Note

The name of the input file (Inputs/parameters.txt) is written here.

Definition at line 57 of file FullSWOF\_1D.cpp.

## 6.65 Sources/libboundaryconditions/bc\_imp\_discharge.cpp File Reference

Imposed discharge.

```
#include "bc_imp_discharge.hpp"
```

### 6.65.1 Detailed Description

Imposed discharge.

#### Author

Ulrich Razafison [ulrich.razafison@math.cnrs.fr](mailto:ulrich.razafison@math.cnrs.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2011-2012)

#### Version

1.00.01

#### Date

2012-04-26

Boundary condition: imposed discharge (and water height if necessary).

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Definition in file [bc\\_imp\\_discharge.cpp](#).

## 6.66 Sources/libboundaryconditions/bc\_imp\_height.cpp File Reference

Imposed water height.

```
#include "bc_imp_height.hpp"
```

### 6.66.1 Detailed Description

Imposed water height.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

1.00.00

#### Date

2012-04-25

Boundary condition: imposed water height (and discharge if necessary), based on the modified method of characteristics and Riemann invariants.

#### See Also

Olivier Delestre Ph.D thesis Annexe A [Delestre \[2010\]](#) <http://tel.archives-ouvertes.fr/tel-00587197>

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Definition in file [bc\\_imp\\_height.cpp](#).

## 6.67 Sources/libboundaryconditions/bc\_neumann.cpp File Reference

Neumann condition.

```
#include "bc_neumann.hpp"
```

### 6.67.1 Detailed Description

Neumann condition.

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

**Version**

1.00.00

**Date**

2012-04-25

Boundary condition: Neumann condition (the normal derivative is null).

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Definition in file [bc\\_neumann.cpp](#).

## 6.68 Sources/libboundaryconditions/bc\_periodic.cpp File Reference

Periodic condition.

```
#include "bc_periodic.hpp"
```

### 6.68.1 Detailed Description

Periodic condition.

**Author**

Pierre-Antoine Ksinant [pierreantoine.ksinantgarcia@gmail.com](mailto:pierreantoine.ksinantgarcia@gmail.com) (2010)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

**Version**

1.00.00

**Date**

2012-04-25

Boundary condition: periodic condition.

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Definition in file [bc\\_periodic.cpp](#).

## 6.69 Sources/libboundaryconditions/bc\_wall.cpp File Reference

Wall condition.

```
#include "bc_wall.hpp"
```

### 6.69.1 Detailed Description

Wall condition.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

1.00.00

#### Date

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Boundary condition: wall condition (the discharge at the boundary is null).

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Definition in file [bc\\_wall.cpp](#).

## 6.70 Sources/libboundaryconditions/boundary\_condition.cpp File Reference

Boundary condition.

```
#include "boundary_condition.hpp"
```

### 6.70.1 Detailed Description

Boundary condition.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

**Version**

1.00.00

**Date**

2012-04-25

Common part for all the boundary conditions.

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Definition in file [boundary\\_condition.cpp](#).

## 6.71 Sources/libboundaryconditions/choice\_condition.cpp File Reference

Choice of boundary condition.

```
#include "choice_condition.hpp"
```

### 6.71.1 Detailed Description

Choice of boundary condition.

**Author**Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)**Version**

1.00.00

**Date**

2012-04-25

From the value of the corresponding parameter, calls the chosen boundary condition.

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Definition in file [choice\\_condition.cpp](#).



## 6.72 Sources/libflux/choice\_flux.cpp File Reference

Choice of numerical flux.

```
#include "choice_flux.hpp"
```

### 6.72.1 Detailed Description

Choice of numerical flux.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2010)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

From the value of the corresponding parameter, calls the chosen numerical flux.

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Definition in file [choice\\_flux.cpp](#).

## 6.73 Sources/libflux/f\_hll.cpp File Reference

HLL flux.

```
#include "f_hll.hpp"
```

### 6.73.1 Detailed Description

HLL flux.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

1.00.00

**Date**

2012-04-25

Numerical flux: Harten, Lax, van Leer formulation.

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Definition in file [f\\_hll.cpp](#).

## 6.74 Sources/libflux/f\_hll2.cpp File Reference

HLL flux.

```
#include "f_hll2.hpp"
```

### 6.74.1 Detailed Description

HLL flux.

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

1.00.00

**Date**

2012-04-25

Numerical flux: Harten, Lax, van Leer reduced formulation.

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Definition in file [f\\_hll2.cpp](#).

## 6.75 Sources/libflux/f\_kinetic.cpp File Reference

Kinetic flux.

```
#include "f_kinetic.hpp"
```

### 6.75.1 Detailed Description

Kinetic flux.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2010)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

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#### Date

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Numerical flux: kinetic formulation.

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Definition in file [f\\_kinetic.cpp](#).

## 6.76 Sources/libflux/f\_rusanov.cpp File Reference

Rusanov flux.

```
#include "f_rusanov.hpp"
```

### 6.76.1 Detailed Description

Rusanov flux.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

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**Date**

2012-04-25

Numerical flux: Rusanov formulation.

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Definition in file [f\\_rusanov.cpp](#).

## 6.77 Sources/libflux/f\_vfroe.cpp File Reference

VFRoe flux.

```
#include "f_vfroe.hpp"
```

### 6.77.1 Detailed Description

VFRoe flux.

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2010)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

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**Date**

2012-04-25

Numerical flux: VFRoe-ncv formulation.

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Definition in file [f\\_vfroe.cpp](#).

## 6.78 Sources/libflux/flux.cpp File Reference

Numerical flux.

```
#include "flux.hpp"
```

### 6.78.1 Detailed Description

Numerical flux.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

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#### Date

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Definition in file [flux.cpp](#).

## 6.79 Sources/libfrictions/choice\_friction.cpp File Reference

Choice of friction law.

```
#include "choice_friction.hpp"
```

### 6.79.1 Detailed Description

Choice of friction law.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

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**Date**

2012-04-25

From the value of the corresponding parameter, calls the chosen friction law.

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Definition in file [choice\\_friction.cpp](#).

## 6.80 Sources/libfrictions/fr\_darcy\_weisbach.cpp File Reference

Darcy-Weisbach law.

```
#include "fr_darcy_weisbach.hpp"
```

### 6.80.1 Detailed Description

Darcy-Weisbach law.

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

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Friction law: Darcy-Weisbach.

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Definition in file [fr\\_darcy\\_weisbach.cpp](#).

## 6.81 Sources/libfrictions/fr\_manning.cpp File Reference

Manning law.

```
#include "fr_manning.hpp"
```

### 6.81.1 Detailed Description

Manning law.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

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#### Date

2012-04-25

Friction law: Manning.

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Definition in file [fr\\_manning.cpp](#).

## 6.82 Sources/libfrictions/friction.cpp File Reference

Friction law

```
#include "friction.hpp"
```

### 6.82.1 Detailed Description

Friction law

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

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**Date**

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Definition in file [friction.cpp](#).

## 6.83 Sources/libfrictions/no\_friction.cpp File Reference

No friction.

```
#include "no_friction.hpp"
```

### 6.83.1 Detailed Description

No friction.

**Author**

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

1.00.00

**Date**

2012-04-25

Friction law: does no computation.

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Definition in file [no\\_friction.cpp](#).



## 6.84 Sources/libinitializations/choice\_init\_hu.cpp File Reference

Choice of initialization for h and u.

```
#include "choice_init_hu.hpp"
```

### 6.84.1 Detailed Description

Choice of initialization for h and u.

#### Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2009)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

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#### Date

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From the value of the corresponding parameter, calls the chosen initialization of the water height and of the velocity.

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Definition in file [choice\\_init\\_hu.cpp](#).

## 6.85 Sources/libinitializations/choice\_init\_topo.cpp File Reference

Choice of initialization for the topography.

```
#include "choice_init_topo.hpp"
```

### 6.85.1 Detailed Description

Choice of initialization for the topography.

#### Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2009)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

**Version**

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**Date**

2012-04-25

From the value of the corresponding parameter, calls the chosen initialization of the topography.

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Definition in file [choice\\_init\\_topo.cpp](#).

## 6.86 Sources/libinitializations/hu\_generated.cpp File Reference

No water configuration.

```
#include "hu_generated.hpp"
```

### 6.86.1 Detailed Description

No water configuration.

**Author**

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2009)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

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**Date**

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Initialization of the water height and of the velocity: case of a wet domain.

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Definition in file [hu\\_generated.cpp](#).

## 6.87 Sources/libinitializations/hu\_generated\_dressler\_dam\_break.cpp File Reference

Dressler dam break configuration.

```
#include "hu_generated_dressler_dam_break.hpp"
```

### 6.87.1 Detailed Description

Dressler dam break configuration.

#### Author

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

1.00.00

#### Date

2012-04-25

Initialization of the water height and of the velocity: case of a dam break as studied by Dressler (with friction).

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Definition in file [hu\\_generated\\_dressler\\_dam\\_break.cpp](#).

## 6.88 Sources/libinitializations/hu\_generated\_dry\_dam\_break.cpp File Reference

Dry dam break configuration.

```
#include "hu_generated_dry_dam_break.hpp"
```

### 6.88.1 Detailed Description

Dry dam break configuration.

#### Author

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

1.00.00

**Date**

2012-04-25

Initialization of the water height and of the velocity: case of a dam break on a dry domain.

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Definition in file [hu\\_generated\\_dry\\_dam\\_break.cpp](#).

## 6.89 Sources/libinitializations/hu\_generated\_thacker.cpp File Reference

Thacker configuration.

```
#include "hu_generated_thacker.hpp"
```

### 6.89.1 Detailed Description

Thacker configuration.

**Author**

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

**Version**

1.00.00

**Date**

2012-04-25

Initialization of the water height and of the velocity: case of Thacker's benchmark.

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Definition in file [hu\\_generated\\_thacker.cpp](#).

## 6.90 Sources/libinitializations/hu\_generated\_wet\_dam\_break.cpp File Reference

Wet dam break configuration.

```
#include "hu_generated_wet_dam_break.hpp"
```

### 6.90.1 Detailed Description

Wet dam break configuration.

#### Author

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

1.00.00

#### Date

2012-04-25

Initialization of the water height and of the velocity: case of a dam break on a wet domain.

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Definition in file [hu\\_generated\\_wet\\_dam\\_break.cpp](#).

## 6.91 Sources/libinitializations/hu\_read.cpp File Reference

File configuration.

```
#include "hu_read.hpp"
```

### 6.91.1 Detailed Description

File configuration.

#### Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2009)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012-2013)

#### Version

1.00.02

#### Date

2013-05-12

Initialization of the water height and of the velocity: the values are read in a file.

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Definition in file [hu\\_read.cpp](#).

## 6.92 Sources/libinitializations/initialization\_hu.cpp File Reference

Initialization of h and u

```
#include "initialization_hu.hpp"
```

### 6.92.1 Detailed Description

Initialization of h and u

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

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#### Date

2012-04-25

Common part for all the initialization of the water height and of the velocity.

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Definition in file [initialization\\_hu.cpp](#).

## 6.93 Sources/libinitializations/initialization\_topo.cpp File Reference

Initialization of z

```
#include "initialization_topo.hpp"
```

### 6.93.1 Detailed Description

Initialization of z

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

Common part for all the initialization of the topography.

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Definition in file [initialization\\_topo.cpp](#).

## 6.94 Sources/libinitializations/topo\_generated\_bump.cpp File Reference

Bump configuration.

```
#include "topo_generated_bump.hpp"
```

### 6.94.1 Detailed Description

Bump configuration.

#### Author

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

1.00.00

#### Date

2012-04-25

Initialization of the topography: the topography is a bump.

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Definition in file [topo\\_generated\\_bump.cpp](#).

## 6.95 Sources/libinitializations/topo\_generated\_flat.cpp File Reference

Flat configuration.

```
#include "topo_generated_flat.hpp"
```

### 6.95.1 Detailed Description

Flat configuration.

#### Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2009)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

Initialization of the topography: the topography is flat, its value is 0.

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Definition in file [topo\\_generated\\_flat.cpp](#).

## 6.96 Sources/libinitializations/topo\_generated\_thacker.cpp File Reference

Thacker configuration.

```
#include "topo_generated_thacker.hpp"
```



### 6.96.1 Detailed Description

Thacker configuration.

#### Author

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

1.00.02

#### Date

2013-05-11

Initialization of the topography: parabolic topography for Thacker's Benchmark.

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Definition in file [topo\\_generated\\_thacker.cpp](#).

## 6.97 Sources/libinitializations/topo\_read.cpp File Reference

File configuration.

```
#include "topo_read.hpp"
```

### 6.97.1 Detailed Description

File configuration.

#### Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2009)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012-2013)

#### Version

1.00.02

#### Date

2013-05-12

Initialization of the topography: the values are read in a file.

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Definition in file [topo\\_read.cpp](#).

## 6.98 Sources/liblimitations/choice\_limiter.cpp File Reference

Choice of slope limiter.

```
#include "choice_limiter.hpp"
```

### 6.98.1 Detailed Description

Choice of slope limiter.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2010)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

From the value of the corresponding parameter, calls the chosen slope limiter.

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Definition in file [choice\\_limiter.cpp](#).

## 6.99 Sources/liblimitations/limiter.cpp File Reference

Slope limiter.

```
#include "limiter.hpp"
```

### 6.99.1 Detailed Description

Slope limiter.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

Common part for all the slope limiters.

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Definition in file [limiter.cpp](#).

## 6.100 Sources/liblimitations/minmod.cpp File Reference

Minmod limiter

```
#include "minmod.hpp"
```

### 6.100.1 Detailed Description

Minmod limiter

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

Slope limiter: minmod.

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Definition in file [minmod.cpp](#).

## 6.101 Sources/liblimitations/vanalbada.cpp File Reference

Van Albada limiter.

```
#include "vanalbada.hpp"
```

### 6.101.1 Detailed Description

Van Albada limiter.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

Slope limiter: Van Albada.

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Definition in file [vanalbada.cpp](#).

## 6.102 Sources/liblimitations/vanleer.cpp File Reference

Van Leer limiter.

```
#include "vanleer.hpp"
```

### 6.102.1 Detailed Description

Van Leer limiter.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

Slope limiter: Van Leer.

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Definition in file [vanleer.cpp](#).

## 6.103 Sources/libparameters/parameters.cpp File Reference

Gets parameters.

```
#include "parameters.hpp"
```

### 6.103.1 Detailed Description

Gets parameters.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2011-2014)

#### Version

1.01.01

#### Date

2014-01-14

Reads the parameters, checks their values.

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Definition in file [parameters.cpp](#).

## 6.104 Sources/libparser/parser.cpp File Reference

Parser

```
#include "parser.hpp"
```

### 6.104.1 Detailed Description

Parser

Author

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

Version

1.00.00

Date

2012-04-25

Reads the input file.

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Definition in file [parser.cpp](#).

## 6.105 Sources/librain\_infiltration/choice\_infiltration.cpp File Reference

Choice of infiltration law.

```
#include "choice_infiltration.hpp"
```

### 6.105.1 Detailed Description

Choice of infiltration law. author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

#### Version

1.01.00

#### Date

2013-05-15

From the value of the corresponding parameter, calls the chosen infiltration law.

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Definition in file [choice\\_infiltration.cpp](#).

## 6.106 Sources/librain\_infiltration/choice\_rain.cpp File Reference

Choice of initialization for the rain.

```
#include "choice_rain.hpp"
```

### 6.106.1 Detailed Description

Choice of initialization for the rain. author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

#### Version

1.01.00

#### Date

2013-05-12

From the value of the corresponding parameter, calls the chosen initialization of the rain.

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Definition in file [choice\\_rain.cpp](#).

## 6.107 Sources/librain\_infiltration/greenampt.cpp File Reference

Green-Ampt law.

```
#include "greenampt.hpp"
```

### 6.107.1 Detailed Description

Green-Ampt law. author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

#### Version

1.01.00

#### Date

2013-05-14

Infiltration law: bi-layer Green-Ampt.

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Definition in file [greenampt.cpp](#).

## 6.108 Sources/librain\_infiltration/infiltration.cpp File Reference

Infiltration

```
#include "infiltration.hpp"
```

### 6.108.1 Detailed Description

Infiltration author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

#### Version

1.01.00

#### Date

2013-05-14

Common part for the infiltration.



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Definition in file [infiltration.cpp](#).

**6.109 Sources/librain\_infiltration/no\_infiltration.cpp File Reference**

No infiltration.

```
#include "no_infiltration.hpp"
```

**6.109.1 Detailed Description**

No infiltration. author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

**Version**

1.01.00

**Date**

2013-05-14

Infiltration: there is no infiltration.

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Definition in file [no\\_infiltration.cpp](#).

**6.110 Sources/librain\_infiltration/no\_rain.cpp File Reference**

No rain.

```
#include "no_rain.hpp"
```

**6.110.1 Detailed Description**

No rain. author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

**Version**

1.01.00

**Date**

2013-05-12

Rain: there is no rain.

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Definition in file [no\\_rain.cpp](#).

## 6.111 Sources/librain\_infiltration/rain.cpp File Reference

**Rain**

```
#include "rain.hpp"
```

### 6.111.1 Detailed Description

Rain author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

**Version**

1.01.00

**Date**

2013-05-12

Common part for the initialization of the rain.

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Definition in file [rain.cpp](#).

## 6.112 Sources/librain\_infiltration/rain\_generated.cpp File Reference

Constant rain configuration.

```
#include "rain_generated.hpp"
```

### 6.112.1 Detailed Description

Constant rain configuration. author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

#### Version

1.01.00

#### Date

2013-05-12

Initialization of the rain: the value is equals to 0.00001 m/s = 36 mm/h, constant during the simulation.

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Definition in file [rain\\_generated.cpp](#).

## 6.113 Sources/librain\_infiltration/rain\_read.cpp File Reference

File configuration.

```
#include "rain_read.hpp"
```

### 6.113.1 Detailed Description

File configuration. author Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2013)

#### Version

1.01.00

#### Date

2013-05-12

Initialization of the rain: the values are read in a file.

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Definition in file [rain\\_read.cpp](#).

## 6.114 Sources/libreconstructions/choice\_reconstruction.cpp File Reference

Choice of reconstruction.

```
#include "choice_reconstruction.hpp"
```

### 6.114.1 Detailed Description

Choice of reconstruction.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

From the value of the corresponding parameter, calls the chosen reconstruction.

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Definition in file [choice\\_reconstruction.cpp](#).

## 6.115 Sources/libreconstructions/eno.cpp File Reference

ENO reconstruction

```
#include "eno.hpp"
```

### 6.115.1 Detailed Description

ENO reconstruction

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

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**Date**

2012-04-25

Linear reconstruction: ENO.

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Definition in file [eno.cpp](#).

## 6.116 Sources/libreconstructions/eno\_mod.cpp File Reference

Modified ENO reconstruction.

```
#include "eno_mod.hpp"
```

### 6.116.1 Detailed Description

Modified ENO reconstruction.

**Author**Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)**Version**

1.00.00

**Date**

2012-04-25

Linear reconstruction: modified ENO.

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Definition in file [eno\\_mod.cpp](#).

## 6.117 Sources/libreconstructions/hydrostatic.cpp File Reference

Hydrostatic reconstruction

```
#include "hydrostatic.hpp"
```

### 6.117.1 Detailed Description

Hydrostatic reconstruction

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

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Definition in file [hydrostatic.cpp](#).

## 6.118 Sources/libreconstructions/muscl.cpp File Reference

MUSCL reconstruction

```
#include "muscl.hpp"
```

### 6.118.1 Detailed Description

MUSCL reconstruction

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

**Date**

2012-04-25

Linear reconstruction: MUSCL.

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Definition in file [muscl.cpp](#).

## 6.119 Sources/libreconstructions/reconstruction.cpp File Reference

**Reconstruction**

```
#include "reconstruction.hpp"
```

### 6.119.1 Detailed Description

**Reconstruction****Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

**Version**

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**Date**

2012-04-25

Common part for all the reconstructions.

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Definition in file [reconstruction.cpp](#).

## 6.120 Sources/libsave/choice\_output.cpp File Reference

Choice of output format.

```
#include "choice_output.hpp"
```

### 6.120.1 Detailed Description

Choice of output format.

#### Author

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

1.00.00

#### Date

2012-04-25

From the value of the corresponding parameter, calls the savings in the chosen format.

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Definition in file [choice\\_output.cpp](#).

## 6.121 Sources/libsave/gnuplot.cpp File Reference

Gnuplot output

```
#include "gnuplot.hpp"
```

### 6.121.1 Detailed Description

Gnuplot output

#### Author

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2012)

#### Version

1.00.00

#### Date

2012-04-25

Output format: optimized for Gnuplot (for huz\_evolution.dat).



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Definition in file [gnuplot.cpp](#).

## 6.122 Sources/libsave/output.cpp File Reference

Output format

```
#include "output.hpp"
```

### 6.122.1 Detailed Description

Output format

**Author**

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2010-2014)

**Version**

1.01.01

**Date**

2014-01-15

Common part for all the output formats.

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Definition in file [output.cpp](#).

## 6.123 Sources/libschemas/choice\_scheme.cpp File Reference

Choice of numerical scheme.

```
#include "choice_scheme.hpp"
```

### 6.123.1 Detailed Description

Choice of numerical scheme.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012)

#### Version

1.00.00

#### Date

2012-04-25

From the value of the corresponding parameter, calls the chosen numerical scheme.

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Definition in file [choice\\_scheme.cpp](#).

## 6.124 Sources/libschemas/order1.cpp File Reference

Order 1 scheme.

```
#include "order1.hpp"
```

### 6.124.1 Detailed Description

Order 1 scheme.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012-2013)

#### Version

1.01.00

#### Date

2013-05-16

Numerical scheme: at order 1.

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Definition in file [order1.cpp](#).

**6.125 Sources/libschemas/order2.cpp File Reference**

Order 2 scheme.

```
#include "order2.hpp"
```

**6.125.1 Detailed Description**

Order 2 scheme.

**Author**

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012-2013)

**Version**

1.01.00

**Date**

2013-05-16

Numerical scheme: at order 2.

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Definition in file [order2.cpp](#).

**6.126 Sources/libschemas/scheme.cpp File Reference**

Numerical scheme.

```
#include "scheme.hpp"
```

### 6.126.1 Detailed Description

Numerical scheme.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2012-2013)

#### Version

1.01.00

#### Date

2013-05-16

Common part for all the numerical schemes.

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Definition in file [scheme.cpp](#).

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