

Documentation  
of  
FullSWOF\_2D

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# Chapter 1

## Todo List

### **Class [Boundary\\_condition](#)**

Add time and space dependency in the boundary conditions.

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 \[2001\]](#).



## Chapter 2

# Hierarchical Index

### 2.1 Class Hierarchy

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## Chapter 3

# Class Index

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## Chapter 5

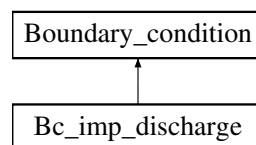
# Class Documentation

### 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](#) &, [TAB](#) &, int, int)  
*Constructor.*
- [SCALAR getValueOfPolynomial](#) (const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), int, int) const  
*Gives the value of the function that must vanish.*
- [SCALAR getValueOfDerivativeOfPolynomial](#) (const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), int, int) const  
*Gives the value of the derivative of the function that must vanish.*
- [SCALAR newtonSolver](#) (const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), const [SCALAR](#), int, int) const  
*Solves the equation with Newton iterative method.*
- void [calcul](#) ([SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), int, int)  
*Calculates the boundary condition.*
- 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 73 of file `bc_imp_discharge.hpp`.

### 5.1.2 Constructor & Destructor Documentation

**Bc\_imp\_discharge::Bc\_imp\_discharge ( Parameters & *par*, TAB & *z*, int *n1*, int *n2* )**

Constructor.

**Parameters**

in	<i>par</i>	parameter, contains all the values from the parameters file (unused).
in	<i>n1</i>	integer to specify whether it is the left (-1) or the right (1) boundary.
in	<i>n2</i>	integer to specify whether it is the bottom (-1) or the top (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.

**Bc\_imp\_discharge::~~Bc\_imp\_discharge ( ) [virtual]**

Destructor.

Definition at line 255 of file bc\_imp\_discharge.cpp.

**5.1.3 Member Function Documentation**

**void Bc\_imp\_discharge::calcul ( SCALAR *hin*, SCALAR *unorm\_in*, SCALAR *utan\_in*, SCALAR *hfix*, SCALAR *qfix*, SCALAR *hin\_oppbound*, SCALAR *unorm\_in\_oppbound*, SCALAR *utan\_in\_oppbound*, SCALAR *time*, int *n1*, int *n2* ) [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>unorm_in</i>	normal velocity of the first cell inside the domain.
in	<i>utan_in</i>	tangential 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>unorm_in_↔ oppbound</i>	value of the normal velocity of the first cell inside the domain at the opposite bound (unused).
in	<i>utan_in_↔ oppbound</i>	value of the tangential velocity of the first cell inside the domain at the opposite bound (unused).
in	<i>time</i>	current time (unused).
in	<i>n1</i>	integer to specify whether it is the left (-1) or the right (1) boundary.
in	<i>n2</i>	integer to specify whether it is the bottom (-1) or the top (1) boundary.

**Warning**

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

**Modifies**

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

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

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

Implements [Boundary\\_condition](#).

Definition at line 190 of file bc\_imp\_discharge.cpp.

**SCALAR Bc\_imp\_discharge::getValueofDerivativeOfPolynomial ( const SCALAR *HIN*, const SCALAR *UNORM\_IN*, const SCALAR *UTAN\_IN*, const SCALAR *H*, int *n1*, int *n2* ) const**

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

Computes  $3\sqrt{gH} - (n1 + n2)(UNORM\_IN + 2(n1 + n2)\sqrt{gHIN})$  where *n1*, *n2* are the normals.

**Parameters**

in	<i>HIN</i>	water height of the first cell inside the domain.
in	<i>UNORM_IN</i>	normal velocity of the first cell inside the domain.
in	<i>UTAN_IN</i>	tangential velocity of the first cell inside the domain (unused).
in	<i>H</i>	value for the variable of the polynomial function.
in	<i>n1</i>	integer to specify whether it is the left (-1) or the right (1) boundary.
in	<i>n2</i>	integer to specify whether it is the bottom (-1) or the top (1) boundary.

**Returns**

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

Definition at line 132 of file bc\_imp\_discharge.cpp.

**SCALAR Bc\_imp\_discharge::getValueOfPolynomial ( const SCALAR *HIN*, const SCALAR *UNORM\_IN*, const SCALAR *UTAN\_IN*, const SCALAR *QFIX*, const SCALAR *H*, int *n1*, int *n2* ) const**

Gives the value of the function that must vanish.

Computes  $2H\sqrt{gH} - (n1 + n2)(UNORM\_IN + 2(n1 + n2)\sqrt{gHIN})H - |QFIX|$  where *n1*, *n2* are the normals.

**Parameters**

in	<i>HIN</i>	water height of the first cell inside the domain.
in	<i>UNORM_IN</i>	normal velocity of the first cell inside the domain.
in	<i>UTAN_IN</i>	tangential velocity of the first cell inside the domain (unused).
in	<i>QFIX</i>	fixed (imposed) value of the discharge.
in	<i>H</i>	value for the variable of the polynomial function.
in	<i>n1</i>	integer to specify whether it is the left (-1) or the right (1) boundary.
in	<i>n2</i>	integer to specify whether it is the bottom (-1) or the top (1) boundary.

**Returns**

The value of the polynomial function.

Definition at line 112 of file bc\_imp\_discharge.cpp.

**SCALAR Bc\_imp\_discharge::newtonSolver ( const SCALAR *HIN*, const SCALAR *UNORM\_IN*, const SCALAR *UTAN\_IN*, const SCALAR *QFIX*, const SCALAR *H\_INIT*, int *n1*, int *n2* ) 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>UNORM_IN</i>	normal velocity of the first cell inside the domain.
in	<i>UTAN_IN</i>	tangential velocity of the first cell inside the domain.
in	<i>QFIX</i>	fixed (imposed) value of the discharge.
in	<i>H_INIT</i>	initialization of the Newton solver.
in	<i>n1</i>	integer to specify whether it is the left (-1) or the right (1) boundary.

<code>in</code>	<code>n2</code>	integer to specify whether it is the bottom (-1) or the top (1) boundary.
-----------------	-----------------	---

### Warning

Warning: Newton bc did not converge.

### Returns

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

Definition at line 151 of file `bc_imp_discharge.cpp`.

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

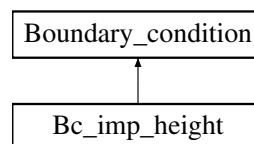
- Headers/libboundaryconditions/[bc\\_imp\\_discharge.hpp](#)
- Sources/libboundaryconditions/[bc\\_imp\\_discharge.cpp](#)

## 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](#) &, [TAB](#) &, int, int)  
*Constructor.*
- void [calcul](#) ([SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), int, 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

**`Bc_imp_height::Bc_imp_height ( Parameters & par, TAB & z, int n1, int n2 )`**

Constructor.

**Parameters**

in	<i>par</i>	parameter, contains all the values from the parameters file (unused).
in	<i>n1</i>	integer to specify whether it is the left (-1) or the right (1) boundary.
in	<i>n2</i>	integer to specify whether it is the bottom (-1) or the top (1) boundary.
in, out	<i>z</i>	vector that represents the topography with suitable values on the fictive cells.

Definition at line 64 of file `bc_imp_height.cpp`.

**Bc\_imp\_height::~Bc\_imp\_height ( ) [virtual]**

Destructor.

Definition at line 179 of file `bc_imp_height.cpp`.

**5.2.3 Member Function Documentation**

**void Bc\_imp\_height::calcul ( SCALAR *hin*, SCALAR *unorm\_in*, SCALAR *utan\_in*, SCALAR *hfix*, SCALAR *qfix*, SCALAR *hin\_oppbound*, SCALAR *unorm\_in\_oppbound*, SCALAR *utan\_in\_oppbound*, SCALAR *time*, int *n1*, int *n2* ) [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>unorm_in</i>	normal velocity of the first cell inside the domain.
in	<i>utan_in</i>	tangential 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>unorm_in</i> ↔ <i>oppbound</i>	value of the normal velocity of the first cell inside the domain at the opposite bound (unused).
in	<i>utan_in</i> ↔ <i>oppbound</i>	value of the tangential velocity of the first cell inside the domain at the opposite bound (unused).
in	<i>time</i>	current time (unused).
in	<i>n1</i>	integer to specify whether it is the left (-1) or the right (1) boundary.
in	<i>n2</i>	integer to specify whether it is the bottom (-1) or the top (1) boundary.

**Modifies**

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

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

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

Implements [Boundary\\_condition](#).

Definition at line 111 of file `bc_imp_height.cpp`.

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

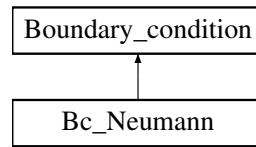
- Headers/libboundaryconditions/[bc\\_imp\\_height.hpp](#)
- Sources/libboundaryconditions/[bc\\_imp\\_height.cpp](#)

**5.3 Bc\_Neumann Class Reference**

Neumann condition.

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

Inheritance diagram for Bc\_Neumann:



## Public Member Functions

- **Bc\_Neumann** (**Parameters** &, **TAB** &, int, int)  
*Constructor.*
- void **calcul** (**SCALAR**, **SCALAR**, **SCALAR**, **SCALAR**, **SCALAR**, **SCALAR**, **SCALAR**, **SCALAR**, **SCALAR**, **SCALAR**, int, 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 73 of file bc\_neumann.hpp.

### 5.3.2 Constructor & Destructor Documentation

**Bc\_Neumann::Bc\_Neumann** ( **Parameters** & *par*, **TAB** & *z*, int *n1*, int *n2* )

Constructor.

**Parameters**

in	<i>par</i>	parameter, contains all the values from the parameters file (unused).
in	<i>n1</i>	integer to specify whether it is the left (-1) or the right (1) boundary.
in	<i>n2</i>	integer to specify whether it is the bottom (-1) or the top (1) boundary.
in, out	<i>z</i>	vector that represents the topography with suitable values on the fictive cells.

Definition at line 61 of file bc\_neumann.cpp.

**Bc\_Neumann::~~Bc\_Neumann** ( ) [**virtual**]

Destructor.

Definition at line 141 of file bc\_neumann.cpp.

### 5.3.3 Member Function Documentation

**void Bc\_Neumann::calcul** ( **SCALAR** *hin*, **SCALAR** *unorm\_in*, **SCALAR** *utan\_in*, **SCALAR** *hfix*, **SCALAR** *qfix*, **SCALAR** *hin\_oppbound*, **SCALAR** *unorm\_in\_oppbound*, **SCALAR** *utan\_in\_oppbound*, **SCALAR** *time*, int *n1*, int *n2* ) [**virtual**]

Calculates the boundary condition.

**Parameters**

in	<i>hin</i>	water height of the first cell inside the domain.
in	<i>unorm_in</i>	normal velocity of the first cell inside the domain.
in	<i>utan_in</i>	tangential 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>unorm_in_↔ oppbound</i>	value of the normal velocity of the first cell inside the domain at the opposite bound (unused).
in	<i>utan_in_↔ oppbound</i>	value of the tangential velocity of the first cell inside the domain at the opposite bound (unused).
in	<i>time</i>	current time (unused).
in	<i>n1</i>	integer to specify whether it is the left (-1) or the right (1) boundary (unused).
in	<i>n2</i>	integer to specify whether it is the bottom (-1) or the top (1) boundary (unused).

**Modifies**

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

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

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

Implements [Boundary\\_condition](#).

Definition at line 106 of file `bc_neumann.cpp`.

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

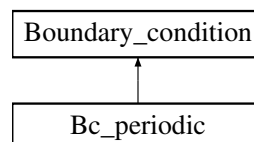
- `Headers/libboundaryconditions/bc_neumann.hpp`
- `Sources/libboundaryconditions/bc_neumann.cpp`

**5.4 Bc\_periodic Class Reference**

Periodic condition.

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

Inheritance diagram for `Bc_periodic`:

**Public Member Functions**

- [Bc\\_periodic](#) ([Parameters](#) &, [TAB](#) &, int, int)

*Constructor.*

- void [calcul](#) ([SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), int, 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 74 of file bc\_periodic.hpp.

### 5.4.2 Constructor & Destructor Documentation

**Bc\_periodic::Bc\_periodic ( Parameters & *par*, TAB & *z*, int *n1*, int *n2* )**

Constructor.

Parameters

in	<i>par</i>	parameter, contains all the values from the parameters file (unused).
in	<i>n1</i>	integer to specify whether it is the left (-1) or the right (1) boundary.
in	<i>n2</i>	integer to specify whether it is the bottom (-1) or the top (1) boundary.
in, out	<i>z</i>	vector that represents the topography with suitable values on the fictive cells.

Definition at line 61 of file bc\_periodic.cpp.

**Bc\_periodic::~~Bc\_periodic ( ) [virtual]**

Destructor.

Definition at line 144 of file bc\_periodic.cpp.

### 5.4.3 Member Function Documentation

**void Bc\_periodic::calcul ( SCALAR *hin*, SCALAR *unorm\_in*, SCALAR *utan\_in*, SCALAR *hfix*, SCALAR *qfix*, SCALAR *hin\_oppbound*, SCALAR *unorm\_in\_oppbound*, SCALAR *utan\_in\_oppbound*, SCALAR *time*, int *n1*, int *n2* ) [virtual]**

Calculates boundary condition.

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

Parameters

in	<i>hin</i>	water height of the first cell inside the domain (unused).
in	<i>unorm_in</i>	normal velocity of the first cell inside the domain (unused).
in	<i>utan_in</i>	tangential velocity of the first cell inside the domain (unused).
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.
in	<i>unorm_in</i> ↔ <i>oppbound</i>	value of the normal velocity of the first cell inside the domain at the opposite bound.
in	<i>utan_in</i> ↔ <i>oppbound</i>	value of the tangential velocity of the first cell inside the domain at the opposite bound.
in	<i>time</i>	current time (unused).
in	<i>n1</i>	integer to specify whether it is the left (-1) or the right (1) boundary (unused).
in	<i>n2</i>	integer to specify whether it is the bottom (-1) or the top (1) boundary (unused).

Modifies

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

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

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

Implements [Boundary\\_condition](#).

Definition at line 108 of file `bc_periodic.cpp`.

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

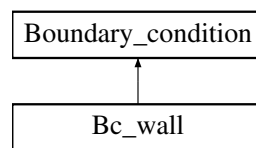
- Headers/libboundaryconditions/[bc\\_periodic.hpp](#)
- Sources/libboundaryconditions/[bc\\_periodic.cpp](#)

## 5.5 Bc\_wall Class Reference

Wall condition.

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

Inheritance diagram for `Bc_wall`:



### Public Member Functions

- [Bc\\_wall](#) ([Parameters](#) &, [TAB](#) &, int, int)  
*Constructor.*
- void [calcul](#) ([SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), int, 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

**`Bc_wall::Bc_wall ( Parameters & par, TAB & z, int n1, int n2 )`**

Constructor.

Parameters

<code>in</code>	<code>par</code>	parameter, contains all the values from the parameters file (unused).
<code>in</code>	<code>n1</code>	integer to specify whether it is the left (-1) or the right (1) boundary.
<code>in</code>	<code>n2</code>	integer to specify whether it is the bottom (-1) or the top (1) boundary.

<code>in, out</code>	<code>z</code>	vector that represents the topography with suitable values on the fictive cells.
----------------------	----------------	--

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

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

Destructor.

Definition at line 141 of file `bc_wall.cpp`.

### 5.5.3 Member Function Documentation

**void Bc\_wall::calcul ( SCALAR *hin*, SCALAR *unorm\_in*, SCALAR *utan\_in*, SCALAR *hfix*, SCALAR *qfix*, SCALAR *hin\_oppbound*, SCALAR *unorm\_in\_oppbound*, SCALAR *utan\_in\_oppbound*, SCALAR *time*, int *n1*, int *n2* ) [virtual]**

Calculates the boundary condition.

Parameters

<code>in</code>	<code>hin</code>	water height of the first cell inside the domain.
<code>in</code>	<code>unorm_in</code>	normal velocity of the first cell inside the domain.
<code>in</code>	<code>utan_in</code>	tangential velocity of the first cell inside the domain.
<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 (unused).
<code>in</code>	<code>unorm_in_↔ oppbound</code>	value of the normal velocity of the first cell inside the domain at the opposite bound (unused).
<code>in</code>	<code>utan_in_↔ oppbound</code>	value of the tangential velocity of the first cell inside the domain at the opposite bound (unused).
<code>in</code>	<code>time</code>	current time (unused).
<code>in</code>	<code>n1</code>	integer to specify whether it is the left (-1) or the right (1) boundary (unused).
<code>in</code>	<code>n2</code>	integer to specify whether it is the bottom (-1) or the top (1) boundary (unused).

Modifies

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

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

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

Implements [Boundary\\_condition](#).

Definition at line 106 of file `bc_wall.cpp`.

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

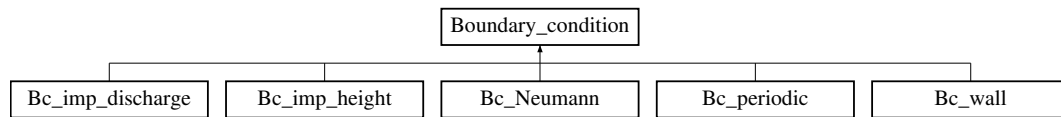
- Headers/libboundaryconditions/[bc\\_wall.hpp](#)
- Sources/libboundaryconditions/[bc\\_wall.cpp](#)

## 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 [calcul](#) ([SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), int, int)=0  
*Function to be specified in each boundary condition.*
- [SCALAR get\\_hbound](#) () const  
*Gives the water height on the fictive cell.*
- [SCALAR get\\_unormbound](#) () const  
*Gives the normal velocity of the flow on the fictive cell.*
- [SCALAR get\\_utanbound](#) () const  
*Gives the tangential velocity of the flow on the fictive cell.*
- virtual [~Boundary\\_condition](#) ()  
*Destructor.*

## Protected Attributes

- const int [NXCELL](#)
- const int [NYCELL](#)
- [SCALAR hbound](#)
- [SCALAR unormbound](#)
- [SCALAR utanbound](#)
- [SCALAR unormfix](#)
- map< int, int > [Choice\\_Lbound](#)
- map< int, int > [Choice\\_Rbound](#)
- map< int, int > [Choice\\_Bbound](#)
- map< int, int > [Choice\\_Tbound](#)

### 5.6.1 Detailed Description

Boundary condition.

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

**Todo** Add time and space dependency in the boundary conditions.

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 74 of file boundary\_condition.hpp.

### 5.6.2 Constructor & Destructor Documentation

**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 60 of file boundary\_condition.cpp.

**Boundary\_condition::~Boundary\_condition ( ) [virtual]**

Destructor.

Definition at line 106 of file boundary\_condition.cpp.

**5.6.3 Member Function Documentation**

**virtual void Boundary\_condition::calcul ( SCALAR , SCALAR , SCALAR , SCALAR , SCALAR , SCALAR , SCALAR , SCALAR , SCALAR , SCALAR , int , int ) [pure virtual]**

Function to be specified in each boundary condition.

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

**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 75 of file boundary\_condition.cpp.

**SCALAR Boundary\_condition::get\_unormbound ( ) const**

Gives the normal velocity of the flow on the fictive cell.

Returns

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

Definition at line 85 of file boundary\_condition.cpp.

**SCALAR Boundary\_condition::get\_utanbound ( ) const**

Gives the tangential velocity of the flow on the fictive cell.

Returns

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

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

**5.6.4 Member Data Documentation**

**map<int,int> Boundary\_condition::Choice\_Bbound [protected]**

Definition at line 112 of file boundary\_condition.hpp.

**map<int,int> Boundary\_condition::Choice\_Lbound [protected]**

Definition at line 110 of file boundary\_condition.hpp.

**map<int,int> Boundary\_condition::Choice\_Rbound [protected]**

Definition at line 111 of file boundary\_condition.hpp.

**map<int,int> Boundary\_condition::Choice\_Tbound [protected]**

Definition at line 113 of file boundary\_condition.hpp.

**SCALAR Boundary\_condition::hbound [protected]**

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

Definition at line 102 of file boundary\_condition.hpp.

**const int Boundary\_condition::NXCELL [protected]**

Number of cells (in space) in the x direction.

Definition at line 98 of file boundary\_condition.hpp.

**const int Boundary\_condition::NYCELL [protected]**

Number of cells (in space) in the y direction.

Definition at line 100 of file boundary\_condition.hpp.

**SCALAR Boundary\_condition::unormbound [protected]**

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

Definition at line 104 of file boundary\_condition.hpp.

**SCALAR Boundary\_condition::unormfix [protected]**

Imposed value of the velocity from [Parameters::left\\_imp\\_discharge](#) (or [Parameters::right\\_imp\\_discharge](#), [Parameters::bottom\\_imp\\_discharge](#), [Parameters::top\\_imp\\_discharge](#)) and [Parameters::left\\_imp\\_h](#) (or [Parameters::right\\_imp\\_h](#), [Parameters::bottom\\_imp\\_h](#), [Parameters::top\\_imp\\_h](#)).

Definition at line 108 of file boundary\_condition.hpp.

**SCALAR Boundary\_condition::utanbound [protected]**

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

Definition at line 106 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** (map< int, int > &, **Parameters** &, **TAB** &, int, int)  
*Constructor.*
- void **calcul** (**SCALAR**, **SCALAR**, **SCALAR**, **SCALAR**, **SCALAR**, **SCALAR**, **SCALAR**, **SCALAR**, **SCALAR**, **SCALAR**, int, int)  
*Calculates the boundary condition.*
- **SCALAR** **get\_hbound** ()  
*Gives the water height on the fictive cell.*
- **SCALAR** **get\_unormbound** ()  
*Gives the normal velocity of the flow on the fictive cell.*
- **SCALAR** **get\_utanbound** ()  
*Gives the tangential velocity of the flow on the fictive cell.*
- virtual **~Choice\_condition** ()  
*Destructor.*
- void **setXY** (const int, const int)  
*set index (i,j) of mesh to compute boundary condition*
- void **setChoice** (map< int, int > &)  
*set the type of boundary condition*

### 5.7.1 Detailed Description

Choice of boundary condition.

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

Definition at line 94 of file choice\_condition.hpp.

### 5.7.2 Constructor & Destructor Documentation

**Choice\_condition::Choice\_condition** ( map< int, int > & *choice*, **Parameters** & *par*, **TAB** & *z*, int *n1*, int *n2* )

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>	array that represents the topography.
in	<i>n1</i>	integer to specify whether it is the left (-1) or the right (1) boundary.
in	<i>n2</i>	integer to specify whether it is the bottom (-1) or the top (1) boundary.

Definition at line 61 of file choice\_condition.cpp.

**Choice\_condition::~Choice\_condition** ( ) [**virtual**]

Destructor.

Definition at line 241 of file choice\_condition.cpp.

### 5.7.3 Member Function Documentation

**void Choice\_condition::calcul** ( **SCALAR** *hin*, **SCALAR** *unorm\_in*, **SCALAR** *utan\_in*, **SCALAR** *hfix*, **SCALAR** *qfix*, **SCALAR** *hin\_oppbound*, **SCALAR** *unorm\_in\_oppbound*, **SCALAR** *utan\_in\_oppbound*, **SCALAR** *time*, int *n1*, int *n2* )

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>unorm_in</i>	normal velocity of the first cell inside the domain.
in	<i>utan_in</i>	tangential 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>unorm_in_↔ oppbound</i>	value of the normal velocity of the first cell inside the domain at the opposite bound.
in	<i>utan_in_↔ oppbound</i>	value of the tangential velocity of the first cell inside the domain at the opposite bound.
in	<i>time</i>	current time.
in	<i>n1</i>	integer to specify whether it is the left (-1) or the right (1) boundary.
in	<i>n2</i>	integer to specify whether it is the bottom (-1) or the top (1) boundary.

Definition at line 85 of file choice\_condition.cpp.

**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 165 of file choice\_condition.cpp.

**SCALAR Choice\_condition::get\_unormbound ( )**

Gives the normal velocity of the flow on the fictive cell.

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

Returns

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

Definition at line 176 of file choice\_condition.cpp.

**SCALAR Choice\_condition::get\_utanbound ( )**

Gives the tangential velocity of the flow on the fictive cell.

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

Returns

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

Definition at line 190 of file choice\_condition.cpp.

**void Choice\_condition::setChoice ( map< int, int > & vChoice\_bound )**

set the type of boundary condition

Calls the function to define the container containing the set of choices

**Parameters**

<code>in, out</code>	<i>container</i>	containing the choice of boundary conditions
----------------------	------------------	--

**Returns**

none.

Definition at line 229 of file `choice_condition.cpp`.

**void Choice\_condition::setXY ( const int *i*, const int *j* )**

set index (*i*,*j*) of mesh to compute boundary condition

Calls the function to define the point indices where the boundary condition is evaluated

**Parameters**

<code>in</code>	<i>index</i>	of the point in the x direction
<code>in</code>	<i>index</i>	of the point in the y direction

**Warning**

\*\*\*: ERROR: the indexes *i* and *j* are too big/small.

**Returns**

none.

Definition at line 202 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 [calcul](#) (SCALAR, SCALAR, 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\\_f3](#) ()  
*Gives the third 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 93 of file choice\_flux.hpp.

### 5.8.2 Constructor & Destructor Documentation

#### 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 61 of file choice\_flux.cpp.

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

Destructor.

Definition at line 161 of file choice\_flux.cpp.

### 5.8.3 Member Function Documentation

#### void Choice\_flux::calcul ( SCALAR *h\_L*, SCALAR *u\_L*, SCALAR *v\_L*, SCALAR *h\_R*, SCALAR *u\_R*, SCALAR *v\_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 (in the x direction) at the left of the interface where the flux is calculated.
in	<i>v_L</i>	velocity (in the y direction) 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 (in the x direction) at the right of the interface where the flux is calculated.
in	<i>v_R</i>	velocity (in the y direction) at the right of the interface where the flux is calculated.

Definition at line 90 of file choice\_flux.cpp.

#### 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 150 of file choice\_flux.cpp.

**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 117 of file choice\_flux.cpp.

**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 128 of file choice\_flux.cpp.

**SCALAR Choice\_flux::get\_f3 ( )**

Gives the third component of the numerical flux.

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

Returns

[Flux::f3](#) third component of the numerical flux.

Definition at line 139 of file choice\_flux.cpp.

**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

<a href="#">in</a>	<a href="#">tx</a>	value of dt/dx.
--------------------	--------------------	-----------------

Definition at line 106 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](#) ([Parameters](#) &)  
*Constructor.*
- void [calcul](#) (const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, [SCALAR](#))  
*Calculates the friction term.*
- [TAB get\\_q1mod](#) ()

*Gives the discharge in the first direction modified by the friction term.*

- `TAB get_q2mod ()`

*Gives the discharge in the second direction modified by the friction term.*

- `void calculSf (const TAB &, const TAB &, const TAB &)`

*Calculates the explicit friction term. It will be used for computations with erosion.*

- `TAB get_Sf1 ()`

*Gives the explicit friction term in the first direction.*

- `TAB get_Sf2 ()`

*Gives the explicit friction term in the second direction.*

- `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 89 of file choice\_friction.hpp.

### 5.9.2 Constructor & Destructor Documentation

#### **Choice\_friction::Choice\_friction ( 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 60 of file choice\_friction.cpp.

#### **Choice\_friction::~~Choice\_friction ( ) [virtual]**

Destructor.

Definition at line 161 of file choice\_friction.cpp.

### 5.9.3 Member Function Documentation

#### **void Choice\_friction::calcul ( const TAB & uold, const TAB & vold, const TAB & hnew, const TAB & q1new, const TAB & q2new, SCALAR dt )**

Calculates the friction term.

Calls the calculation of the friction law.

**Parameters**

<code>in</code>	<code>uold</code>	velocity in the first direction at the previous time ( $n$ if you are calculating the $n + 1$ th time step).
<code>in</code>	<code>vold</code>	velocity in the second direction at the previous time ( $n$ if you are calculating the $n + 1$ th time step).
<code>in</code>	<code>hnew</code>	water height after the Shallow-Water computation (without friction).
<code>in</code>	<code>q1new</code>	discharge in the first direction after the Shallow-Water computation (without friction).

<i>in</i>	<i>q2new</i>	discharge in the second direction after the Shallow-Water computation (without friction).
<i>in</i>	<i>dt</i>	time step.

**Note**

The friction only affects the discharge.

Definition at line 85 of file `choice_friction.cpp`.

**void Choice\_friction::calculSf ( const TAB & *h*, const TAB & *u*, const TAB & *v* )**

Calculates the explicit friction term. It will be used for computations with erosion.

Calls the calculation of the explicit friction law.

**Parameters**

<i>in</i>	<i>h</i>	water height.
<i>in</i>	<i>u</i>	velocity in the first direction.
<i>in</i>	<i>v</i>	velocity in the second direction.

**Note**

This term will be used to compute erosion.

Definition at line 125 of file `choice_friction.cpp`.

**TAB Choice\_friction::get\_q1mod ( )**

Gives the discharge in the first direction modified by the friction term.

Calls the function to get the discharge in the first direction modified by the friction term.

**Returns**

[Friction::q1mod](#) discharge in the first direction modified by the friction term.

Definition at line 102 of file `choice_friction.cpp`.

**TAB Choice\_friction::get\_q2mod ( )**

Gives the discharge in the second direction modified by the friction term.

Calls the function to get the discharge in the second direction modified by the friction term.

**Returns**

[Friction::q2mod](#) discharge in the second direction modified by the friction term.

Definition at line 113 of file `choice_friction.cpp`.

**TAB Choice\_friction::get\_Sf1 ( )**

Gives the explicit friction term in the first direction.

Calls the function to get the explicit friction term in the first direction.

**Returns**

[Friction::Sf1](#) explicit friction term in the first direction.

Definition at line 139 of file `choice_friction.cpp`.

**TAB Choice\_friction::get\_Sf2 ( )**

Gives the explicit friction term in the second direction.

Calls the function to get the explicit friction term in the second direction.

Returns

[Friction::Sf2](#) explicit friction term in the second direction.

Definition at line 150 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 [calcul](#) (const [TAB](#) &, const [TAB](#) &, const [SCALAR](#))  
*Performs the computation of the modified water height and the infiltrated volume.*
- virtual [~Choice\\_infiltration](#) ()  
*Destructor.*
- [TAB get\\_hmod](#) ()  
*Gives the value of the modified water height.*
- [TAB 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 82 of file choice\_infiltration.hpp.

**5.10.2 Constructor & Destructor Documentation****Choice\_infiltration::Choice\_infiltration ( [Parameters](#) & *par* )**

Constructor.

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

**Parameters**

<a href="#">in</a>	<a href="#">par</a>	parameter, contains all the values from the parameters file.
--------------------	---------------------	--

Definition at line 61 of file choice\_infiltration.cpp.

**Choice\_infiltration::~~Choice\_infiltration ( ) [[virtual](#)]**

Destructor.

Definition at line 112 of file choice\_infiltration.cpp.

### 5.10.3 Member Function Documentation

**void Choice\_infiltration::calcul ( const TAB & *h*, const TAB & *Vin*, const SCALAR *dt* )**

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

Calls the computation of infiltration.

**Parameters**

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

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

**TAB Choice\_infiltration::get\_hmod ( )**

Gives the value of the modified water height.

**Returns**

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

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

**TAB Choice\_infiltration::get\_Vin ( )**

Gives the value of the infiltrated volume.

**Returns**

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

Definition at line 102 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\_huv Class Reference

Choice of initialization for h and U=(u,v)

```
#include <choice_init_huv.hpp>
```

### Public Member Functions

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

#### 5.11.1 Detailed Description

Choice of initialization for h and U=(u,v)

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

Definition at line 93 of file choice\_init\_huv.hpp.



### 5.11.2 Constructor & Destructor Documentation

#### Choice\_init\_huv::Choice\_init\_huv ( Parameters & *par* )

Constructor.

Defines the initialization of the water height and of the velocity 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 60 of file choice\_init\_huv.cpp.

#### Choice\_init\_huv::~~Choice\_init\_huv ( ) [virtual]

Destructor.

Definition at line 101 of file choice\_init\_huv.cpp.

### 5.11.3 Member Function Documentation

#### void Choice\_init\_huv::initialization ( TAB & *h*, TAB & *u*, TAB & *v* )

Performs the initialization.

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

Parameters

<i>in</i>	<i>h</i>	water height.
<i>in</i>	<i>u</i>	first component of the velocity.
<i>in</i>	<i>v</i>	second component of the velocity.

Definition at line 88 of file choice\_init\_huv.cpp.

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

- Headers/libinitializations/[choice\\_init\\_huv.hpp](#)
- Sources/libinitializations/[choice\\_init\\_huv.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](#) (TAB &)

*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 84 of file choice\_init\_topo.hpp.

### 5.12.2 Constructor & Destructor Documentation

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

Constructor.

Defines the initialization of the topography 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 60 of file choice\_init\_topo.cpp.

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

Destructor.

Definition at line 93 of file choice\_init\_topo.cpp.

### 5.12.3 Member Function Documentation

#### void Choice\_init\_topo::initialization ( TAB & *topo* )

Performs the initialization.

Calls the initialization of the topography.

Parameters

<i>in</i>	<i>topo</i>	topography.
-----------	-------------	-------------

Definition at line 82 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 [calcul](#) (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 84 of file choice\_limiter.hpp.

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

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

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

```
Choice_limiter::~Choice_limiter ( ) [virtual]
```

Definition at line 104 of file choice\_limiter.cpp.

```
void Choice_limiter::calcul ( SCALAR a, SCALAR b )
```

Calls the calculation of the slope limiter.

in	$a$	slope on the left of the cell.
in	$b$	slope on the right of the cell.

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

**SCALAR Choice\_limiter::get\_rec ( ) const**

Calls the function to get the reconstructed value.

**Limiter::rec** reconstructed value for the chosen slope limiter.

Definition at line 93 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

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

## Public Member Functions

- Choice\_output (Parameters &)  
    *Constructor.*
- void write (const TAB &, const TAB &, const TAB &, const TAB &, const SCALAR &)  
    *Save the current time.*
- void check\_vol (const SCALAR &, const SCALAR &, const SCALAR &, const SCALAR &, const SCALAR  
    &, const SCALAR &) const

*Saves the infiltrated and rain volumes.*

- void **result** (const **SCALAR** &, const clock\_t &, const **SCALAR** &, const **SCALAR** &, const **SCALAR** &, const **SCALAR** &, const int &, const **SCALAR** &) const

*Saves global values.*

- void **initial** (const **TAB** &, const **TAB** &, const **TAB** &, const **TAB** &) const

*Saves the initial time.*

- void **final** (const **TAB** &, const **TAB** &, const **TAB** &, const **TAB** &) const

*Saves the final time.*

- **SCALAR boundaries\_flux** (const **SCALAR** &, const **TAB** &, const **TAB** &, const **SCALAR** &, const **SCALAR** &, const int &, const int &) const

*Saves the cumulated fluxes on the boundaries.*

- void **boundaries\_flux\_LR** (const **SCALAR** &, const **TAB** &) const

*Saves the fluxes on the left and right boundaries.*

- void **boundaries\_flux\_BT** (const **SCALAR** &, const **TAB** &) const

*Saves the fluxes on the bottom and top boundaries.*

- 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 84 of file choice\_output.hpp.

### 5.14.2 Constructor & Destructor Documentation

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

Constructor.

Defines the output format 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\_output.cpp.

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

Destructor.

Definition at line 202 of file choice\_output.cpp.

### 5.14.3 Member Function Documentation

**SCALAR Choice\_output::boundaries\_flux** ( const **SCALAR** & *time*, const **TAB** & *flux\_u*, const **TAB** & *flux\_v*, const **SCALAR** & *dt*, const **SCALAR** & *dt\_first*, const int & *ORDER*, const int & *verif* ) const

Saves the cumulated fluxes on the boundaries.

Calls the saving of the cumulative flux on the boundaries.

Parameters

in	<i>time</i>	current time.
in	<i>flux_u</i>	flux on the left and right boundaries ( $m^2/s$ ).
in	<i>flux_v</i>	flux on the bottom and top boundaries ( $m^2/s$ ).
in	<i>dt</i>	current time step.
in	<i>dt_first</i>	previous time step.
in	<i>ORDER</i>	order of scheme.
in	<i>verif</i>	parameter to know if we removed the computation with the previous time step ( <i>dt_first</i> ).

Definition at line 161 of file choice\_output.cpp.

**void Choice\_output::boundaries\_flux\_BT ( const SCALAR & *time*, const TAB & *BT\_flux* ) const**

Saves the fluxes on the bottom and top boundaries.

Calls the saving of the fluxes on the top and bottom boundaries.

**Parameters**

in	<i>time</i>	current time.
in	<i>BT_flux</i>	flux on the bottom and tom boundaries ( $m^2/s$ ).

Definition at line 190 of file choice\_output.cpp.

**void Choice\_output::boundaries\_flux\_LR ( const SCALAR & *time*, const TAB & *LR\_flux* ) const**

Saves the fluxes on the left and right boundaries.

Calls the saving of the fluxes on the left and right boundaries.

**Parameters**

in	<i>time</i>	current time.
in	<i>LR_flux</i>	flux on the left and right boundaries ( $m^2/s$ ).

Definition at line 178 of file choice\_output.cpp.

**void Choice\_output::check\_vol ( const SCALAR & *time*, const SCALAR & *dt*, const SCALAR & *Vol\_rain\_tot*, const SCALAR & *Vol\_inf*, const SCALAR & *Vol\_of*, const SCALAR & *Vol\_bound\_tot* ) const**

Saves the infiltrated and rain volumes.

Calls the saving of the infiltrated and rain volumes.

**Parameters**

in	<i>time</i>	current time.
in	<i>dt</i>	time step.
in	<i>Vol_rain_tot</i>	total rain volume.
in	<i>Vol_inf</i>	volume of infiltrated water.
in	<i>Vol_of</i>	volume of overland flow.
in	<i>Vol_bound_tot</i>	total volume of water at the boundary.

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

**void Choice\_output::final ( const TAB & *z*, const TAB & *h*, const TAB & *u*, const TAB & *v* ) const**

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>u</i>	first component of the velocity.
in	<i>v</i>	second component of the velocity.

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

**void Choice\_output::initial ( const TAB & *z*, const TAB & *h*, const TAB & *u*, const TAB & *v* ) const**

Saves the initial time.

Calls the saving of the initial time.

**Parameters**

in	<i>z</i>	topography.
in	<i>h</i>	water height.
in	<i>u</i>	first component of the velocity.
in	<i>v</i>	second component of the velocity.

Definition at line 131 of file choice\_output.cpp.

**void Choice\_output::result ( const SCALAR & *time*, const clock\_t & *cpu*, const SCALAR & *Vol\_rain*, const SCALAR & *Vol\_inf*, const SCALAR & *Vol\_of*, const SCALAR & *FROUDE*, const int & *NBITER*, const SCALAR & *vol\_output* ) const**

Saves global values.

Calls the saving of the global values.

**Parameters**

in	<i>time</i>	elapsed time.
in	<i>cpu</i>	CPU time.
in	<i>Vol_rain</i>	total rain volume.
in	<i>Vol_inf</i>	total volume of infiltrated water.
in	<i>Vol_of</i>	total volume of overland flow.
in	<i>FROUDE</i>	mean Froude number (in space) at the final time.
in	<i>NBITER</i>	number of time steps.
in	<i>vol_output</i>	total outflow volume at the boundary.

Definition at line 113 of file choice\_output.cpp.

**void Choice\_output::write ( const TAB & *h*, const TAB & *u*, const TAB & *v*, const TAB & *z*, const SCALAR & *time* )**

Saves the current time.

Calls the saving of the current time.

**Parameters**

in	<i>h</i>	water height.
in	<i>u</i>	first component of the velocity.
in	<i>v</i>	second component of the velocity.
in	<i>z</i>	topography.
in	<i>time</i>	value of the current time.

Definition at line 82 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](#), [TAB](#) &)  
*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 84 of file choice\_rain.hpp.

### 5.15.2 Constructor & Destructor Documentation

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

Constructor.

Defines the initialization of the rain 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\_rain.cpp.

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

Destructor.

Definition at line 94 of file choice\_rain.cpp.

### 5.15.3 Member Function Documentation

#### void Choice\_rain::rain\_func ( [SCALAR](#) *time*, [TAB](#) & *Tab\_rain* )

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

Calls the initialization of the rain.

**Parameters**

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

Definition at line 83 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](#) &, [TAB](#) &)  
*Constructor.*
- void [calcul](#) ([TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &)  
*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 86 of file `choice_reconstruction.hpp`.

### 5.16.2 Constructor & Destructor Documentation

#### **Choice\_reconstruction::Choice\_reconstruction ( [Parameters](#) & *par*, [TAB](#) & *z* )**

Constructor.

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

**Parameters**

<a href="#">in</a>	<a href="#">par</a>	parameter, contains all the values from the parameters file.
<a href="#">in</a>	<a href="#">z</a>	array that represents the topography.

Definition at line 60 of file `choice_reconstruction.cpp`.

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

Destructor.

Definition at line 112 of file `choice_reconstruction.cpp`.

### 5.16.3 Member Function Documentation

**void Choice\_reconstruction::calcul ( [TAB](#) & *h*, [TAB](#) & *u*, [TAB](#) & *v*, [TAB](#) & *z*, [TAB](#) & *delzc1*, [TAB](#) & *delzc2*, [TAB](#) & *delz1*, [TAB](#) & *delz2*, [TAB](#) & *h1r*, [TAB](#) & *u1r*, [TAB](#) & *v1r*, [TAB](#) & *h1l*, [TAB](#) & *u1l*, [TAB](#) & *v1l*, [TAB](#) & *h2r*, [TAB](#) & *u2r*, [TAB](#) & *v2r*, [TAB](#) & *h2l*, [TAB](#) & *u2l*, [TAB](#) & *v2l* )**

Calculates the second order reconstruction in space.

Calls the calculation of the second order reconstruction in space.

**Parameters**

<a href="#">in</a>	<a href="#">h</a>	water height.
<a href="#">in</a>	<a href="#">u</a>	velocity of the flow in the first direction.
<a href="#">in</a>	<a href="#">v</a>	velocity of the flow in the second direction.
<a href="#">in</a>	<a href="#">z</a>	topography.
<a href="#">out</a>	<a href="#">delzc1</a>	difference between the reconstructed topographies on the left and on the right boundary of a cell in the first direction.



out	<i>delzc2</i>	difference between the reconstructed topographies on the left and on the right boundary of a cell in the second direction.
out	<i>delz1</i>	difference between two reconstructed topographies on the same boundary (from two adjacent cells) in the first direction.
out	<i>delz2</i>	difference between two reconstructed topographies on the same boundary (from two adjacent cells) in the second direction.
out	<i>h1r</i>	reconstructed water height on the right of the cell in the first direction.
out	<i>u1r</i>	first component of the reconstructed velocity on the right of the cell in the first direction.
out	<i>v1r</i>	second component of the reconstructed velocity on the right of the cell in the first direction.
out	<i>h1l</i>	reconstructed water height on the left of the cell in the first direction.
out	<i>u1l</i>	first component of the reconstructed velocity on the left of the cell in the first direction.
out	<i>v1l</i>	second component of the reconstructed velocity on the left of the cell in the first direction.
out	<i>h2r</i>	reconstructed water height on the right of the cell in the second direction.
out	<i>u2r</i>	first component of the reconstructed velocity on the right of the cell in the second direction.
out	<i>v2r</i>	second component of the reconstructed velocity on the right of the cell in the second direction.
out	<i>h2l</i>	reconstructed water height on the left of the cell in the second direction.
out	<i>u2l</i>	first component of the reconstructed velocity on the left of the cell in the second direction.
out	<i>v2l</i>	second component of the reconstructed velocity on the left of the cell in the second direction.

Definition at line 82 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\_save\_specific\_points Class Reference

Choice of the output of the specific points.

```
#include <choice_save_specific_points.hpp>
```

### Public Member Functions

- [Choice\\_save\\_specific\\_points](#) (Parameters &)  
*Constructor.*
- void [save](#) (const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [SCALAR](#))  
*Save the current time.*
- virtual [~Choice\\_save\\_specific\\_points](#) ()  
*Destructor.*

### 5.17.1 Detailed Description

Choice of the output of the specific points.

From the value of the corresponding parameter, calls the savings of the corresponding specific points.

Definition at line 84 of file `choice_save_specific_points.hpp`.

### 5.17.2 Constructor & Destructor Documentation

#### Choice\_save\_specific\_points::Choice\_save\_specific\_points ( Parameters & *par* )

Constructor.

Defines the number (0,1,>1) of points to save 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\_save\_specific\_points.cpp.

#### Choice\_save\_specific\_points::~~Choice\_save\_specific\_points ( ) [virtual]

Destructor.

Definition at line 96 of file choice\_save\_specific\_points.cpp.

### 5.17.3 Member Function Documentation

#### void Choice\_save\_specific\_points::save ( const TAB & *h*, const TAB & *u*, const TAB & *v*, const SCALAR *time* )

Save the current time.

Calls the saving of the current time.

Parameters

<i>in</i>	<i>h</i>	water height.
<i>in</i>	<i>u</i>	first component of the velocity.
<i>in</i>	<i>v</i>	second component of the velocity.
<i>in</i>	<i>time</i>	value of the current time.

Definition at line 82 of file choice\_save\_specific\_points.cpp.

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

- Headers/libsave/[choice\\_save\\_specific\\_points.hpp](#)
- Sources/libsave/[choice\\_save\\_specific\\_points.cpp](#)

## 5.18 Choice\_scheme Class Reference

Choice of numerical scheme.

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

### Public Member Functions

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

*Constructor.*

- void [calcul](#) ()

*Performs the scheme.*

- virtual [~Choice\\_scheme](#) ()

*Destructor.*

### 5.18.1 Detailed Description

Choice of numerical scheme.

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

Definition at line 81 of file choice\_scheme.hpp.



## Additional Inherited Members

### 5.19.1 Detailed Description

ENO reconstruction

Class that computes ENO reconstruction in space.

Definition at line 72 of file eno.hpp.

### 5.19.2 Constructor & Destructor Documentation

#### ENO::ENO ( Parameters & *par*, TAB & *z* )

Constructor.

Initializations.

Parameters

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

Definition at line 59 of file eno.cpp.

#### ENO::~~ENO ( )

Destructor.

Definition at line 370 of file eno.cpp.

### 5.19.3 Member Function Documentation

**void ENO::calcul ( TAB & *h*, TAB & *u*, TAB & *v*, TAB & *z*, TAB & *delzc1*, TAB & *delzc2*, TAB & *delz1*, TAB & *delz2*, TAB & *h1r*, TAB & *u1r*, TAB & *v1r*, TAB & *h1l*, TAB & *u1l*, TAB & *v1l*, TAB & *h2r*, TAB & *u2r*, TAB & *v2r*, TAB & *h2l*, TAB & *u2l*, TAB & *v2l* ) [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 the first direction.
in	<i>v</i>	velocity of the flow in the second direction.
in	<i>z</i>	topography.
out	<i>delzc1</i>	difference between the reconstructed topographies on the left and on the right boundary of a cell in the first direction.
out	<i>delzc2</i>	difference between the reconstructed topographies on the left and on the right boundary of a cell in the second direction.
out	<i>delz1</i>	difference between two reconstructed topographies on the same boundary (from two adjacent cells) in the first direction.
out	<i>delz2</i>	difference between two reconstructed topographies on the same boundary (from two adjacent cells) in the second direction.
out	<i>h1r</i>	reconstructed water height on the right of the cell in the first direction.
out	<i>u1r</i>	first component of the reconstructed velocity on the right of the cell in the first direction.

out	$v1r$	second component of the reconstructed velocity on the right of the cell in the first direction.
out	$h1l$	reconstructed water height on the left of the cell in the first direction.
out	$u1l$	first component of the reconstructed velocity on the left of the cell in the first direction.
out	$v1l$	second component of the reconstructed velocity on the left of the cell in the first direction.
out	$h2r$	reconstructed water height on the right of the cell in the second direction.
out	$u2r$	first component of the reconstructed velocity on the right of the cell in the second direction.
out	$v2r$	second component of the reconstructed velocity on the right of the cell in the second direction.
out	$h2l$	reconstructed water height on the left of the cell in the second direction.
out	$u2l$	first component of the reconstructed velocity on the left of the cell in the second direction.
out	$v2l$	second component of the reconstructed velocity on the left of the cell in the second direction.

Implements [Reconstruction](#).

Definition at line 88 of file eno.cpp.

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

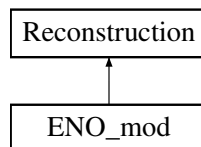
- Headers/libreconstructions/[eno.hpp](#)
- Sources/libreconstructions/[eno.cpp](#)

## 5.20 ENO\_mod Class Reference

Modified ENO reconstruction.

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

Inheritance diagram for ENO\_mod:



### Public Member Functions

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

### Additional Inherited Members

#### 5.20.1 Detailed Description

Modified ENO reconstruction.

Class that computes the modified ENO reconstruction in space.

Definition at line 73 of file eno\_mod.hpp.

### 5.20.2 Constructor & Destructor Documentation

**ENO\_mod::ENO\_mod ( Parameters & *par*, TAB & *z* )**

Constructor.

Initializations.

Parameters

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

Definition at line 60 of file eno\_mod.cpp.

**ENO\_mod::~~ENO\_mod ( )**

Destructor.

Definition at line 398 of file eno\_mod.cpp.

### 5.20.3 Member Function Documentation

**void ENO\_mod::calcul ( TAB & *h*, TAB & *u*, TAB & *v*, TAB & *z*, TAB & *delzc1*, TAB & *delzc2*, TAB & *delz1*, TAB & *delz2*, TAB & *h1r*, TAB & *u1r*, TAB & *v1r*, TAB & *h1l*, TAB & *u1l*, TAB & *v1l*, TAB & *h2r*, TAB & *u2r*, TAB & *v2r*, TAB & *h2l*, TAB & *u2l*, TAB & *v2l* ) [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 the first direction.
in	<i>v</i>	velocity of the flow in the second direction.
in	<i>z</i>	topography.
out	<i>delzc1</i>	difference between the reconstructed topographies on the left and on the right boundary of a cell in the first direction.
out	<i>delzc2</i>	difference between the reconstructed topographies on the left and on the right boundary of a cell in the second direction.
out	<i>delz1</i>	difference between two reconstructed topographies on the same boundary (from two adjacent cells) in the first direction.
out	<i>delz2</i>	difference between two reconstructed topographies on the same boundary (from two adjacent cells) in the second direction.
out	<i>h1r</i>	reconstructed water height on the right of the cell in the first direction.
out	<i>u1r</i>	first component of the reconstructed velocity on the right of the cell in the first direction.
out	<i>v1r</i>	second component of the reconstructed velocity on the right of the cell in the first direction.
out	<i>h1l</i>	reconstructed water height on the left of the cell in the first direction.
out	<i>u1l</i>	first component of the reconstructed velocity on the left of the cell in the first direction.
out	<i>v1l</i>	second component of the reconstructed velocity on the left of the cell in the first direction.

out	$h2r$	reconstructed water height on the right of the cell in the second direction.
out	$u2r$	first component of the reconstructed velocity on the right of the cell in the second direction.
out	$v2r$	second component of the reconstructed velocity on the right of the cell in the second direction.
out	$h2l$	reconstructed water height on the left of the cell in the second direction.
out	$u2l$	first component of the reconstructed velocity on the left of the cell in the second direction.
out	$v2l$	second component of the reconstructed velocity on the left of the cell in the second direction.

Implements [Reconstruction](#).

Definition at line 85 of file eno\_mod.cpp.

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

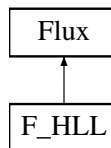
- Headers/libreconstructions/[eno\\_mod.hpp](#)
- Sources/libreconstructions/[eno\\_mod.cpp](#)

## 5.21 F\_HLL Class Reference

HLL flux.

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

Inheritance diagram for F\_HLL:



### Public Member Functions

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

### Additional Inherited Members

#### 5.21.1 Detailed Description

HLL flux.

Class that computes HLL numerical flux.

Definition at line 72 of file f\_hll.hpp.

#### 5.21.2 Constructor & Destructor Documentation

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

Constructor.

Definition at line 59 of file f\_hll.cpp.

**F\_HLL::~~F\_HLL( ) [virtual]**

Destructor.

Definition at line 134 of file f\_hll.cpp.

### 5.21.3 Member Function Documentation

**void F\_HLL::calcul ( SCALAR h\_L, SCALAR u\_L, SCALAR v\_L, SCALAR h\_R, SCALAR u\_R, SCALAR v\_R ) [virtual]**

Calculates the numerical flux.

Recall that this is reduced to a one-dimensional computation along the normal of the mesh edge.

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,  $U = {}^t(h, hu, hv)$  and  $F(U) = {}^t(hu, hu^2 + gh^2/2, hv^2)$ .

**Parameters**

in	$h\_L$	water height at the left of the interface where the flux is calculated.
in	$u\_L$	velocity (in the x direction) at the left of the interface where the flux is calculated.
in	$v\_L$	velocity (in the y direction) 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 (in the x direction) at the right of the interface where the flux is calculated.
in	$v\_R$	velocity (in the y direction) 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::f3](#) third component of the numerical flux.

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

**Note**

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

Implements [Flux](#).

Definition at line 62 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](#)

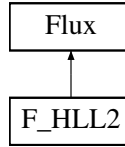


## 5.22 F\_HLL2 Class Reference

HLL flux.

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

Inheritance diagram for F\_HLL2:



### Public Member Functions

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

### Additional Inherited Members

#### 5.22.1 Detailed Description

HLL flux.

Class that computes HLL numerical flux with a reduced formulation.

Definition at line 71 of file f\_hll2.hpp.

#### 5.22.2 Constructor & Destructor Documentation

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

Constructor.

Definition at line 60 of file f\_hll2.cpp.

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

Destructor.

Definition at line 118 of file f\_hll2.cpp.

#### 5.22.3 Member Function Documentation

**void F\_HLL2::calcul ( SCALAR *h\_L*, SCALAR *u\_L*, SCALAR *v\_L*, SCALAR *h\_R*, SCALAR *u\_R*, SCALAR *v\_R* ) [virtual]**

Calculates the numerical flux.

Recall that this is reduced to a one-dimensional computation along the normal of the mesh edge.

If the water heights on the two sides are small or  $c_1 \approx c_2 \approx 0$ , there is no water. Else, HLL reduced formulation is used (see [Batten et al. \[1997\]](#)):

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

with

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

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

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

#### Parameters

in	$h\_L$	water height at the left of the interface where the flux is calculated.
in	$u\_L$	velocity (in the x direction) at the left of the interface where the flux is calculated.
in	$v\_L$	velocity (in the y direction) 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 (in the x direction) at the right of the interface where the flux is calculated.
in	$v\_R$	velocity (in the y direction) 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::f3** third component of the numerical flux.  
**Flux::cfl** value of the CFL.

#### Note

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

Implements [Flux](#).

Definition at line 64 of file `f_hll2.cpp`.

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

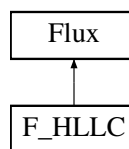
- Headers/libflux/[f\\_hll2.hpp](#)
- Sources/libflux/[f\\_hll2.cpp](#)

## 5.23 F\_HLLC Class Reference

HLLC flux.

```
#include <f_hllc.hpp>
```

Inheritance diagram for `F_HLLC`:



#### Public Member Functions

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

## Additional Inherited Members

### 5.23.1 Detailed Description

HLLC flux.

Class that computes HLLC numerical flux.

Definition at line 73 of file f\_hllc.hpp.

### 5.23.2 Constructor & Destructor Documentation

#### F\_HLLC::F\_HLLC ( )

Constructor.

Definition at line 60 of file f\_hllc.cpp.

#### F\_HLLC::~~F\_HLLC ( ) [virtual]

Destructor.

Definition at line 159 of file f\_hllc.cpp.

### 5.23.3 Member Function Documentation

#### void F\_HLLC::calcul ( SCALAR h\_L, SCALAR u\_L, SCALAR v\_L, SCALAR h\_R, SCALAR u\_R, SCALAR v\_R ) [virtual]

Calculates the numerical flux.

The HLLC approximate Riemann solver is a modification of the basic HLL scheme to account for the contact and shear waves (see [Toro \[2001\]](#)).

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,  $U = {}^t(h, hu, hv)$  and  $F(U) = {}^t(hu, hu^2 + gh^2/2, hv^2)$ .

If we consider the approximate flux HLL

$$F_{i+\frac{1}{2}} = \begin{pmatrix} F_{i+\frac{1}{2}}^1 \\ F_{i+\frac{1}{2}}^2 \\ F_{i+\frac{1}{2}}^3 \end{pmatrix}$$

then to obtain the HLLC solver just add the following expression for the third component

$$F_{i+\frac{1}{2}}^3 = \begin{cases} F_{i+\frac{1}{2}}^1 * V_L & \text{if } 0 \leq u_*, \\ F_{i+\frac{1}{2}}^1 * V_R & \text{if } u_* < 0, \end{cases}$$

Where

$$u_* = \frac{c_1 h_R (u_R - c_2) - c_2 h_L (u_L - c_1)}{h_R (u_R - c_2) - h_L (u_L - c_1)}$$

**Parameters**

in	$h_L$	water height at the left of the interface where the flux is calculated.
in	$u_L$	velocity (in the x direction) at the left of the interface where the flux is calculated.
in	$v_L$	velocity (in the y direction) 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 (in the x direction) at the right of the interface where the flux is calculated.
in	$v_R$	velocity (in the y direction) 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::f3](#) third component of the numerical flux.

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

**Note**

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

Implements [Flux](#).

Definition at line 63 of file `f_hllc.cpp`.

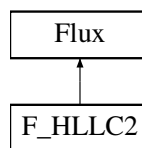
The documentation for this class was generated from the following files:

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

**5.24 F\_HLLC2 Class Reference**

```
#include <f_hllc2.hpp>
```

Inheritance diagram for F\_HLLC2:

**Public Member Functions**

- [F\\_HLLC2 \(\)](#)  
*Constructor.*
- void [calcul \(SCALAR, SCALAR, SCALAR, SCALAR, SCALAR, SCALAR\)](#)  
*Calculates the numerical flux.*
- virtual [~F\\_HLLC2 \(\)](#)  
*Destructor.*

**Additional Inherited Members****5.24.1 Detailed Description**

Definition at line 71 of file `f_hllc2.hpp`.

### 5.24.2 Constructor & Destructor Documentation

#### F\_HLLC2::F\_HLLC2 ( )

Constructor.

Definition at line 60 of file f\_hllc2.cpp.

#### F\_HLLC2::~~F\_HLLC2 ( ) [virtual]

Destructor.

Definition at line 142 of file f\_hllc2.cpp.

### 5.24.3 Member Function Documentation

#### void F\_HLLC2::calcul ( SCALAR h\_L, SCALAR u\_L, SCALAR v\_L, SCALAR h\_R, SCALAR u\_R, SCALAR v\_R ) [virtual]

Calculates the numerical flux.

The HLLC approximate Riemann solver is a modification of the basic HLL scheme to account for the contact and shear waves (see [Toro \[2001\]](#)).

If the water heights on the two sides are small or  $c_1 \approx c_2 \approx 0$ , there is no water.

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

with

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

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

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

If we consider the approximate flux HLL

$$F_{i+\frac{1}{2}} = \begin{pmatrix} F_{i+\frac{1}{2}}^1 \\ F_{i+\frac{1}{2}}^2 \\ F_{i+\frac{1}{2}}^3 \end{pmatrix}$$

then to obtain the HLLC solver just add the following expression for the third component

$$F_{i+\frac{1}{2}}^3 = \begin{cases} F_{i+\frac{1}{2}}^1 * V_L & \text{if } 0 \leq u_*, \\ F_{i+\frac{1}{2}}^1 * V_R & \text{if } u_* < 0, \end{cases}$$

Where

$$u_* = \frac{c_1 h_R (u_R - c_2) - c_2 h_L (u_L - c_1)}{h_R (u_R - c_2) - h_L (u_L - c_1)}$$

#### Parameters

in	$h\_L$	water height at the left of the interface where the flux is calculated.
in	$u\_L$	velocity (in the x direction) at the left of the interface where the flux is calculated.

in	$v_L$	velocity (in the y direction) 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 (in the x direction) at the right of the interface where the flux is calculated.
in	$v_R$	velocity (in the y direction) 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::f3](#) third component of the numerical flux.  
[Flux::cfl](#) value of the CFL.

#### Note

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

Implements [Flux](#).

Definition at line 64 of file `f_hllc2.cpp`.

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

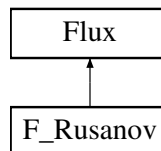
- `Headers/libflux/f_hllc2.hpp`
- `Sources/libflux/f_hllc2.cpp`

## 5.25 F\_Rusanov Class Reference

Rusanov flux.

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

Inheritance diagram for `F_Rusanov`:



### Public Member Functions

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

### Additional Inherited Members

#### 5.25.1 Detailed Description

Rusanov flux.

Class that computes Rusanov numerical flux.

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

### 5.25.2 Constructor & Destructor Documentation

**F\_Rusanov::F\_Rusanov ( )**

Constructor.

Definition at line 59 of file f\_rusanov.cpp.

**F\_Rusanov::~~F\_Rusanov ( ) [virtual]**

Destructor.

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

### 5.25.3 Member Function Documentation

**void F\_Rusanov::calcul ( SCALAR h\_L, SCALAR u\_L, SCALAR v\_L, SCALAR h\_R, SCALAR u\_R, SCALAR v\_R ) [virtual]**

Calculates the numerical flux.

Recall that this is reduced to a one-dimensional computation along the normal of the mesh edge.

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

**Parameters**

in	$h\_L$	water height at the left of the interface where the flux is calculated.
in	$u\_L$	velocity (in the x direction) at the left of the interface where the flux is calculated.
in	$v\_L$	velocity (in the y direction) 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 (in the x direction) at the right of the interface where the flux is calculated.
in	$v\_R$	velocity (in the y direction) 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::f3](#) third component of the numerical flux.

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

Implements [Flux](#).

Definition at line 63 of file f\_rusanov.cpp.

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

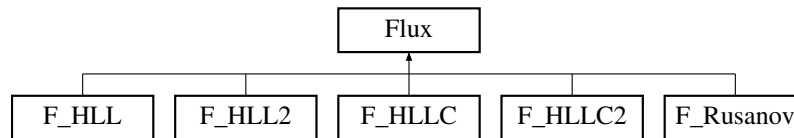
- Headers/libflux/f\_rusanov.hpp
- Sources/libflux/f\_rusanov.cpp

## 5.26 Flux Class Reference

Numerical flux.

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

Inheritance diagram for Flux:



## Public Member Functions

- `Flux ()`  
*Constructor.*
- virtual void `calcul (SCALAR, SCALAR, 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_f3 () const`  
*Gives the third component of the numerical flux.*
- `SCALAR get_cfl () const`  
*Gives the CFL value.*
- virtual `~Flux ()`  
*Destructor.*

## Protected Attributes

- `SCALAR f1`
- `SCALAR f2`
- `SCALAR f3`
- `SCALAR cfl`
- `SCALAR tx`

### 5.26.1 Detailed Description

Numerical flux.

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

Definition at line 68 of file `flux.hpp`.

### 5.26.2 Constructor & Destructor Documentation

#### `Flux::Flux ( )`

Constructor.

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

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

Destructor.

Definition at line 116 of file `flux.cpp`.



### 5.26.3 Member Function Documentation

**virtual void Flux::calcul ( SCALAR , SCALAR , SCALAR , SCALAR , SCALAR , SCALAR ) [pure virtual]**

Function to be specified in each numerical flux.

Implemented in [F\\_HLLC](#), [F\\_HLL](#), [F\\_HLL2](#), [F\\_HLLC2](#), and [F\\_Rusanov](#).

**SCALAR Flux::get\_cfl ( ) const**

Gives the CFL value.

Returns

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

Definition at line 106 of file flux.cpp.

**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.

**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.

**SCALAR Flux::get\_f3 ( ) const**

Gives the third component of the numerical flux.

Returns

[Flux::f3](#) third component of the numerical flux.

Definition at line 96 of file flux.cpp.

**void Flux::set\_tx ( SCALAR tx )**

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

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

Parameters

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

Definition at line 66 of file flux.cpp.

### 5.26.4 Member Data Documentation

**SCALAR Flux::cfl [protected]**

CFL value.

Definition at line 105 of file flux.hpp.

**SCALAR Flux::f1 [protected]**

First component of the numerical flux.  
Definition at line 99 of file flux.hpp.

**SCALAR Flux::f2 [protected]**

Second component of the numerical flux.  
Definition at line 101 of file flux.hpp.

**SCALAR Flux::f3 [protected]**

Third component of the numerical flux.  
Definition at line 103 of file flux.hpp.

**SCALAR Flux::tx [protected]**

Value of dt/dx.  
Definition at line 107 of file flux.hpp.  
The documentation for this class was generated from the following files:

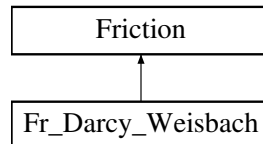
- Headers/libflux/[flux.hpp](#)
- Sources/libflux/[flux.cpp](#)

**5.27 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](#) ([Parameters](#) &)  
*Constructor.*
- void [calcul](#) (const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, [SCALAR](#))  
*Calculates the Darcy-Weisbach friction term.*
- void [calculSf](#) (const [TAB](#) &, const [TAB](#) &, const [TAB](#) &)  
*Calculates the explicit Darcy-Weisbach friction term.*
- virtual [~Fr\\_Darcy\\_Weisbach](#) ()  
*Destructor.*

**Additional Inherited Members****5.27.1 Detailed Description**

Darcy-Weisbach law.

General formulation:  $S_f = \frac{fU|U|}{8gh}$ . This term is integrated in the code thanks to a semi-implicit method.  
Definition at line 71 of file fr\_darcy\_weisbach.hpp.

### **5.27.2 Constructor & Destructor Documentation**

**Fr\_Darcy\_Weisbach::Fr\_Darcy\_Weisbach ( Parameters & *par* )**

Constructor.

**Parameters**

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

Definition at line 59 of file fr\_darcy\_weisbach.cpp.

**Fr\_Darcy\_Weisbach::~~Fr\_Darcy\_Weisbach ( ) [virtual]**

Destructor.

Definition at line 125 of file fr\_darcy\_weisbach.cpp.

**5.27.3 Member Function Documentation**

**void Fr\_Darcy\_Weisbach::calcul ( const TAB & uold, const TAB & vold, const TAB & hnew, const TAB & q1new, const TAB & q2new, SCALAR dt ) [virtual]**

Calculates the Darcy-Weisbach friction term.

General formulation (see [Smith et al. \[2007\]](#)):  $S_f = \frac{fU|U|}{8gh}$ . This term is integrated in the code thanks to a semi-implicit method:

$$q_{1/2i}^{n+1} = \frac{q_{1/2i}^*}{1 + dt \frac{f|U_i^n|}{8h_i^{n+1}}}$$

where  $f$  is the friction coefficient.

**Parameters**

in	uold	velocity in the first direction at the previous time ( $n$ if you are calculating the $n + 1$ th time step), first component of $U_i^n$ in the above formula.
in	vold	velocity in the second direction at the previous time ( $n$ if you are calculating the $n + 1$ th time step), second component of $U_i^n$ in the above formula.
in	hnew	water height after the Shallow-Water computation (without friction), denoted by $h_i^{n+1}$ in the above formula.
in	q1new	discharge in the first direction after the Shallow-Water computation (without friction), denoted by $q_{1i}^*$ in the above formula.
in	q2new	discharge in the second direction after the Shallow-Water computation (without friction), denoted by $q_{2i}^*$ in the above formula.
in	dt	time step.

**Modifies**

[Friction::q1mod](#) discharge in the first direction modified by the friction term,

[Friction::q2mod](#) discharge in the second direction modified by the friction term.

**Note**

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

Implements [Friction](#).

Definition at line 68 of file fr\_darcy\_weisbach.cpp.

**void Fr\_Darcy\_Weisbach::calculSf ( const TAB & h, const TAB & u, const TAB & v ) [virtual]**

Calculates the explicit Darcy-Weisbach friction term.

Explicit friction term:  $S_f = \frac{fU|U|}{8gh}$  where  $f$  is the friction coefficient.

**Parameters**

in	$h$	water height.
in	$u$	velocity in the first direction, first component of $U$ in the above formula.
in	$v$	velocity in the second direction, second component of $U$ in the above formula.

**Modifies**

[Friction::Sf1](#) explicit friction term in the first direction,  
[Friction::Sf2](#) explicit friction term in the second direction.

**Note**

This explicit friction term will be used for erosion.

Implements [Friction](#).

Definition at line 96 of file `fr_darcy_weisbach.cpp`.

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

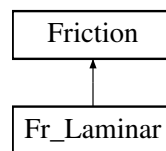
- Headers/libfrictions/[fr\\_darcy\\_weisbach.hpp](#)
- Sources/libfrictions/[fr\\_darcy\\_weisbach.cpp](#)

## 5.28 Fr\_Laminar Class Reference

Laminar law.

```
#include <fr_laminar.hpp>
```

Inheritance diagram for `Fr_Laminar`:

**Public Member Functions**

- [Fr\\_Laminar](#) ([Parameters](#) &)  
*Constructor.*
- void [calcul](#) (const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, [SCALAR](#))  
*Calculates the laminar friction term.*
- void [calculSf](#) (const [TAB](#) &, const [TAB](#) &, const [TAB](#) &)  
*Calculates the explicit Manning friction term.*
- virtual [~Fr\\_Laminar](#) ()  
*Destructor.*

**Additional Inherited Members**

### 5.28.1 Detailed Description

Laminar law.

General formulation:  $S_f = \nu \frac{1}{gh} \frac{U}{h}$ . This term is integrated in the code thanks to an implicit method.

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

### 5.28.2 Constructor & Destructor Documentation

**Fr\_Laminar::Fr\_Laminar ( Parameters & *par* )**

Constructor.

**Parameters**

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

Definition at line 58 of file fr\_laminar.cpp.

**Fr\_Laminar::~Fr\_Laminar ( ) [virtual]**

Destructor.

Definition at line 128 of file fr\_laminar.cpp.

**5.28.3 Member Function Documentation**

**void Fr\_Laminar::calcul ( const TAB & uold, const TAB & vold, const TAB & hnew, const TAB & q1new, const TAB & q2new, SCALAR dt ) [virtual]**

Calculates the laminar friction term.

General formulation:  $S_f = \nu \frac{1}{gh} \frac{U}{h}$ . This term is integrated in the code thanks to an implicit method:

$$q_{1/2i}^{n+1} = \frac{q_{1/2i}^*}{1 + \nu dt \frac{1}{(h_i^{n+1})^2}}$$

where  $\nu$  is the friction coefficient.

**Parameters**

in	uold	velocity in the first direction at the previous time ( $n$ if you are calculating the $n + 1$ th time step), first component of $U_i^n$ in the above formula.
in	vold	velocity in the second direction at the previous time ( $n$ if you are calculating the $n + 1$ th time step), second component of $U_i^n$ in the above formula.
in	hnew	water height after the Shallow-Water computation (without friction), denoted by $h_i^{n+1}$ in the above formula.
in	q1new	discharge in the first direction after the Shallow-Water computation (without friction), denoted by $q_{1i}^*$ in the above formula.
in	q2new	discharge in the second direction after the Shallow-Water computation (without friction), denoted by $q_{2i}^*$ in the above formula.
in	dt	time step.

**Modifies**

[Friction::q1mod](#) discharge in the first direction modified by the friction term,

[Friction::q2mod](#) discharge in the second direction modified by the friction term.

**Note**

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

Implements [Friction](#).

Definition at line 67 of file fr\_laminar.cpp.

**void Fr\_Laminar::calculSf ( const TAB & h, const TAB & u, const TAB & v ) [virtual]**

Calculates the explicit Manning friction term.

Explicit friction term:  $S_f = \nu \frac{1}{gh} \frac{U}{h}$  where  $\nu$  is the friction coefficient.

**Parameters**

in	$h$	water height.
in	$u$	velocity in the first direction, first component of $U$ in the above formula.
in	$v$	velocity in the second direction, second component of $U$ in the above formula.

**Modifies**

[Friction::Sf1](#) explicit friction term in the first direction,  
[Friction::Sf2](#) explicit friction term in the second direction.

**Note**

This explicit friction term will be used for erosion.

Implements [Friction](#).

Definition at line 98 of file `fr_laminar.cpp`.

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

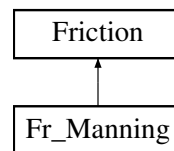
- Headers/libfrictions/[fr\\_laminar.hpp](#)
- Sources/libfrictions/[fr\\_laminar.cpp](#)

**5.29 Fr\_Manning Class Reference**

Manning law.

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

Inheritance diagram for `Fr_Manning`:

**Public Member Functions**

- [Fr\\_Manning](#) ([Parameters](#) &)  
*Constructor.*
- void [calcul](#) (const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, [SCALAR](#))  
*Calculates the Manning friction term.*
- void [calculSf](#) (const [TAB](#) &, const [TAB](#) &, const [TAB](#) &)  
*Calculates the explicit Manning friction term.*
- virtual [~Fr\\_Manning](#) ()  
*Destructor.*

**Additional Inherited Members****5.29.1 Detailed Description**

Manning law.

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

Definition at line 72 of file `fr_manning.hpp`.



## **5.29.2 Constructor & Destructor Documentation**

**Fr\_Manning::Fr\_Manning ( Parameters & *par* )**

Constructor.

**Parameters**

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

Definition at line 59 of file fr\_manning.cpp.

**Fr\_Manning::~Fr\_Manning ( ) [virtual]**

Destructor.

Definition at line 126 of file fr\_manning.cpp.

**5.29.3 Member Function Documentation**

**void Fr\_Manning::calcul ( const TAB & *uold*, const TAB & *vold*, const TAB & *hnew*, const TAB & *q1new*, const TAB & *q2new*, SCALAR *dt* ) [virtual]**

Calculates the Manning friction term.

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

$$q_{1/2i}^{n+1} = \frac{q_{1/2i}^*}{1 + dt \frac{c^2 g |U_i^n|}{(h_i^{n+1})^{4/3}}}$$

where  $c$  is the friction coefficient.

**Parameters**

in	<i>uold</i>	velocity in the first direction at the previous time ( $n$ if you are calculating the $n + 1$ th time step), first component of $U_i^n$ in the above formula.
in	<i>vold</i>	velocity in the second direction at the previous time ( $n$ if you are calculating the $n + 1$ th time step), second component of $U_i^n$ 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>q1new</i>	discharge in the first direction after the Shallow-Water computation (without friction), denoted by $q_{1i}^*$ in the above formula.
in	<i>q2new</i>	discharge in the second direction after the Shallow-Water computation (without friction), denoted by $q_{2i}^*$ in the above formula.
in	<i>dt</i>	time step.

**Modifies**

[Friction::q1mod](#) discharge in the first direction modified by the friction term,

[Friction::q2mod](#) discharge in the second direction modified by the friction term.

**Note**

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

Implements [Friction](#).

Definition at line 68 of file fr\_manning.cpp.

**void Fr\_Manning::calculSf ( const TAB & *h*, const TAB & *u*, const TAB & *v* ) [virtual]**

Calculates the explicit Manning friction term.

Explicit friction term:  $S_f = c^2 \frac{U|U|}{h^{4/3}}$  where  $c$  is the friction coefficient.

**Parameters**

in	$h$	water height.
in	$u$	velocity in the first direction, first component of $U$ in the above formula.
in	$v$	velocity in the second direction, second component of $U$ in the above formula.

**Modifies**

[Friction::Sf1](#) explicit friction term in the first direction,  
[Friction::Sf2](#) explicit friction term in the second direction.

**Note**

This explicit friction term will be used for erosion.

Implements [Friction](#).

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

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

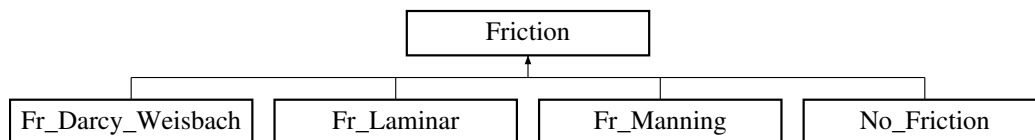
- Headers/libfrictions/[fr\\_manning.hpp](#)
- Sources/libfrictions/[fr\\_manning.cpp](#)

## 5.30 Friction Class Reference

**Friction law**

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

Inheritance diagram for Friction:

**Public Member Functions**

- [Friction](#) ([Parameters](#) &)  
*Constructor.*
- virtual void [calcul](#) (const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, [SCALAR](#))=0  
*Function to be specified in each friction law.*
- virtual [TAB](#) [get\\_q1mod](#) () const  
*Gives the discharge in the first direction modified by the friction term.*
- virtual [TAB](#) [get\\_q2mod](#) () const  
*Gives the discharge in the second direction modified by the friction term.*
- virtual void [calculSf](#) (const [TAB](#) &, const [TAB](#) &, const [TAB](#) &)=0  
*Calculates the explicit friction term. It will be used for computations with erosion.*
- virtual [TAB](#) [get\\_Sf1](#) () const  
*Gives the explicit friction term in the first direction.*
- virtual [TAB](#) [get\\_Sf2](#) () const  
*Gives the explicit friction term in the second direction.*
- virtual [~Friction](#) ()  
*Destructor.*

## Protected Attributes

- const int [NXCELL](#)
- const int [NYCELL](#)
- const [SCALAR DX](#)
- const [SCALAR DY](#)
- [TAB q1mod](#)
- [TAB q2mod](#)
- [TAB Sf1](#)
- [TAB Sf2](#)
- [TAB Fric\\_tab](#)

### 5.30.1 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 72 of file friction.hpp.

### 5.30.2 Constructor & Destructor Documentation

#### Friction::Friction ( Parameters & *par* )

Constructor.

Defines the number of cells, the space steps and initializes [Friction::Fric\\_tab](#), [Friction::q1mod](#), [Friction::q2mod](#), [Friction::Sf1](#), [Friction::Sf2](#).

Parameters

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

Warning

\*\*\*: ERROR: the value at the point \*\*\*.

Initialization of [Friction](#)

Definition at line 59 of file friction.cpp.

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

Destructor.

Deallocation of [Friction::Fric\\_tab](#), [Friction::q1mod](#), [Friction::q2mod](#), [Friction::Sf1](#), [Friction::Sf2](#)

Definition at line 152 of file friction.cpp.

### 5.30.3 Member Function Documentation

**virtual void Friction::calcul ( const TAB & , const TAB & , const TAB & , const TAB & , const TAB & , SCALAR ) [pure virtual]**

Function to be specified in each friction law.

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

**virtual void Friction::calculSf ( const TAB & , const TAB & , const TAB & ) [pure virtual]**

Calculates the explicit friction term. It will be used for computations with erosion.

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

**TAB Friction::get\_q1mod ( ) const [virtual]**

Gives the discharge in the first direction modified by the friction term.

Returns

[Friction::q1mod](#) discharge in the first direction modified by the friction term.

Definition at line 112 of file friction.cpp.

**TAB Friction::get\_q2mod ( ) const [virtual]**

Gives the discharge in the second direction modified by the friction term.

Returns

[Friction::q2mod](#) discharge in the second direction modified by the friction term.

Definition at line 122 of file friction.cpp.

**TAB Friction::get\_Sf1 ( ) const [virtual]**

Gives the explicit friction term in the first direction.

Returns

[Friction::Sf1](#) explicit friction term in the first direction.

Definition at line 132 of file friction.cpp.

**TAB Friction::get\_Sf2 ( ) const [virtual]**

Gives the explicit friction term in the second direction.

Returns

[Friction::Sf2](#) explicit friction term in the second direction.

Definition at line 142 of file friction.cpp.

**5.30.4 Member Data Documentation****const SCALAR Friction::DX [protected]**

Space step in the first (x) direction.

Definition at line 106 of file friction.hpp.

**const SCALAR Friction::DY [protected]**

Space step in the second (y) direction.

Definition at line 108 of file friction.hpp.

**TAB Friction::Fric\_tab [protected]**

Array that contains the friction coefficient by cell.

Definition at line 119 of file friction.hpp.

**const int Friction::NXCELL [protected]**

Number of cells in space in the first (x) direction.

Definition at line 102 of file friction.hpp.

**const int Friction::NYCELL [protected]**

Number of cells in space in the second (y) direction.

Definition at line 104 of file friction.hpp.

**TAB Friction::q1mod [protected]**

Discharge in the first direction modified by the friction term.

Definition at line 111 of file friction.hpp.

**TAB Friction::q2mod [protected]**

Discharge in the second direction modified by the friction term.

Definition at line 113 of file friction.hpp.

**TAB Friction::Sf1 [protected]**

Explicit friction term in the first direction.

Definition at line 115 of file friction.hpp.

**TAB Friction::Sf2 [protected]**

Explicit friction term in the second direction.

Definition at line 117 of file friction.hpp.

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

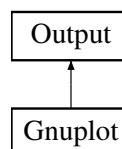
- Headers/libfrictions/[friction.hpp](#)
- Sources/libfrictions/[friction.cpp](#)

## 5.31 Gnuplot Class Reference

Gnuplot output

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

Inheritance diagram for Gnuplot:



### Public Member Functions

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

## Additional Inherited Members

### 5.31.1 Detailed Description

Gnuplot output

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

Definition at line 73 of file gnuplot.hpp.

### 5.31.2 Constructor & Destructor Documentation

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

Constructor.

Writes the header of the file 'huz\_evolution.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 huz\_evolution.dat cannot be opened, the code will exit with failure termination code.

Definition at line 60 of file gnuplot.cpp.

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

Destructor.

Definition at line 125 of file gnuplot.cpp.

### 5.31.3 Member Function Documentation

#### void Gnuplot::write ( const TAB & *h*, const TAB & *u*, const TAB & *v*, const TAB & *z*, const SCALAR & *time* ) [virtual]

Saves one time step.

Writes the values of [Scheme::h](#), [Scheme::u](#) ( $=q1/h$ ), [Scheme::v](#) ( $=q2/h$ ), [Scheme::h](#)+ [Scheme::z](#) (free surface), [Scheme::z](#),  $|U| = \sqrt{u^2 + v^2}$ , the Froude number  $\frac{|U|}{\sqrt{gh}}$ , [Scheme::q1](#), [Scheme::q2](#), and  $h|U|$  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

<i>in</i>	<i>h</i>	the water height.
<i>in</i>	<i>u</i>	first component of the velocity.
<i>in</i>	<i>v</i>	second component of the velocity.
<i>in</i>	<i>z</i>	the topography.
<i>in</i>	<i>time</i>	the current time.

Implements [Output](#).

Definition at line 89 of file gnuplot.cpp.

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

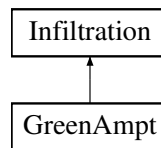
- Headers/libsave/[gnuplot.hpp](#)
- Sources/libsave/[gnuplot.cpp](#)

## 5.32 GreenAmpt Class Reference

Green-Ampt 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 the infiltration capacity.*

- void [calcul](#) (const [TAB](#) &, const [TAB](#) &, const [SCALAR](#))

*Calculates the infiltrated volume.*

- virtual [~GreenAmpt](#) ()

*Destructor.*

### Additional Inherited Members

#### 5.32.1 Detailed Description

Green-Ampt law.

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

Definition at line 72 of file greenampt.hpp.

#### 5.32.2 Constructor & Destructor Documentation

##### **GreenAmpt::GreenAmpt ( [Parameters](#) & *par* )**

Constructor.

Initializes the values for Green-Ampt infiltration.

**Parameters**

<a href="#">in</a>	<a href="#">par</a>	parameter, contains all the values from the parameters file.
--------------------	---------------------	--

Warning

\*\*\*: ERROR: the value at the point \*\*\*.

Definition at line 59 of file greenampt.cpp.

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

Destructor.

Definition at line 306 of file greenampt.cpp.



### 5.32.3 Member Function Documentation

**void GreenAmpt::calcul ( const TAB & *h*, const TAB & *Vin\_tot*, const SCALAR *dt* ) [virtual]**

Calculates the infiltrated volume.

**Parameters**

in	$h$	water height.
in	$Vin\_tot$	total infiltrated volume.
in	$dt$	time step.

**Modifies**

infiltration::hmod modified water height.

infiltration::Vin total infiltrated volume containing the current time step.

Implements [Infiltration](#).

Definition at line 260 of file greenampt.cpp.

**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 the infiltration capacity.

the infiltration capacity is given by:

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

with the effective hydraulic conductivity

$$K_e = \frac{1}{\frac{1}{K_s} * (1 - \frac{zcrust * dtheta}{Vin\_tot}) + zcrust * \frac{dtheta}{Vin\_tot} * \frac{1}{K_c}}$$

**Parameters**

in	$h$	water height.
in	$Vin\_tot$	total infiltrated volume.
in	$dt$	time step.
in	$Kc$	hydraulic conductivity of the (upper) crust.
in	$Ks$	hydraulic conductivity of the (lower) soil.
in	$dtheta$	water content.
in	$Psi$	load pressure.
in	$zcrust$	thickness of the (upper) crust.

**Returns**

**lc**: infiltration capacity.

Definition at line 216 of file greenampt.cpp.

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

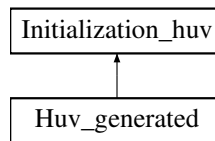
- Headers/librain\_infiltration/[greenampt.hpp](#)
- Sources/librain\_infiltration/[greenampt.cpp](#)

## 5.33 Huv\_generated Class Reference

No water configuration.

```
#include <huv_generated.hpp>
```

Inheritance diagram for Huv\_generated:



### Public Member Functions

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

### Additional Inherited Members

#### 5.33.1 Detailed Description

No water configuration.

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

Definition at line 73 of file huv\_generated.hpp.

#### 5.33.2 Constructor & Destructor Documentation

**Huv\_generated::Huv\_generated ( [Parameters](#) & *par* )**

Constructor.

**Parameters**

<a href="#">in</a>	<a href="#">par</a>	parameter, contains all the values from the parameters file (unused).
--------------------	---------------------	---

Definition at line 60 of file huv\_generated.cpp.

**Huv\_generated::~~Huv\_generated ( ) [[virtual](#)]**

Destructor.

Definition at line 86 of file huv\_generated.cpp.

#### 5.33.3 Member Function Documentation

**void Huv\_generated::initialization ( [TAB](#) & *h*, [TAB](#) & *u*, [TAB](#) & *v* ) [[virtual](#)]**

Performs the initialization.

Initializes the water height and the velocity at 0.

**Parameters**

---

in, out	$h$	water height.
in, out	$u$	first component of the velocity.
in, out	$v$	second component of the velocity.

Implements [Initialization\\_huv](#).

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

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

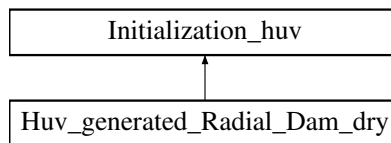
- Headers/libinitializations/[huv\\_generated.hpp](#)
- Sources/libinitializations/[huv\\_generated.cpp](#)

## 5.34 Huv\_generated\_Radial\_Dam\_dry Class Reference

Dry radial dam break configuration.

```
#include <huv_generated_radial_dam_dry.hpp>
```

Inheritance diagram for `Huv_generated_Radial_Dam_dry`:



### Public Member Functions

- [Huv\\_generated\\_Radial\\_Dam\\_dry](#) ([Parameters](#) &)  
*Constructor.*
- void [initialization](#) ([TAB](#) &, [TAB](#) &, [TAB](#) &)  
*Performs the initialization.*
- virtual [~Huv\\_generated\\_Radial\\_Dam\\_dry](#) ()  
*Destructor.*

### Additional Inherited Members

#### 5.34.1 Detailed Description

Dry radial dam break configuration.

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

Definition at line 73 of file `huv_generated_radial_dam_dry.hpp`.

#### 5.34.2 Constructor & Destructor Documentation

**`Huv_generated_Radial_Dam_dry::Huv_generated_Radial_Dam_dry ( 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 meter) and the velocity (0 m/s), see [Goutal and Maurel \[1997\]](#), [Audusse et al. \[2000\]](#).

Parameters

---

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

Definition at line 60 of file `huv_generated_radial_dam_dry.cpp`.

**Huv\_generated\_Radial\_Dam\_dry::~Huv\_generated\_Radial\_Dam\_dry ( ) [virtual]**

Destructor.

Definition at line 100 of file `huv_generated_radial_dam_dry.cpp`.

### 5.34.3 Member Function Documentation

**void Huv\_generated\_Radial\_Dam\_dry::initialization ( TAB & *h*, TAB & *u*, TAB & *v* ) [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>	first component of the velocity.
<i>in, out</i>	<i>v</i>	second component of the velocity.

Implements [Initialization\\_huv](#).

Definition at line 79 of file `huv_generated_radial_dam_dry.cpp`.

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

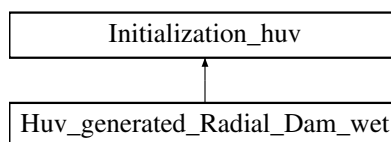
- Headers/libinitializations/[huv\\_generated\\_radial\\_dam\\_dry.hpp](#)
- Sources/libinitializations/[huv\\_generated\\_radial\\_dam\\_dry.cpp](#)

## 5.35 Huv\_generated\_Radial\_Dam\_wet Class Reference

Wet radial dam break configuration.

```
#include <huv_generated_radial_dam_wet.hpp>
```

Inheritance diagram for Huv\_generated\_Radial\_Dam\_wet:



### Public Member Functions

- [Huv\\_generated\\_Radial\\_Dam\\_wet](#) (Parameters &)  
*Constructor.*
- void [initialization](#) (TAB &, TAB &, TAB &)  
*Performs the initialization.*
- virtual [~Huv\\_generated\\_Radial\\_Dam\\_wet](#) ()  
*Destructor.*

### Additional Inherited Members

#### 5.35.1 Detailed Description

Wet radial dam break configuration.

Class for the initialization of the water height and velocity for a radial dam break on a wet domain.

Definition at line 74 of file `huv_generated_radial_dam_wet.hpp`.

### 5.35.2 Constructor & Destructor Documentation

#### **Huv\_generated\_Radial\_Dam\_wet::Huv\_generated\_Radial\_Dam\_wet ( 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 (4 millimeter) and the velocity (0 m/s), see [Goutal and Maurel \[1997\]](#), [Audusse et al. \[2000\]](#).

Parameters

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

Definition at line 60 of file `huv_generated_radial_dam_wet.cpp`.

#### **Huv\_generated\_Radial\_Dam\_wet::~~Huv\_generated\_Radial\_Dam\_wet ( ) [virtual]**

Destructor.

Definition at line 100 of file `huv_generated_radial_dam_wet.cpp`.

### 5.35.3 Member Function Documentation

#### **void Huv\_generated\_Radial\_Dam\_wet::initialization ( TAB & *h*, TAB & *u*, TAB & *v* ) [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>	first component of the velocity.
in, out	<i>v</i>	second component of the velocity.

Implements [Initialization\\_huv](#).

Definition at line 79 of file `huv_generated_radial_dam_wet.cpp`.

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

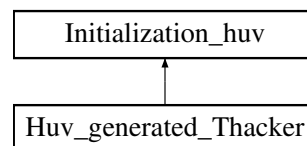
- Headers/libinitializations/[huv\\_generated\\_radial\\_dam\\_wet.hpp](#)
- Sources/libinitializations/[huv\\_generated\\_radial\\_dam\\_wet.cpp](#)

## 5.36 Huv\_generated\_Thacker Class Reference

Thacker configuration.

```
#include <huv_generated_thacker.hpp>
```

Inheritance diagram for Huv\_generated\_Thacker:



### Public Member Functions

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

## Additional Inherited Members

### 5.36.1 Detailed Description

Thacker configuration.

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

Definition at line 74 of file `huv_generated_thacker.hpp`.

### 5.36.2 Constructor & Destructor Documentation

#### **Huv\_generated\_Thacker::Huv\_generated\_Thacker ( Parameters & *par* )**

Constructor.

Defines the characteristics of the paraboloid.

Parameters

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

Definition at line 60 of file `huv_generated_thacker.cpp`.

#### **Huv\_generated\_Thacker::~~Huv\_generated\_Thacker ( ) [virtual]**

Destructor.

Definition at line 106 of file `huv_generated_thacker.cpp`.

### 5.36.3 Member Function Documentation

#### **void Huv\_generated\_Thacker::initialization ( TAB & *h*, TAB & *u*, TAB & *v* ) [virtual]**

Performs the initialization.

Initializes the water height to a plane surface and the velocity to zero, see [Thacker \[1981\]](#).

Parameters

<i>in, out</i>	<i>h</i>	water height.
<i>in, out</i>	<i>u</i>	first component of the velocity.
<i>in, out</i>	<i>v</i>	second component of the velocity.

Implements [Initialization\\_huv](#).

Definition at line 80 of file `huv_generated_thacker.cpp`.

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

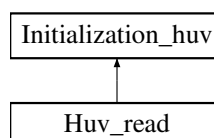
- [Headers/libinitializations/huv\\_generated\\_thacker.hpp](#)
- [Sources/libinitializations/huv\\_generated\\_thacker.cpp](#)

## 5.37 Huv\_read Class Reference

File configuration.

```
#include <huv_read.hpp>
```

Inheritance diagram for Huv\_read:



## Public Member Functions

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

## Additional Inherited Members

### 5.37.1 Detailed Description

File configuration.

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

Definition at line 72 of file `huv_read.hpp`.

### 5.37.2 Constructor & Destructor Documentation

#### **Huv\_read::Huv\_read ( Parameters & *par* )**

Constructor.

Defines the name of the file for the initialization.

**Parameters**

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

Definition at line 60 of file `huv_read.cpp`.

#### **Huv\_read::~~Huv\_read ( ) [virtual]**

Destructor.

Definition at line 201 of file `huv_read.cpp`.

### 5.37.3 Member Function Documentation

#### **void Huv\_read::initialization ( TAB & *h*, TAB & *u*, TAB & *v* ) [virtual]**

Performs the initialization.

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

**Parameters**

<i>in, out</i>	<i>h</i>	water height.
<i>in, out</i>	<i>u</i>	first component of the velocity.
<i>in, out</i>	<i>v</i>	second component of the velocity.

## Warning

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



**Note**

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

Implements [Initialization\\_huv](#).

Definition at line 72 of file `huv_read.cpp`.

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

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

## 5.38 Hydrostatic Class Reference

Hydrostatic reconstruction

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

### Public Member Functions

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

### Protected Attributes

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

#### 5.38.1 Detailed Description

Hydrostatic reconstruction

Class that computes the hydrostatic reconstruction.

Definition at line 67 of file `hydrostatic.hpp`.

#### 5.38.2 Constructor & Destructor Documentation

##### **Hydrostatic::Hydrostatic ( )**

Constructor.

Definition at line 60 of file `hydrostatic.cpp`.

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

Destructor.

Definition at line 102 of file `hydrostatic.cpp`.

### 5.38.3 Member Function Documentation

**void Hydrostatic::calcul ( SCALAR *hl*, SCALAR *hr*, SCALAR *dz* )**

Calculates the hydrostatic reconstruction.

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

**Parameters**

<code>in</code>	<code>hl</code>	water height on the cell located at the left of the boundary.
<code>in</code>	<code>hr</code>	water height on the cell located at the right of the boundary.
<code>in</code>	<code>dz</code>	Difference between the values of the topography of the two adjacent cells.

**Modifies**

`Hydrostatic::hl_rec`, set to  $(hl - \max(0, dz))_+$ .

`Hydrostatic::hr_rec`, set to  $(hr - \max(0, -dz))_+$ .

Definition at line 63 of file `hydrostatic.cpp`.

**SCALAR Hydrostatic::get\_hhydro\_l ( )**

Gives the reconstructed water height on the left.

**Returns**

`Hydrostatic::hl_rec` Hydrostatic reconstruction on the left.

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

**SCALAR Hydrostatic::get\_hhydro\_r ( )**

Gives the reconstructed water height on the right.

**Returns**

`Hydrostatic::hr_rec` Hydrostatic reconstruction on the right.

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

**5.38.4 Member Data Documentation****SCALAR Hydrostatic::hl\_rec [protected]**

Hydrostatic reconstruction on the left

Definition at line 87 of file `hydrostatic.hpp`.

**SCALAR Hydrostatic::hr\_rec [protected]**

Hydrostatic reconstruction on the right

Definition at line 89 of file `hydrostatic.hpp`.

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

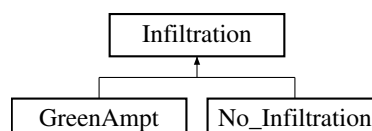
- Headers/libreconstructions/[hydrostatic.hpp](#)
- Sources/libreconstructions/[hydrostatic.cpp](#)

**5.39 Infiltration Class Reference**

Definition of infiltration law.

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

Inheritance diagram for Infiltration:



## Public Member Functions

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

## Protected Attributes

- const int [NXCELL](#)
- const int [NYCELL](#)
- const [SCALAR](#) [DX](#)
- const [SCALAR](#) [DY](#)
- [TAB](#) [hmod](#)
- [TAB](#) [Vin](#)

### 5.39.1 Detailed Description

Definition of infiltration law.

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

Definition at line 71 of file infiltration.hpp.

### 5.39.2 Constructor & Destructor Documentation

#### **[Infiltration::Infiltration](#) ( [Parameters](#) & *par* )**

Constructor.

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

Parameters

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

Definition at line 60 of file infiltration.cpp.

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

Destructor.

Definition at line 103 of file infiltration.cpp.

### 5.39.3 Member Function Documentation

#### **virtual void [Infiltration::calcul](#) ( const [TAB](#) & , const [TAB](#) & , const [SCALAR](#) ) [[pure virtual](#)]**

Function to be specified in each case.

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

**TAB Infiltration::get\_hmod ( ) const**

Gives the modified valued of the water height.

Returns

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

Definition at line 83 of file infiltration.cpp.

**TAB Infiltration::get\_Vin ( ) const**

Gives the infiltrated volume.

Returns

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

Definition at line 93 of file infiltration.cpp.

**5.39.4 Member Data Documentation****const SCALAR Infiltration::DX [protected]**

Space step in the first (x) direction.

Definition at line 96 of file infiltration.hpp.

**const SCALAR Infiltration::DY [protected]**

Space step in the second (y) direction.

Definition at line 98 of file infiltration.hpp.

**TAB Infiltration::hmod [protected]**

Modified valued of the water height

Definition at line 100 of file infiltration.hpp.

**const int Infiltration::NXCELL [protected]**

Number of cells in space in the first (x) direction.

Definition at line 92 of file infiltration.hpp.

**const int Infiltration::NYCELL [protected]**

Number of cells in space in the second (y) direction.

Definition at line 94 of file infiltration.hpp.

**TAB Infiltration::Vin [protected]**

Infiltrated volume

Definition at line 102 of file infiltration.hpp.

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

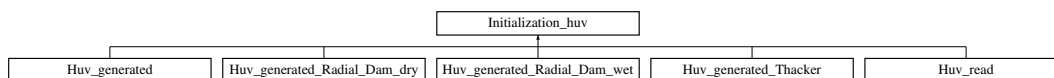
- Headers/librain\_infiltration/[infiltration.hpp](#)
- Sources/librain\_infiltration/[infiltration.cpp](#)

## 5.40 Initialization\_huv Class Reference

Initialization of h, u and v.

```
#include <initialization_huv.hpp>
```

Inheritance diagram for Initialization\_huv:



### Public Member Functions

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

### Protected Attributes

- const int [NXCELL](#)
- const int [NYCELL](#)
- const [SCALAR DX](#)
- const [SCALAR DY](#)

#### 5.40.1 Detailed Description

Initialization of h, u and v.

Class that contains all the common declarations for the initialization of the water height and of the velocity.  
Definition at line 71 of file initialization\_huv.hpp.

#### 5.40.2 Constructor & Destructor Documentation

**Initialization\_huv::Initialization\_huv ( [Parameters](#) & *par* )**

Constructor.

Defines the numbers of cells and the space steps.

**Parameters**

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

Definition at line 59 of file initialization\_huv.cpp.

**Initialization\_huv::~~Initialization\_huv ( ) [virtual]**

Destructor.

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

#### 5.40.3 Member Function Documentation

**virtual void Initialization\_huv::initialization ( [TAB](#) &, [TAB](#) &, [TAB](#) & ) [pure virtual]**

Function to be specified in each initialization.

Implemented in [Huv\\_generated\\_Radial\\_Dam\\_wet](#), [Huv\\_generated\\_Thacker](#), [Huv\\_generated\\_Radial\\_Dam\\_dry](#), [Huv\\_generated](#), and [Huv\\_read](#).

#### 5.40.4 Member Data Documentation

**const SCALAR Initialization\_huv::DX** **[protected]**

Space step in the x direction.

Definition at line 90 of file initialization\_huv.hpp.

**const SCALAR Initialization\_huv::DY** **[protected]**

Space step in the y direction.

Definition at line 92 of file initialization\_huv.hpp.

**const int Initialization\_huv::NXCELL** **[protected]**

Number of cells in space in the x direction.

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

**const int Initialization\_huv::NYCELL** **[protected]**

Number of cells in space in the y direction.

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

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

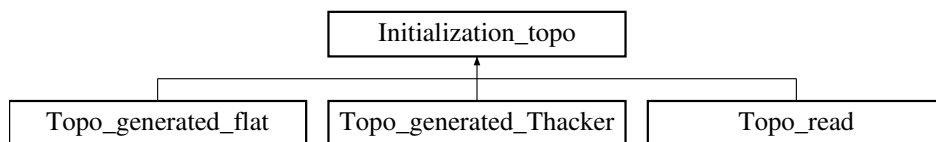
- Headers/libinitializations/[initialization\\_huv.hpp](#)
- Sources/libinitializations/[initialization\\_huv.cpp](#)

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

#### Protected Attributes

- const int [NXCELL](#)
- const int [NYCELL](#)
- const [SCALAR DX](#)
- const [SCALAR DY](#)

### 5.41.1 Detailed Description

Initialization of `z`.

Class that contains all the common declarations for the initialization of the topography.

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

### 5.41.2 Constructor & Destructor Documentation

#### **Initialization\_topo::Initialization\_topo ( Parameters & *par* )**

Constructor.

Defines the numbers of cells and the space steps.

Parameters

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

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

#### **Initialization\_topo::~~Initialization\_topo ( ) [virtual]**

Destructor.

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

### 5.41.3 Member Function Documentation

#### **virtual void Initialization\_topo::initialization ( TAB & ) [pure virtual]**

Function to be specified in each initialization.

Implemented in [Topo\\_generated\\_flat](#), [Topo\\_generated\\_Thacker](#), and [Topo\\_read](#).

### 5.41.4 Member Data Documentation

#### **const SCALAR Initialization\_topo::DX [protected]**

Space step in the x direction.

Definition at line 91 of file `initialization_topo.hpp`.

#### **const SCALAR Initialization\_topo::DY [protected]**

Space step in the y direction.

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

#### **const int Initialization\_topo::NXCELL [protected]**

Number of cells in space in the x direction.

Definition at line 87 of file `initialization_topo.hpp`.

#### **const int Initialization\_topo::NYCELL [protected]**

Number of cells in space in the y direction.

Definition at line 89 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](#)

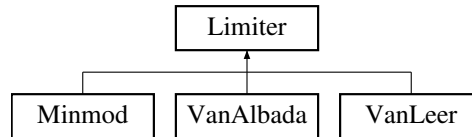


## 5.42 Limiter Class Reference

Slope limiter.

```
#include <limiter.hpp>
```

Inheritance diagram for Limiter:



### Public Member Functions

- [Limiter](#) ()  
*Constructor.*
- virtual void [calcul](#) (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](#)

#### 5.42.1 Detailed Description

Slope limiter.

Class that contains all the common declarations for the slope limiters.

Definition at line 71 of file limiter.hpp.

#### 5.42.2 Constructor & Destructor Documentation

**Limiter::Limiter ( )**

Constructor.

Definition at line 59 of file limiter.cpp.

**Limiter::~~Limiter ( ) [virtual]**

Destructor.

Definition at line 73 of file limiter.cpp.

#### 5.42.3 Member Function Documentation

**virtual void Limiter::calcul ( SCALAR , SCALAR ) [pure virtual]**

Function to be specified in each slope limiter.

Implemented in [Minmod](#), [VanAlbada](#), and [VanLeer](#).

**SCALAR Limiter::get\_rec ( ) const**

Gives the reconstructed value.

Returns

[Limiter::rec](#) reconstructed value.

Definition at line 63 of file limiter.cpp.

**5.42.4 Member Data Documentation****SCALAR Limiter::rec [protected]**

Reconstructed value

Definition at line 90 of file limiter.hpp.

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

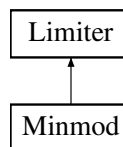
- Headers/liblimitations/[limiter.hpp](#)
- Sources/liblimitations/[limiter.cpp](#)

**5.43 Minmod Class Reference**

Minmod slope limiter

```
#include <minmod.hpp>
```

Inheritance diagram for Minmod:

**Public Member Functions**

- [Minmod \( \)](#)  
*Constructor.*
- void [calcul \(SCALAR, SCALAR\)](#)  
*Calculates the value of the slope limiter.*
- virtual [~Minmod \( \)](#)  
*Destructor.*

**Additional Inherited Members****5.43.1 Detailed Description**

Minmod slope limiter

Class that calculates the minmod slope limiter.

Definition at line 71 of file minmod.hpp.

**5.43.2 Constructor & Destructor Documentation****Minmod::Minmod ( )**

Constructor.

Definition at line 59 of file minmod.cpp.

**Minmod::~Minmod ( ) [virtual]**

Destructor.

Definition at line 88 of file minmod.cpp.

### 5.43.3 Member Function Documentation

**void Minmod::calcul ( 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 62 of file minmod.cpp.

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

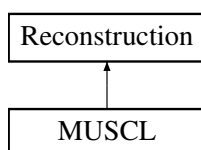
- Headers/liblimitations/[minmod.hpp](#)
- Sources/liblimitations/[minmod.cpp](#)

## 5.44 MUSCL Class Reference

MUSCL reconstruction

```
#include <muscl.hpp>
```

Inheritance diagram for MUSCL:



### Public Member Functions

- [MUSCL](#) ([Parameters](#) &, [TAB](#) &)

*Constructor.*

- void [calcul](#) ([TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &)

*Calculates the reconstruction in space.*

- [~MUSCL](#) ()

*Destructor.*

## Additional Inherited Members

### 5.44.1 Detailed Description

MUSCL reconstruction

Class that computes MUSCL reconstruction in space.

Definition at line 72 of file muscl.hpp.

### 5.44.2 Constructor & Destructor Documentation

**MUSCL::MUSCL ( Parameters & *par*, TAB & *z* )**

Constructor.

Initializations.

Parameters

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

Definition at line 60 of file muscl.cpp.

**MUSCL::~~MUSCL ( )**

Destructor.

Definition at line 225 of file muscl.cpp.

### 5.44.3 Member Function Documentation

**void MUSCL::calcul ( TAB & *h*, TAB & *u*, TAB & *v*, TAB & *z*, TAB & *delzc1*, TAB & *delzc2*, TAB & *delz1*, TAB & *delz2*, TAB & *h1r*, TAB & *u1r*, TAB & *v1r*, TAB & *h1l*, TAB & *u1l*, TAB & *v1l*, TAB & *h2r*, TAB & *u2r*, TAB & *v2r*, TAB & *h2l*, TAB & *u2l*, TAB & *v2l* ) [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 the first direction.
in	<i>v</i>	velocity of the flow in the second direction.
in	<i>z</i>	topography.
out	<i>delzc1</i>	difference between the reconstructed topographies on the left and on the right boundary of a cell in the first direction.
out	<i>delzc2</i>	difference between the reconstructed topographies on the left and on the right boundary of a cell in the second direction.
out	<i>delz1</i>	difference between two reconstructed topographies on the same boundary (from two adjacent cells) in the first direction.
out	<i>delz2</i>	difference between two reconstructed topographies on the same boundary (from two adjacent cells) in the second direction.
out	<i>h1r</i>	reconstructed water height on the right of the cell in the first direction.
out	<i>u1r</i>	first component of the reconstructed velocity on the right of the cell in the first direction.

out	<i>v1r</i>	second component of the reconstructed velocity on the right of the cell in the first direction.
out	<i>h1l</i>	reconstructed water height on the left of the cell in the first direction.
out	<i>u1l</i>	first component of the reconstructed velocity on the left of the cell in the first direction.
out	<i>v1l</i>	second component of the reconstructed velocity on the left of the cell in the first direction.
out	<i>h2r</i>	reconstructed water height on the right of the cell in the second direction.
out	<i>u2r</i>	first component of the reconstructed velocity on the right of the cell in the second direction.
out	<i>v2r</i>	second component of the reconstructed velocity on the right of the cell in the second direction.
out	<i>h2l</i>	reconstructed water height on the left of the cell in the second direction.
out	<i>u2l</i>	first component of the reconstructed velocity on the left of the cell in the second direction.
out	<i>v2l</i>	second component of the reconstructed velocity on the left of the cell in the second direction.

Implements [Reconstruction](#).

Definition at line 72 of file `muscl.cpp`.

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

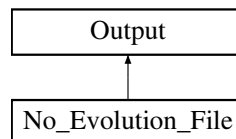
- Headers/libreconstructions/[muscl.hpp](#)
- Sources/libreconstructions/[muscl.cpp](#)

## 5.45 No\_Evolution\_File Class Reference

No output.

```
#include <no_evolution_file.hpp>
```

Inheritance diagram for `No_Evolution_File`:



### Public Member Functions

- [No\\_Evolution\\_File](#) ([Parameters](#) &)  
*Constructor.*
- void [write](#) (const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [SCALAR](#) &)  
*Saves one time step: nothing to do.*
- virtual [~No\\_Evolution\\_File](#) ()  
*Destructor.*

### Additional Inherited Members

#### 5.45.1 Detailed Description

No output.

No output files with time evolution are created.

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

### 5.45.2 Constructor & Destructor Documentation

**No\_Evolution\_File::No\_Evolution\_File ( 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 no\_evolution\_file.cpp.

**No\_Evolution\_File::~No\_Evolution\_File ( ) [virtual]**

Destructor.

Definition at line 88 of file no\_evolution\_file.cpp.

**5.45.3 Member Function Documentation****void No\_Evolution\_File::write ( const TAB & *h*, const TAB & *u*, const TAB & *v*, const TAB & *z*, const SCALAR & *time* ) [virtual]**

Saves one time step: nothing to do.

Does nothing.

**Parameters**

<i>in</i>	<i>h</i>	the water height (unused).
<i>in</i>	<i>u</i>	first component of the velocity (unused).
<i>in</i>	<i>v</i>	second component of the velocity (unused).
<i>in</i>	<i>z</i>	the topography (unused).
<i>in</i>	<i>time</i>	the current time (unused).

Implements [Output](#).

Definition at line 67 of file no\_evolution\_file.cpp.

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

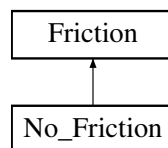
- Headers/libsave/[no\\_evolution\\_file.hpp](#)
- Sources/libsave/[no\\_evolution\\_file.cpp](#)

**5.46 No\_Friction Class Reference**

No friction.

```
#include <no_friction.hpp>
```

Inheritance diagram for No\_Friction:

**Public Member Functions**

- [No\\_Friction](#) ([Parameters](#) &)  
*Constructor.*
- void [calcul](#) (const TAB &, const TAB &, const TAB &, const TAB &, const TAB &, SCALAR)  
*Does no calculation.*
- void [calculSf](#) (const TAB &, const TAB &, const TAB &)  
*Return the friction term equal to zero.*
- virtual [~No\\_Friction](#) ()  
*Destructor.*

## Additional Inherited Members

### 5.46.1 Detailed Description

No friction.

Does no computation.

Definition at line 71 of file no\_friction.hpp.

### 5.46.2 Constructor & Destructor Documentation

#### No\_Friction::No\_Friction ( Parameters & *par* )

Constructor.

Parameters

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

Definition at line 59 of file no\_friction.cpp.

#### No\_Friction::~~No\_Friction ( ) [virtual]

Destructor.

Definition at line 123 of file no\_friction.cpp.

### 5.46.3 Member Function Documentation

**void No\_Friction::calcul ( const TAB & *uold*, const TAB & *vold*, const TAB & *hnew*, const TAB & *q1new*, const TAB & *q2new*, SCALAR *dt* ) [virtual]**

Does no calculation.

No computation (no friction).

Parameters

<i>in</i>	<i>uold</i>	velocity in the first direction at the previous time ( <i>n</i> if you are calculating the <i>n</i> + 1th time step) (unused).
<i>in</i>	<i>vold</i>	velocity in the second direction at the previous time ( <i>n</i> if you are calculating the <i>n</i> + 1th time step) (unused).
<i>in</i>	<i>hnew</i>	water height after the Shallow-Water computation (without friction) (unused).
<i>in</i>	<i>q1new</i>	discharge in the first direction after the Shallow-Water computation (without friction) (unused).
<i>in</i>	<i>q2new</i>	discharge in the second direction after the Shallow-Water computation (without friction) (unused).
<i>in</i>	<i>dt</i>	time step (unused).

Modifies

[Friction::q1mod](#) discharge in the first direction modified by the friction term,

[Friction::q2mod](#) discharge in the second direction modified by the friction term.

Implements [Friction](#).

Definition at line 68 of file no\_friction.cpp.

**void No\_Friction::calculSf ( const TAB & *h*, const TAB & *u*, const TAB & *v* ) [virtual]**

Return the friction term equal to zero.

Explicit friction term:  $S_f = 0$ .



**Parameters**

<code>in</code>	<code>h</code>	water height (unused).
<code>in</code>	<code>u</code>	velocity in the first direction (unused).
<code>in</code>	<code>v</code>	velocity in the second direction (unused).

**Modifies**

[Friction::Sf1](#) explicit friction term in the first direction,  
[Friction::Sf2](#) explicit friction term in the second direction.

**Note**

This explicit friction term will be used for erosion.

Implements [Friction](#).

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

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

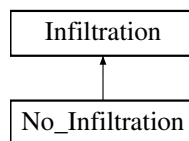
- Headers/libfrictions/[no\\_friction.hpp](#)
- Sources/libfrictions/[no\\_friction.cpp](#)

**5.47 No\_Infiltration Class Reference**

No infiltration.

```
#include <no_infiltration.hpp>
```

Inheritance diagram for No\_Infiltration:

**Public Member Functions**

- [No\\_Infiltration](#) ([Parameters](#) &)  
*Constructor.*
- void [calcul](#) (const [TAB](#) &, const [TAB](#) &, const [SCALAR](#))  
*Does no infiltration.*
- virtual [~No\\_Infiltration](#) ()  
*Destructor.*

**Additional Inherited Members****5.47.1 Detailed Description**

No infiltration.

The water height and infiltrated volume remain unchanged.

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

**5.47.2 Constructor & Destructor Documentation**

**No\_Infiltration::No\_Infiltration ( [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 no\_infiltration.cpp.

**No\_Infiltration::~No\_Infiltration ( ) [virtual]**

Destructor.

Definition at line 90 of file no\_infiltration.cpp.

**5.47.3 Member Function Documentation****void No\_Infiltration::calcul ( const TAB & *h*, const TAB & *Vin\_tot*, const SCALAR *dt* ) [virtual]**

Does no infiltration.

No computation (water height and infiltrated volume remain unchanged).

**Parameters**

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

**Modifies**

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

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

Implements [Infiltration](#).

Definition at line 67 of file no\_infiltration.cpp.

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

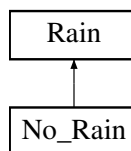
- Headers/librain\_infiltration/[no\\_infiltration.hpp](#)
- Sources/librain\_infiltration/[no\\_infiltration.cpp](#)

**5.48 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](#), [TAB](#) &)  
*Sets the rain intensity to zero.*
- virtual [~No\\_Rain](#) ()  
*Destructor.*

## Additional Inherited Members

### 5.48.1 Detailed Description

No rain.

Sets the rain intensity to zero.

Definition at line 70 of file no\_rain.hpp.

### 5.48.2 Constructor & Destructor Documentation

#### No\_Rain::No\_Rain ( 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 no\_rain.cpp.

#### No\_Rain::~~No\_Rain ( ) [virtual]

Destructor.

Definition at line 85 of file no\_rain.cpp.

### 5.48.3 Member Function Documentation

#### void No\_Rain::rain\_func ( SCALAR *time*, TAB & *Tab\_rain* ) [virtual]

Sets the rain intensity to zero.

No computation (rain intensity set to zero).

Parameters

<i>in</i>	<i>time</i>	current time (unused).
<i>in, out</i>	<i>Tab_rain</i>	rain intensity at the current time on each cell.

Implements [Rain](#).

Definition at line 68 of file no\_rain.cpp.

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

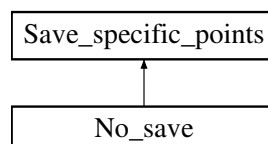
- Headers/librain\_infiltration/[no\\_rain.hpp](#)
- Sources/librain\_infiltration/[no\\_rain.cpp](#)

## 5.49 No\_save Class Reference

No output.

```
#include <no_save.hpp>
```

Inheritance diagram for No\_save:



## Public Member Functions

- [No\\_save](#) ([Parameters](#) &)  
*Constructor.*
- void [save](#) (const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [SCALAR](#))  
*Nothing to do.*
- virtual [~No\\_save](#) ()  
*Destructor.*

## Additional Inherited Members

### 5.49.1 Detailed Description

No output.

No output files for specific points are created.

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

### 5.49.2 Constructor & Destructor Documentation

#### **No\_save::No\_save ( [Parameters](#) & *par* )**

Constructor.

**Parameters**

<a href="#">in</a>	<a href="#">par</a>	parameter, contains all the values from the parameters file (unused).
--------------------	---------------------	---

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

#### **No\_save::~~No\_save ( ) [[virtual](#)]**

Destructor.

Definition at line 85 of file `no_save.cpp`.

### 5.49.3 Member Function Documentation

#### **void No\_save::save ( const [TAB](#) & *h*, const [TAB](#) & *u*, const [TAB](#) & *v*, const [SCALAR](#) *time* ) [[virtual](#)]**

Nothing to do.

Does nothing.

**Parameters**

<a href="#">in</a>	<a href="#">h</a>	the water height (unused).
<a href="#">in</a>	<a href="#">u</a>	first component of the velocity (unused).
<a href="#">in</a>	<a href="#">v</a>	second component of the velocity (unused).
<a href="#">in</a>	<a href="#">time</a>	the current time (unused).

Implements [Save\\_specific\\_points](#).

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

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

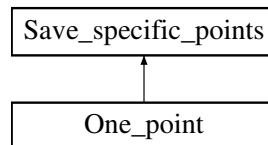
- Headers/libsave/[no\\_save.hpp](#)
- Sources/libsave/[no\\_save.cpp](#)

## 5.50 One\_point Class Reference

One point output.

```
#include <one_point.hpp>
```

Inheritance diagram for One\_point:



### Public Member Functions

- `One_point (Parameters &)`  
*Constructor.*
- `void save (const TAB &, const TAB &, const TAB &, const SCALAR)`  
*Saves the values at one point.*
- `virtual ~One_point ()`  
*Destructor.*

### Additional Inherited Members

#### 5.50.1 Detailed Description

One point output.

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

Definition at line 73 of file one\_point.hpp.

#### 5.50.2 Constructor & Destructor Documentation

##### One\_point::One\_point ( Parameters & par )

Constructor.

Writes the header of the file 'hu\_specific\_points.dat'.

Parameters

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

Warning

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

Note

If hu\_specific\_points.dat cannot be opened, the code will exit with failure termination code.

Definition at line 60 of file one\_point.cpp.

##### One\_point::~One\_point ( ) [virtual]

Destructor.

Definition at line 132 of file one\_point.cpp.

### 5.50.3 Member Function Documentation

**void One\_point::save ( const TAB & *h*, const TAB & *u*, const TAB & *v*, const SCALAR *time* )**  
**[virtual]**

Saves the values at one point.

Writes the values of [Scheme::h](#), [Scheme::u](#) ( $=q1/h$ ), [Scheme::v](#) ( $=q2/h$ ), [Scheme::h](#)+ [Scheme::z](#) (free surface), [Scheme::z](#),  $|U| = \sqrt{u^2 + v^2}$ , the Froude number  $\frac{|U|}{\sqrt{gh}}$ , [Scheme::q1](#), [Scheme::q2](#), and  $h|U|$  at the current time in "hu\_specific\_points.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>u</i>	first component of the velocity.
in	<i>v</i>	second component of the velocity.
in	<i>time</i>	the current time.

Implements [Save\\_specific\\_points](#).

Definition at line 91 of file one\_point.cpp.

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

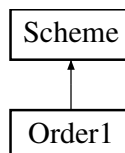
- Headers/libsave/[one\\_point.hpp](#)
- Sources/libsave/[one\\_point.cpp](#)

## 5.51 Order1 Class Reference

Order 1 scheme.

```
#include <order1.hpp>
```

Inheritance diagram for Order1:



### Public Member Functions

- [Order1](#) ([Parameters](#) &)  
*Constructor.*
- void [calcul](#) ()  
*Performs the numerical scheme.*
- virtual [~Order1](#) ()  
*Destructor.*

### Additional Inherited Members

#### 5.51.1 Detailed Description

Order 1 scheme.

Class that computes the solution with a numerical scheme at order 1.

Definition at line 71 of file order1.hpp.

### 5.51.2 Constructor & Destructor Documentation

#### Order1::Order1 ( Parameters & *par* )

Constructor.

**Parameters**

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

Definition at line 59 of file order1.cpp.

**Order1::~~Order1 ( ) [virtual]**

Destructor.

Definition at line 257 of file order1.cpp.

**5.51.3 Member Function Documentation****void Order1::calcul ( ) [virtual]**

Performs the numerical scheme.

Performs the first order numerical scheme.

Note

In DEBUG mode, the programme will save four other files with boundary fluxes and volumes of water.

Warning

order1: WARNING: the computation finished because the maximum number of time steps was reached (see MAX\_ITER in [misc.hpp](#))

Implements [Scheme](#).

Definition at line 69 of file order1.cpp.

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

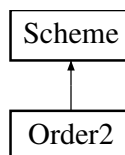
- Headers/libschemas/[order1.hpp](#)
- Sources/libschemas/[order1.cpp](#)

**5.52 Order2 Class Reference**

Order 2 scheme.

```
#include <order2.hpp>
```

Inheritance diagram for Order2:

**Public Member Functions**

- [Order2](#) ([Parameters](#) &)  
*Constructor.*
- void [calcul](#) ()  
*Performs the numerical scheme.*
- virtual [~Order2](#) ()  
*Destructor.*



## Additional Inherited Members

### 5.52.1 Detailed Description

Order 2 scheme.

Class that computes the solution with a numerical scheme at order 2.

Definition at line 71 of file order2.hpp.

### 5.52.2 Constructor & Destructor Documentation

#### Order2::Order2 ( Parameters & *par* )

Constructor.

Initializations, definition of the reconstruction and creation of 3 vectors for this reconstruction.

Parameters

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

Definition at line 59 of file order2.cpp.

#### Order2::~~Order2 ( ) [virtual]

Destructor.

Definition at line 97 of file order2.cpp.

### 5.52.3 Member Function Documentation

#### void Order2::calcul ( ) [virtual]

Performs the numerical scheme.

Performs the second order numerical scheme.

Note

In DEBUG mode, the programme will save another file with volumes of water.

Warning

order2: WARNING: the computation finished because the maximum number of time steps was reached (see MAX\_ITER in [misc.hpp](#))

Implements [Scheme](#).

Definition at line 124 of file order2.cpp.

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

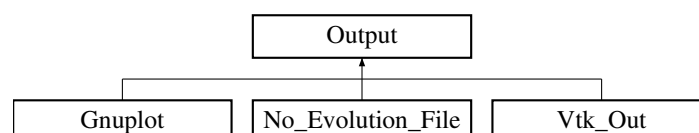
- Headers/libschemas/[order2.hpp](#)
- Sources/libschemas/[order2.cpp](#)

## 5.53 Output Class Reference

Output format

```
#include <output.hpp>
```

Inheritance diagram for Output:



## Public Member Functions

- **Output** (**Parameters** &)

*Constructor.*

- virtual void **write** (const **TAB** &, const **TAB** &, const **TAB** &, const **TAB** &, const **SCALAR** &)=0

*Function to be specified in each output format.*

- void **check\_vol** (const **SCALAR** &, const **SCALAR** &, const **SCALAR** &, const **SCALAR** &, const **SCALAR** &, const **SCALAR** &) const

*Saves the infiltrated and rain volumes.*

- void **result** (const **SCALAR** &, const clock\_t &, const **SCALAR** &, const **SCALAR** &, const **SCALAR** &, const **SCALAR** &, const int &, const **SCALAR** &) const

*Saves global values.*

- void **initial** (const **TAB** &, const **TAB** &, const **TAB** &, const **TAB** &) const

*Saves the initial time.*

- void **final** (const **TAB** &, const **TAB** &, const **TAB** &, const **TAB** &) const

*Saves the final time.*

- **SCALAR boundaries\_flux** (const **SCALAR** &, const **TAB** &, const **TAB** &, const **SCALAR** &, const **SCALAR** &, const int &, const int &)

*Saves the cumulated fluxes on the boundaries.*

- void **boundaries\_flux\_LR** (const **SCALAR** &, const **TAB** &) const

*Saves the fluxes on the left and right boundaries.*

- void **boundaries\_flux\_BT** (const **SCALAR** &, const **TAB** &) const

*Saves the fluxes on the bottom and top boundaries.*

- virtual **~Output** ()

*Destructor.*

## Protected Attributes

- const int **NXCELL**
- const int **NYCELL**
- const **SCALAR DX**
- const **SCALAR DY**
- string **outputDirectory**
- string **namefile\_check\_volume**
- string **namefile\_res**
- string **namefile\_init**
- string **namefile\_final**
- string **namefile\_Bound\_flux**
- string **namefile\_Bound\_flux\_BT**
- string **namefile\_Bound\_flux\_LR**

### 5.53.1 Detailed Description

Output format

Class that contains all the common declarations for the output formats.

Definition at line 70 of file output.hpp.

### 5.53.2 Constructor & Destructor Documentation

#### Output::Output ( Parameters & *par* )

Constructor.

Defines the names of the outputs.

If run in DEBUG mode, writes the header of the file 'boundaries\_flux.dat', 'check\_vol.dat', 'flux\_boundaries\_BT.dat' and 'flux\_boundaries\_LR.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 'boundaries\_flux.dat', 'check\_vol.dat', 'flux\_boundaries\_BT.dat' or 'flux\_boundaries\_LR.dat' cannot be opened, the code will exit with failure termination code.

Definition at line 59 of file output.cpp.

#### Output::~Output ( ) [virtual]

Destructor.

Definition at line 394 of file output.cpp.

### 5.53.3 Member Function Documentation

#### SCALAR Output::boundaries\_flux ( const SCALAR & *time*, const TAB & *flux\_u*, const TAB & *flux\_v*, const SCALAR & *dt*, const SCALAR & *dt\_first*, const int & *ORDER*, const int & *verif* )

Saves the cumulated fluxes on the boundaries.

Parameters

<i>in</i>	<i>time</i>	current time.
<i>in</i>	<i>flux_u</i>	flux on the left and right boundaries ( $m^2/s$ ).
<i>in</i>	<i>flux_v</i>	flux on the bottom and top boundaries ( $m^2/s$ ).
<i>in</i>	<i>dt</i>	current time step.
<i>in</i>	<i>dt_first</i>	previous time step.
<i>in</i>	<i>ORDER</i>	order of scheme.
<i>in</i>	<i>verif</i>	parameter to know if we removed the computation with the previous time step ( <i>dt_first</i> ).

Definition at line 274 of file output.cpp.

#### void Output::boundaries\_flux\_BT ( const SCALAR & *time*, const TAB & *BT\_flux* ) const

Saves the fluxes on the bottom and top boundaries.

Parameters

<i>in</i>	<i>time</i>	current time.
-----------	-------------	---------------

in	<i>BT_flux</i>	flux on the bottom and tom boundaries ( $m^2/s$ ).
----	----------------	--

Definition at line 335 of file output.cpp.

**void Output::boundaries\_flux\_LR ( const SCALAR & *time*, const TAB & *LR\_flux* ) const**

Saves the fluxes on the left and right boundaries.

**Parameters**

in	<i>time</i>	current time.
in	<i>LR_flux</i>	flux on the left and right boundaries ( $m^2/s$ ).

Definition at line 317 of file output.cpp.

**void Output::check\_vol ( const SCALAR & *time*, const SCALAR & *dt*, const SCALAR & *Vol\_rain\_tot*, const SCALAR & *Vol\_inf*, const SCALAR & *Vol\_of*, const SCALAR & *Vol\_bound\_tot* ) const**

Saves the infiltrated and rain volumes.

**Parameters**

in	<i>time</i>	current time.
in	<i>dt</i>	time step (unused).
in	<i>Vol_rain_tot</i>	total rain volume.
in	<i>Vol_inf</i>	volume of infiltrated water.
in	<i>Vol_of</i>	volume of overland flow.
in	<i>Vol_bound_tot</i>	total volume of water at the boundary.

Definition at line 201 of file output.cpp.

**void Output::final ( const TAB & *z*, const TAB & *h*, const TAB & *u*, const TAB & *v* ) const**

Saves the final time.

If the water height is too small, we replace it by 0, the velocities 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>u</i>	first component of the velocity.
in	<i>v</i>	second component of the velocity.

**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.

Definition at line 353 of file output.cpp.

**void Output::initial ( const TAB & *z*, const TAB & *h*, const TAB & *u*, const TAB & *v* ) const**

Saves the initial time.

**Parameters**

<i>in</i>	<i>z</i>	topography.
<i>in</i>	<i>h</i>	water height.
<i>in</i>	<i>u</i>	first component of the velocity.
<i>in</i>	<i>v</i>	second component of the velocity.

**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.

Definition at line 166 of file output.cpp.

**void Output::result ( const SCALAR & *time*, const clock\_t & *cpu*, const SCALAR & *Vol\_rain*, const SCALAR & *Vol\_inf*, const SCALAR & *Vol\_of*, const SCALAR & *FROUDE*, const int & *NBITER*, const SCALAR & *vol\_output* ) const**

Saves global values.

**Parameters**

<i>in</i>	<i>time</i>	elapsed time.
<i>in</i>	<i>cpu</i>	CPU time.
<i>in</i>	<i>Vol_rain</i>	total rain volume.
<i>in</i>	<i>Vol_inf</i>	total volume of infiltrated water.
<i>in</i>	<i>Vol_of</i>	total volume of overland flow.
<i>in</i>	<i>FROUDE</i>	mean Froude number (in space) at the final time.
<i>in</i>	<i>NBITER</i>	number of time steps.
<i>in</i>	<i>vol_output</i>	total outflow volume at the boundary.

**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.

Definition at line 222 of file output.cpp.

**virtual void Output::write ( const TAB & , const TAB & , const TAB & , const TAB & , const SCALAR & ) [pure virtual]**

Function to be specified in each output format.

Implemented in [Gnuplot](#), [Vtk\\_Out](#), and [No\\_Evolution\\_File](#).

**5.53.4 Member Data Documentation**

**const SCALAR Output::DX [protected]**

Space step in the first (x) direction.

Definition at line 110 of file output.hpp.

**const SCALAR Output::DY [protected]**

Space step in the second (y) direction.

Definition at line 112 of file output.hpp.

**string Output::namefile\_Bound\_flux [protected]**

Name of the file where the cumulated boundary fluxes are saved.

Definition at line 124 of file output.hpp.

**string Output::namefile\_Bound\_flux\_BT [protected]**

Name of the file where the bottom and top boundary fluxes are saved.

Definition at line 126 of file output.hpp.

**string Output::namefile\_Bound\_flux\_LR [protected]**

Name of the file where the left and right boundary fluxes are saved.

Definition at line 128 of file output.hpp.

**string Output::namefile\_check\_volume [protected]**

Name of the file where the verification of volumes is saved.

Definition at line 116 of file output.hpp.

**string Output::namefile\_final [protected]**

Name of the file where the final time is saved.

Definition at line 122 of file output.hpp.

**string Output::namefile\_init [protected]**

Name of the file where the initialization is saved.

Definition at line 120 of file output.hpp.

**string Output::namefile\_res [protected]**

Name of the file where the global results are saved.

Definition at line 118 of file output.hpp.

**const int Output::NXCELL [protected]**

Number of cells in space in the first (x) direction.

Definition at line 106 of file output.hpp.

**const int Output::NYCELL [protected]**

Number of cells in space in the second (y) direction.

Definition at line 108 of file output.hpp.

**string Output::outputDirectory [protected]**

Name of the output directory.

Definition at line 114 of file output.hpp.

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

- Headers/libsave/output.hpp
- Sources/libsave/output.cpp

**5.54 Parameters Class Reference**

Gets parameters.

```
#include <parameters.hpp>
```

**Public Member Functions**

- [Parameters](#) ()  
*Constructor.*
- void [setparameters](#) (const char \*)  
*Sets the parameters.*
- virtual [~Parameters](#) ()  
*Destructor.*
- int [get\\_Nxcell](#) () const  
*Gives the number of cells in space along x.*
- int [get\\_Nycell](#) () const  
*Gives the number of cells in space along y.*
- [SCALAR get\\_T](#) () const  
*Gives the final time.*
- int [get\\_nbtimes](#) () const  
*Gives the number of times saved.*
- int [get\\_scheme\\_type](#) () const  
*Gives the choice of type of scheme (fixed cfl or fixed dt)*
- [SCALAR get\\_dtfix](#) () const  
*Gives the fixed time step from the parameters.txt file.*
- [SCALAR get\\_cflfix](#) () const  
*Gives the cfl of the scheme.*
- [SCALAR get\\_dx](#) () const  
*Gives the space step along x.*
- [SCALAR get\\_dy](#) () const  
*Gives the space step along y.*
- [SCALAR get\\_L](#) () const  
*Gives the length of the domain in the first (x) direction.*
- [SCALAR get\\_I](#) () const  
*Gives the length of the domain in the second (y) direction.*
- map< int, int > & [get\\_Lbound](#) ()  
*Gives the value corresponding to the left boundary condition.*
- map< [SCALAR](#), string > & [get\\_times\\_files\\_Lbound](#) ()  
*Gives the list of files and time values corresponding to the left boundary condition.*
- int [get\\_type\\_Lbound](#) () const

- Gives the type (constant or file) of the left boundary condition.*

  - `map< int, SCALAR > & get_left_imp_discharge ()`  
*Gives the value of the imposed discharge in left bc.*
  - `map< int, SCALAR > & get_left_imp_h ()`  
*Gives the value of the imposed water height in left bc.*
  - `map< int, int > & get_Rbound ()`  
*Gives the value corresponding to the right boundary condition.*
  - `map< SCALAR, string > & get_times_files_Rbound ()`  
*Gives the list of files and time values corresponding to the right boundary condition.*
  - `int get_type_Rbound () const`  
*Gives the type (constant or file) of right boundary condition.*
  - `map< int, SCALAR > & get_right_imp_discharge ()`  
*Gives the value of the imposed discharge in right bc.*
  - `map< int, SCALAR > & get_right_imp_h ()`  
*Gives the value of the imposed water height in right bc.*
  - `map< int, int > & get_Bbound ()`  
*Gives the value corresponding to the bottom boundary condition.*
  - `map< SCALAR, string > & get_times_files_Bbound ()`  
*Gives the list of files and time values corresponding to the bottom boundary condition.*
  - `int get_type_Bbound () const`  
*Gives the type (constant or file) of bottom boundary condition.*
  - `map< int, SCALAR > & get_bottom_imp_discharge ()`  
*Gives the value of the imposed discharge in bottom bc.*
  - `map< int, SCALAR > & get_bottom_imp_h ()`  
*Gives the value of the imposed water height in bottom bc.*
  - `map< int, int > & get_Tbound ()`  
*Gives the value corresponding to the top boundary condition.*
  - `map< SCALAR, string > & get_times_files_Tbound ()`  
*Gives the list of files and time values corresponding to the top boundary condition.*
  - `int get_type_Tbound () const`  
*Gives the type (constant or file) of bottom boundary condition.*
  - `map< int, SCALAR > & get_top_imp_discharge ()`  
*Gives the value of the imposed discharge in top bc.*
  - `map< int, SCALAR > & get_top_imp_h ()`  
*Gives the value of the imposed water height in top bc.*
  - `int get_flux () const`  
*Gives the value corresponding to the flux.*
  - `int get_order () const`  
*Gives the order 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.*
  - `int get_lim () const`  
*Gives the value corresponding to the limiter.*
  - `int get_inf () const`  
*Gives the choice of infiltration model.*



- `SCALAR get_amortENO () const`  
*Gives the value of the amortENO parameter.*
- `SCALAR get_modifENO () const`  
*Gives the value of the modifENO parameter.*
- `SCALAR get_friccoef () const`  
*Gives the value of the friction coefficient.*
- `int get_fric_init () const`  
*Gives the value characterizing the spatialization (or not) of the friction coefficient.*
- `string get_KcNameFile (void) const`  
*Gives the full name of the file containing the hydraulic conductivity of the crust.*
- `string get_KcNameFileS () const`  
*Gives the name of the file containing the hydraulic conductivity of the crust.*
- `string get_KsNameFile (void) const`  
*Gives the full name of the file containing the hydraulic conductivity of the surface.*
- `string get_KsNameFileS () const`  
*Gives the name of the file containing the hydraulic conductivity of the surface.*
- `string get_dthetaNameFile (void) const`  
*Gives the full name of the file containing the water content.*
- `string get_dthetaNameFileS () const`  
*Gives the name of the file containing the water content.*
- `string get_PsiNameFile (void) const`  
*Gives the full name of the file containing the load pressure.*
- `string get_PsiNameFileS () const`  
*Gives the name of the file containing the load pressure.*
- `string get_zcrustNameFile (void) const`  
*Gives the full name of the file containing the thickness of the crust.*
- `string get_zcrustNameFileS () const`  
*Gives the name of the file containing the thickness of the crust.*
- `string get_imaxNameFile (void) const`  
*Gives the full name of the file containing the maximum infiltration rate.*
- `string get_imaxNameFileS () const`  
*Gives the name of the file containing the maximum infiltration rate.*
- `int get_Kc_init () const`  
*Gives the value characterizing the spatialization (or not) of the hydraulic conductivity of the crust.*
- `SCALAR get_Kc_coef () const`  
*Gives the value of the hydraulic conductivity of the crust.*
- `int get_Ks_init () const`  
*Gives the value characterizing the spatialization (or not) of the hydraulic conductivity of the soil.*
- `SCALAR get_Ks_coef () const`  
*Gives the value of the hydraulic conductivity of the soil.*
- `int get_dtheta_init () const`  
*Gives the value characterizing the spatialization (or not) of the water content.*
- `SCALAR get_dtheta_coef () const`  
*Gives the value of the water content.*
- `int get_Psi_init () const`  
*Gives the value characterizing the spatialization (or not) of the load pressure.*
- `SCALAR get_Psi_coef () const`

- Gives the value of the load pressure.*

  - int `get_zcrust_init` () const
 

*Gives the value characterizing the spatialization (or not) of the thickness of the crust.*
  - SCALAR `get_zcrust_coef` () const
 

*Gives the value of the thickness of the crust.*
  - int `get_imax_init` () const
 

*Gives the value characterizing the spatialization (or not) of the maximum infiltration rate.*
  - SCALAR `get_imax_coef` () const
 

*Gives the value of the maximum infiltration rate.*
  - int `get_topo` () const
 

*Gives the value corresponding to the choice of topography.*
  - int `get_huv` () const
 

*Gives the value corresponding to the choice of initialization of h, u and v.*
  - int `get_rain` () const
 

*Gives the value corresponding to the choice of initialization of rain.*
  - string `get_topographyNameFile` (void) const
 

*Gives the full name of the file containing the topography.*
  - string `get_topographyNameFileS` () const
 

*Gives the name of the file containing the topography.*
  - string `get_huvNameFile` (void) const
 

*Gives the full name of the file containing the water height (h) and the velocities (u and v)*
  - string `get_huvNameFileS` (void) const
 

*Gives the name of the file containing the water height (h) and the velocities (u and v)*
  - string `get_rainNameFile` (void) const
 

*Gives the full name of the file containing the rain.*
  - string `get_rainNameFileS` (void) const
 

*Gives the name of the file containing the rain.*
  - string `get_frictionNameFile` (void) const
 

*Gives the full name of the file containing the friction coefficient.*
  - string `get_frictionNameFileS` (void) const
 

*Gives the name of the file containing the friction coefficient.*
  - string `get_outputDirectory` (void) const
 

*Gives the output directory with the suffix.*
  - string `get_suffix` (void) const
 

*Gives the suffix for the 'Outputs' directory.*
  - int `get_output` () const
 

*Gives the value corresponding to the choice of the format of the [Output](#) file.*
  - int `get_choice_specific_point` () const
 

*Gives the choice of specific points to be saved.*
  - int `get_choice_dt_specific_points` () const
 

*Gives the choice of time step for specific points to be saved.*
  - SCALAR `get_dt_specific_points` () const
 

*Gives time step for specific points to be saved.*
  - void `fill_array` (TAB &, const SCALAR) const
 

*Fills the TAB array with a SCALAR.*
  - void `fill_array` (TAB &, string) const
 

*Fills the TAB array with the values contained in a file.*

- bool `is_coord_in_file_valid` (const `SCALAR` &x, const `SCALAR` &y, int num\_lin, string namefile) const  
*Verifies if the coordinates x and y exist in the mesh.*
- `SCALAR get_x_coord` (void) const  
*Gives x coordinate of the specific point to be saved.*
- `SCALAR get_y_coord` (void) const  
*Gives y coordinate of the specific point to be saved.*
- string `get_list_pointNameFile` (void) const  
*Gives the full name of file containing the list of the specific points.*
- string `get_list_pointNameFileS` (void) const  
*Gives the name of the file containing the list of the specific points.*
- map< int, int > `fill_array_bc_inhomogeneous` (string, string, char, map< int, `SCALAR` > &, map< int, `SCALAR` > &)  
*Returns the vector containing the choice of boundary conditions. The two containers will contain the values of discharge and water heights imposed for each point.*
- map< `SCALAR`, string > `verif_file_bc_inhomogeneous` (string, string, char, map< int, int > &, map< int, `SCALAR` > &, map< int, `SCALAR` > &)  
*Returns the list of files and time values corresponding to the boundary condition. Moreover, fills the containers that will contain the choice of boundary conditions, the values of discharge and water heights imposed for each point.*
- string `get_path_input_directory` (void) const

### Protected Attributes

- `SCALAR cfl_fix`
- `SCALAR dt_fix`
- int `scheme_type`
- int `Nxcell`
- int `Nycell`
- int `nbtimes`
- `SCALAR T`
- `SCALAR dx`
- `SCALAR dy`
- `SCALAR L`
- `SCALAR I`
- map< int, int > `Lbound`
- map< int, `SCALAR` > `left_imp_discharge`
- map< int, `SCALAR` > `left_imp_h`
- map< `SCALAR`, string > `left_times_files`
- int `Ldtype_bc`
- map< int, int > `Rbound`
- map< int, `SCALAR` > `right_imp_discharge`
- map< int, `SCALAR` > `right_imp_h`
- map< `SCALAR`, string > `right_times_files`
- int `Rdtype_bc`
- map< int, int > `Bbound`
- map< int, `SCALAR` > `bottom_imp_discharge`
- map< int, `SCALAR` > `bottom_imp_h`
- map< `SCALAR`, string > `bottom_times_files`
- int `Bdtype_bc`

- `map< int, int > Tbound`
- `map< int, SCALAR > top_imp_discharge`
- `map< int, SCALAR > top_imp_h`
- `map< SCALAR, string > top_times_files`
- `int Tdtype_bc`
- `int flux`
- `int order`
- `int rec`
- `int fric`
- `int lim`
- `int inf`
- `int topo`
- `int huv_init`
- `int rain`
- `int Kc_init`
- `int Ks_init`
- `int dtheta_init`
- `int Psi_init`
- `int zcrust_init`
- `int imax_init`
- `int output_format`
- `SCALAR amortENO`
- `SCALAR modifENO`
- `int fric_init`
- `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 huv_namefile`
- `string huv_NF`
- `string fric_namefile`
- `string fric_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_outputs`
- int `Choice_points`
- SCALAR `x_coord`
- SCALAR `y_coord`
- string `list_point_NF`
- string `list_point_namefile`
- VECT `list_points_x`
- VECT `list_points_y`
- int `Choice_dt_specific_points`
- SCALAR `dt_specific_points`
- string `path_input_directory`

### 5.54.1 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 73 of file `parameters.hpp`.

### 5.54.2 Constructor & Destructor Documentation

#### **Parameters::Parameters ( )**

Constructor.

Definition at line 3171 of file `parameters.cpp`.

#### **Parameters::~Parameters ( ) [virtual]**

Destructor.

Definition at line 3174 of file `parameters.cpp`.

### 5.54.3 Member Function Documentation

#### **void Parameters::fill\_array ( TAB & *myarray*, const SCALAR *myvalue* ) const**

Fills the TAB array with a SCALAR.

Fills an array with a constant value.

**Parameters**

<code>in, out</code>	<code>myarray</code>	array to fill.
<code>in</code>	<code>myvalue</code>	value.

Definition at line 2592 of file `parameters.cpp`.

#### **void Parameters::fill\_array ( TAB & *myarray*, string *namefile* ) const**

Fills the TAB array with the values contained in a file.

Fills an array with the values given in the file

**Parameters**

in, out	<i>myarray</i>	array to fill.
in	<i>namefile</i>	name of the file containing the values to be inserted into the array.

**Warning**

\*\*\*: ERROR: cannot open the file.  
 \*\*\*: ERROR: the number of data in this file is too big/small.  
 \*\*\*: ERROR: line \*\*\*.  
 \*\*\*: ERROR: the value for the point x = \*\*\* y = \*\*\* is missing.  
 \*\*\*: WARNING: line \*\*\* ; a commentary should begin with the # symbol.

**Note**

If the array cannot be filled correctly, the code will exit with failure termination code.

Definition at line 2606 of file parameters.cpp.

**map< int, int > Parameters::fill\_array\_bc\_inhomogeneous ( string *Bc\_NF*, string *path\_input\_directory*, char *BC*, map< int, SCALAR > & *imp\_q*, map< int, SCALAR > & *imp\_h* )**

Returns the vector containing the choice of boundary conditions. The two containers will contain the values of discharge and water heights imposed for each point.

Extracts from the *Bc\_NF* file the type of boundary condition, discharge and water heights imposed for each point.

**Parameters**

in	<i>Bc_NF</i>	name of the file containing the values to be verified.
in	<i>path_input_directory</i>	path of directory containing <i>Bc_NF</i> file.
in	<i>BC</i>	represents the boundary condition which we handle
out	<i>container</i>	containing discharges [m <sup>3</sup> /s]
out	<i>container</i>	containing water heights [m]

**Warning**

\*\*\*: ERROR: cannot open the file.  
 \*\*\*: ERROR: the number of data in this file is too big/small.  
 \*\*\*: ERROR: the value of data in this file is too big/small.  
 \*\*\*: ERROR: the value for the point x = \*\*\* is missing.  
 \*\*\*: ERROR: the values q and h for the point x = \*\*\* are missing.  
 \*\*\*: ERROR: line \*\*\*.

**Returns**

the vector containing the choice of boundary conditions.

**Note**

If the containers cannot be filled correctly, the code will exit with failure termination code.

Definition at line 2875 of file parameters.cpp.

**SCALAR Parameters::get\_amortENO ( ) const**

Gives the value of the amortENO parameter.

Returns

The value of the amortENO parameter [Parameters::amortENO](#).

Definition at line 2160 of file parameters.cpp.

**map< int, int > & Parameters::get\_Bbound ( )**

Gives the value corresponding to the bottom boundary condition.

Returns

The value corresponding to the bottom boundary condition [Parameters::Bbound](#).

Definition at line 2016 of file parameters.cpp.

**map< int, SCALAR > & Parameters::get\_bottom\_imp\_discharge ( )**

Gives the value of the imposed discharge in bottom bc.

Returns

The value of the imposed discharge per cell in the bottom boundary condition, that is [Parameters::bottom↔\\_imp\\_discharge](#) / [Parameters::L](#).

Definition at line 2039 of file parameters.cpp.

**map< int, SCALAR > & Parameters::get\_bottom\_imp\_h ( )**

Gives the value of the imposed water height in bottom bc.

Returns

The value of the imposed water height in the bottom boundary condition [Parameters::bottom\\_imp\\_h](#).

Definition at line 2049 of file parameters.cpp.

**SCALAR Parameters::get\_cflfix ( ) const**

Gives the cfl of the scheme.

Returns

The fixed cfl [Parameters::cfl\\_fix](#).

Definition at line 1856 of file parameters.cpp.

**int Parameters::get\_choice\_dt\_specific\_points ( ) const**

Gives the choice of time step for specific points to be saved.

Returns

The choice of times saved for the specific points.

Definition at line 2855 of file parameters.cpp.

**int Parameters::get\_choice\_specific\_point ( ) const**

Gives the choice of specific points to be saved.

Returns

The choice for saving specific points.

Definition at line 2845 of file parameters.cpp.

**SCALAR Parameters::get\_dt\_specific\_points ( ) const**

Gives time step for specific points to be saved.

Returns

The time step for saving specific points.

Definition at line 2865 of file parameters.cpp.

**SCALAR Parameters::get\_dtfix ( ) const**

Gives the fixed time step from the parameters.txt file.

Returns

The fixed space step Parameters::dx\_fix.

Definition at line 1846 of file parameters.cpp.

**SCALAR Parameters::get\_dtheta\_coef ( ) const**

Gives the value of the water content.

Returns

The value of dtheta [Parameters::dtheta\\_coef](#).

Definition at line 2420 of file parameters.cpp.

**int Parameters::get\_dtheta\_init ( ) const**

Gives the value characterizing the spatialization (or not) of the water content.

Returns

The value corresponding to the initialization of dtheta [Parameters::dtheta\\_init](#).

Definition at line 2410 of file parameters.cpp.

**string Parameters::get\_dthetaNameFile ( void ) const**

Gives the full name of the file containing the water content.

Returns

The dtheta path for the initialization + Input directory [Parameters::dtheta\\_namefile](#).

Definition at line 2430 of file parameters.cpp.



**string Parameters::get\_dthetaNameFileS ( ) const**

Gives the name of the file containing the water content.

Returns

The dtheta namefile for the initialization (inside the Input directory) [Parameters::dtheta\\_NF](#).

Definition at line 2440 of file parameters.cpp.

**SCALAR Parameters::get\_dx ( ) const**

Gives the space step along x.

Returns

The space step in the first (x) direction [Parameters::dx](#).

Definition at line 1866 of file parameters.cpp.

**SCALAR Parameters::get\_dy ( ) const**

Gives the space step along y.

Returns

The space step in the second (y) direction [Parameters::dy](#).

Definition at line 1876 of file parameters.cpp.

**int Parameters::get\_flux ( ) const**

Gives the value corresponding to the flux.

Returns

The value corresponding to the flux [Parameters::flux](#).

Definition at line 2109 of file parameters.cpp.

**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 2139 of file parameters.cpp.

**int Parameters::get\_fric\_init ( ) const**

Gives the value characterizing the spatialization (or not) of the friction coefficient.

Returns

The value corresponding to the friction coefficient [Parameters::fric\\_init](#).

Definition at line 2190 of file parameters.cpp.

**SCALAR Parameters::get\_friccoef ( ) const**

Gives the value of the friction coefficient.

Returns

The value of the friction coefficient [Parameters::friccoef](#).

Definition at line 2220 of file parameters.cpp.

**string Parameters::get\_frictionNameFile ( void ) const**

Gives the full name of the file containing the friction coefficient.

Returns

The friction coefficient path + Input directory [Parameters::fric\\_namefile](#).

Definition at line 2200 of file parameters.cpp.

**string Parameters::get\_frictionNameFileS ( void ) const**

Gives the name of the file containing the friction coefficient.

Returns

The friction coefficient namefile (inside the Input directory) [Parameters::fric\\_NF](#).

Definition at line 2210 of file parameters.cpp.

**int Parameters::get\_huv ( ) const**

Gives the value corresponding to the choice of initialization of h, u and v.

Returns

The value corresponding to the initialization of h and u,v [Parameters::huv\\_init](#).

Definition at line 2260 of file parameters.cpp.

**string Parameters::get\_huvNameFile ( void ) const**

Gives the full name of the file containing the water height (h) and the velocities (u and v)

Returns

The h and u,v path for the initialization + Input directory [Parameters::huv\\_namefile](#).

Definition at line 2270 of file parameters.cpp.

**string Parameters::get\_huvNameFileS ( void ) const**

Gives the name of the file containing the water height (h) and the velocities (u and v)

Returns

The h and u namefile for the initialization (inside the Input directory) [Parameters::huv\\_NF](#).

Definition at line 2280 of file parameters.cpp.

**SCALAR Parameters::get\_imax\_coef ( ) const**

Gives the value of the maximum infiltration rate.

Returns

The value of imax [Parameters::imax\\_coef](#).

Definition at line 2540 of file parameters.cpp.

**int Parameters::get\_imax\_init ( ) const**

Gives the value characterizing the spatialization (or not) of the maximum infiltration rate.

Returns

The value corresponding to the initialization of imax [Parameters::imax\\_init](#).

Definition at line 2530 of file parameters.cpp.

**string Parameters::get\_imaxNameFile ( void ) const**

Gives the full name of the file containing the maximum infiltration rate.

Returns

The imax path for the initialization + Input directory [Parameters::imax\\_namefile](#).

Definition at line 2550 of file parameters.cpp.

**string Parameters::get\_imaxNameFileS ( ) const**

Gives the name of the file containing the maximum infiltration rate.

Returns

The imax namefile for the initialization (inside the Input directory) [Parameters::imax\\_NF](#).

Definition at line 2560 of file parameters.cpp.

**int Parameters::get\_inf ( ) const**

Gives the choice of infiltration model.

Returns

The value corresponding to the infiltration [Parameters::inf](#).

Definition at line 2180 of file parameters.cpp.

**SCALAR Parameters::get\_Kc\_coef ( ) const**

Gives the value of the hydraulic conductivity of the crust.

Returns

The value of Kc [Parameters::Kc\\_coef](#).

Definition at line 2340 of file parameters.cpp.

**int Parameters::get\_Kc\_init ( ) const**

Gives the value characterizing the spatialization (or not) of the hydraulic conductivity of the crust.

Returns

The value corresponding to the initialization of Kc [Parameters::Kc\\_init](#).

Definition at line 2330 of file parameters.cpp.

**string Parameters::get\_KcNameFile ( void ) const**

Gives the full name of the file containing the hydraulic conductivity of the crust.

Returns

The Kc path for the initialization + Input directory [Parameters::Kc\\_namefile](#).

Definition at line 2350 of file parameters.cpp.

**string Parameters::get\_KcNameFileS ( ) const**

Gives the name of the file containing the hydraulic conductivity of the crust.

Returns

The Kc namefile for the initialization (inside the Input directory) [Parameters::Kc\\_NF](#).

Definition at line 2360 of file parameters.cpp.

**SCALAR Parameters::get\_Ks\_coef ( ) const**

Gives the value of the hydraulic conductivity of the soil.

Returns

The value of Ks [Parameters::Ks\\_coef](#).

Definition at line 2380 of file parameters.cpp.

**int Parameters::get\_Ks\_init ( ) const**

Gives the value characterizing the spatialization (or not) of the hydraulic conductivity of the soil.

Returns

The value corresponding to the initialization of Ks [Parameters::Ks\\_init](#).

Definition at line 2370 of file parameters.cpp.

**string Parameters::get\_KsNameFile ( void ) const**

Gives the full name of the file containing the hydraulic conductivity of the surface.

Returns

The Ks path for the initialization + Input directory [Parameters::Ks\\_namefile](#).

Definition at line 2390 of file parameters.cpp.

**string Parameters::get\_KsNameFileS ( ) const**

Gives the name of the file containing the hydraulic conductivity of the surface.

Returns

The Ks namefile for the initialization (inside the Input directory) [Parameters::Ks\\_NF](#).

Definition at line 2400 of file parameters.cpp.

**SCALAR Parameters::get\_L ( ) const**

Gives the length of the domain in the first (x) direction.

Returns

the length of the domain in the first (x) direction.

Definition at line 1886 of file parameters.cpp.

**SCALAR Parameters::get\_I ( ) const**

Gives the length of the domain in the second (y) direction.

Returns

the length of the domain in the second (y) direction.

Definition at line 1896 of file parameters.cpp.

**map< int, int > & Parameters::get\_Lbound ( )**

Gives the value corresponding to the left boundary condition.

Returns

The value corresponding to the left boundary condition [Parameters::Lbound](#).

Definition at line 1917 of file parameters.cpp.

**map< int, SCALAR > & Parameters::get\_left\_imp\_discharge ( )**

Gives the value of the imposed discharge in left bc.

Returns

The value of the imposed discharge per cell in the left boundary condition, that is [Parameters::left\\_imp\\_discharge](#) / [Parameters::l](#).

Definition at line 1937 of file parameters.cpp.

**map< int, SCALAR > & Parameters::get\_left\_imp\_h ( )**

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::left\\_imp\\_h](#).

Definition at line 1948 of file parameters.cpp.

**int Parameters::get\_lim ( ) const**

Gives the value corresponding to the limiter.

Returns

The value corresponding to the limiter [Parameters::lim](#).

Definition at line 2150 of file parameters.cpp.

**string Parameters::get\_list\_pointNameFile ( void ) const**

Gives the full name of file containing the list of the specific points.

Returns

The name of file containing the list of the specific points path for the initialization + Input directory [Parameters::list\\_point\\_namefile](#).

Definition at line 2826 of file parameters.cpp.

**string Parameters::get\_list\_pointNameFileS ( void ) const**

Gives the name of the file containing the list of the specific points.

Returns

The name of file containing list of the specific points for the initialization (inside the Input directory) [Parameters::list\\_point\\_NF](#).

Definition at line 2835 of file parameters.cpp.

**SCALAR Parameters::get\_modifENO ( ) const**

Gives the value of the modifENO parameter.

Returns

The value of the modifENO parameter [Parameters::modifENO](#).

Definition at line 2170 of file parameters.cpp.

**int Parameters::get\_nbtimes ( ) const**

Gives the number of times saved.

Returns

The number of times saved [Parameters::nbtimes](#).

Definition at line 1826 of file parameters.cpp.

**int Parameters::get\_Nxcell ( ) const**

Gives the number of cells in space along x.

Returns

The number of cells in space in the first (x) direction [Parameters::Nxcell](#).

Definition at line 1796 of file parameters.cpp.

**int Parameters::get\_Nycell ( ) const**

Gives the number of cells in space along y.

Returns

The number of cells in space in the second (y) direction [Parameters::Nycell](#).

Definition at line 1806 of file parameters.cpp.

**int Parameters::get\_order ( ) const**

Gives the order of the scheme.

Returns

The order of the scheme [Parameters::order](#).

Definition at line 2119 of file parameters.cpp.

**int Parameters::get\_output ( ) const**

Gives the value corresponding to the choice of the format of the [Output](#) file.

Returns

The type of output [Parameters::output\\_format](#).

Definition at line 2580 of file parameters.cpp.

**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 2320 of file parameters.cpp.

**string Parameters::get\_path\_input\_directory ( void ) const**

Returns

The Name of the input directory.

Definition at line 3159 of file parameters.cpp.

**SCALAR Parameters::get\_Psi\_coef ( ) const**

Gives the value of the load pressure.

Returns

The value of Psi [Parameters::Psi\\_coef](#).

Definition at line 2460 of file parameters.cpp.

**int Parameters::get\_Psi\_init ( ) const**

Gives the value characterizing the spatialization (or not) of the load pressure.

Returns

The value corresponding to the initialization of Psi [Parameters::Psi\\_init](#).

Definition at line 2450 of file parameters.cpp.

**string Parameters::get\_PsiNameFile ( void ) const**

Gives the full name of the file containing the load pressure.

Returns

The Psi path for the initialization + Input directory [Parameters::Psi\\_namefile](#).

Definition at line 2470 of file parameters.cpp.

**string Parameters::get\_PsiNameFileS ( ) const**

Gives the name of the file containing the load pressure.

Returns

The Psi namefile for the initialization (inside the Input directory) [Parameters::Psi\\_NF](#).

Definition at line 2480 of file parameters.cpp.

**int Parameters::get\_rain ( ) const**

Gives the value corresponding to the choice of initialization of rain.

Returns

The value corresponding to the initialization of the rain [Parameters::rain](#).

Definition at line 2290 of file parameters.cpp.

**string Parameters::get\_rainNameFile ( void ) const**

Gives the full name of the file containing the rain.

Returns

The rain path for the initialization + Input directory [Parameters::rain\\_namefile](#).

Definition at line 2300 of file parameters.cpp.

**string Parameters::get\_rainNameFileS ( void ) const**

Gives the name of the file containing the rain.

Returns

The rain namefile for the initialization (inside the Input directory) [Parameters::rain\\_NF](#).

Definition at line 2310 of file parameters.cpp.



**map< int, int > & Parameters::get\_Rbound ( )**

Gives the value corresponding to the right boundary condition.

Returns

The value corresponding to the right boundary condition [Parameters::Rbound](#).

Definition at line 1966 of file parameters.cpp.

**int Parameters::get\_rec ( ) const**

Gives the value corresponding to the reconstruction.

Returns

The value corresponding to the reconstruction [Parameters::rec](#).

Definition at line 2129 of file parameters.cpp.

**map< int, SCALAR > & Parameters::get\_right\_imp\_discharge ( )**

Gives the value of the imposed discharge in right bc.

Returns

The value of the imposed discharge per cell in the right boundary condition, that is [Parameters::right\\_imp\\_discharge](#) / [Parameters::l](#).

Definition at line 1986 of file parameters.cpp.

**map< int, SCALAR > & Parameters::get\_right\_imp\_h ( )**

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::right\\_imp\\_h](#).

Definition at line 1996 of file parameters.cpp.

**int Parameters::get\_scheme\_type ( ) const**

Gives the choice of type of scheme (fixed cfl or fixed dt)

Returns

The type of scheme [Parameters::scheme\\_type](#).

Definition at line 1836 of file parameters.cpp.

**string Parameters::get\_suffix ( void ) const**

Gives the suffix for the 'Outputs' directory.

Returns

The suffix (for the output directory) [Parameters::suffix\\_outputs](#).

Definition at line 2570 of file parameters.cpp.

**SCALAR Parameters::get\_T ( ) const**

Gives the final time.

Returns

The final time [Parameters::T](#).

Definition at line 1816 of file parameters.cpp.

**map< int, int > & Parameters::get\_Tbound ( )**

Gives the value corresponding to the top boundary condition.

Returns

The value corresponding to the top boundary condition [Parameters::Tbound](#).

Definition at line 2069 of file parameters.cpp.

**map< SCALAR, string > & Parameters::get\_times\_files\_Bbound ( )**

Gives the list of files and time values corresponding to the bottom boundary condition.

Returns

The value corresponding to the bottom boundary condition [Parameters::Bbound](#).

Definition at line 2026 of file parameters.cpp.

**map< SCALAR, string > & Parameters::get\_times\_files\_Lbound ( )**

Gives the list of files and time values corresponding to the left boundary condition.

Returns

The value corresponding to the bottom boundary condition [Parameters::Bbound](#).

Definition at line 1927 of file parameters.cpp.

**map< SCALAR, string > & Parameters::get\_times\_files\_Rbound ( )**

Gives the list of files and time values corresponding to the right boundary condition.

Returns

The value corresponding to the bottom boundary condition [Parameters::Bbound](#).

Definition at line 1976 of file parameters.cpp.

**map< SCALAR, string > & Parameters::get\_times\_files\_Tbound ( )**

Gives the list of files and time values corresponding to the top boundary condition.

Returns

The value corresponding to the bottom boundary condition [Parameters::Bbound](#).

Definition at line 2079 of file parameters.cpp.

**map< int, SCALAR > & Parameters::get\_top\_imp\_discharge ( )**

Gives the value of the imposed discharge in top bc.

Returns

The value of the imposed discharge per cell in the top boundary condition, that is [Parameters::top\\_imp\\_discharge](#) / [Parameters::L](#).

Definition at line 2090 of file parameters.cpp.

**map< int, SCALAR > & Parameters::get\_top\_imp\_h ( )**

Gives the value of the imposed water height in top bc.

Returns

The value of the imposed water height in the bottom boundary condition [Parameters::top\\_imp\\_h](#).

Definition at line 2100 of file parameters.cpp.

**int Parameters::get\_topo ( ) const**

Gives the value corresponding to the choice of topography.

Returns

The value corresponding to the topography [Parameters::topo](#).

Definition at line 2250 of file parameters.cpp.

**string Parameters::get\_topographyNameFile ( void ) const**

Gives the full name of the file containing the topography.

Returns

The topography path + Input directory [Parameters::topography\\_namefile](#).

Definition at line 2230 of file parameters.cpp.

**string Parameters::get\_topographyNameFileS ( void ) const**

Gives the name of the file containing the topography.

Returns

The topography namefile (inside the Input directory) [Parameters::topo\\_NF](#).

Definition at line 2240 of file parameters.cpp.

**int Parameters::get\_type\_Bbound ( ) const**

Gives the type (constant or file) of bottom boundary condition.

Returns

The value corresponding to the left boundary condition [Parameters::Lbound](#).

Definition at line 2005 of file parameters.cpp.

**int Parameters::get\_type\_Lbound ( ) const**

Gives the type (constant or file) of the left boundary condition.

Returns

The value corresponding to the left boundary condition [Parameters::Lbound](#).

Definition at line 1906 of file parameters.cpp.

**int Parameters::get\_type\_Rbound ( ) const**

Gives the type (constant or file) of right boundary condition.

Returns

The value corresponding to the left boundary condition [Parameters::Lbound](#).

Definition at line 1957 of file parameters.cpp.

**int Parameters::get\_type\_Tbound ( ) const**

Gives the type (constant or file) of bottom boundary condition.

Returns

The value corresponding to the left boundary condition [Parameters::Lbound](#).

Definition at line 2058 of file parameters.cpp.

**SCALAR Parameters::get\_x\_coord ( void ) const**

Gives x coordinate of the specific point to be saved.

Returns

x coordinate of the specific point to be saved.

Definition at line 2806 of file parameters.cpp.

**SCALAR Parameters::get\_y\_coord ( void ) const**

Gives y coordinate of the specific point to be saved.

Returns

y coordinate of the specific point to be saved.

Definition at line 2816 of file parameters.cpp.

**SCALAR Parameters::get\_zcrust\_coef ( ) const**

Gives the value of the thickness of the crust.

Returns

The value of zcrust [Parameters::zcrust\\_coef](#).

Definition at line 2500 of file parameters.cpp.

**int Parameters::get\_zcrust\_init ( ) const**

Gives the value characterizing the spatialization (or not) of the thickness of the crust.

Returns

The value corresponding to the initialization of zcrust [Parameters::zcrust\\_init](#).

Definition at line 2490 of file parameters.cpp.

**string Parameters::get\_zcrustNameFile ( void ) const**

Gives the full name of the file containing the thickness of the crust.

Returns

The zcrust path for the initialization + Input directory [Parameters::zcrust\\_namefile](#).

Definition at line 2510 of file parameters.cpp.

**string Parameters::get\_zcrustNameFileS ( ) const**

Gives the name of the file containing the thickness of the crust.

Returns

The zcrust namefile for the initialization (inside the Input directory) [Parameters::zcrust\\_NF](#).

Definition at line 2520 of file parameters.cpp.

**bool Parameters::is\_coord\_in\_file\_valid ( const SCALAR & x, const SCALAR & y, int num\_lin, string namefile ) const**

Verifies if the coordinates x and y exist in the mesh.

Fills an array with the values given in the file

**Parameters**

in	x	coordinate of the specific point.
in	y	coordinate of the specific point.
in	line_number	the line number where the error appears.
in	namefile	name of the file containing the values to be verified.

Warning

\*\*\*: ERROR: .  
 \*\*\*: ERROR: the value of data in this file is too big/small.  
 \*\*\*: ERROR: line \*\*\*.

Note

-1 is used to not display the line number in the error message .  
 if the coordinates are not valid, the code will return with false.

Definition at line 2721 of file parameters.cpp.

**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\_2D 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 paramters 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 value 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.

Definition at line 61 of file parameters.cpp.

**map< double, string > Parameters::verif\_file\_bc\_inhomogeneous ( string *Bc\_NF*, string *path\_input\_directory*, char *BC*, map< int, int > & *vchoice*, map< int, SCALAR > & *imp\_q*, map< int, SCALAR > & *imp\_h* )**

Returns the list of files and time values corresponding to the boundary condition. Moreover, fills the containers that will contain the choice of boundary conditions, the values of discharge and water heights imposed for each point.

Extracts from the *Bc\_NF* file the list of files and time values corresponding to the boundary condition.

**Parameters**

in	<i>Bc_NF</i>	name of the file containing the values to be verified.
in	<i>path_input_directory</i>	path of directory containing <i>Bc_NF</i> file.
in	<i>BC</i>	represents the boundary condition which we handle
out	<i>container</i>	containing the choice of boundary conditions at time equal to 0s.
out	<i>container</i>	containing discharges [m3/s] at time equal to 0s.
out	<i>container</i>	containing water heights [m] at time equal to 0s.

**Warning**

\*\*\*: ERROR: cannot open the file.  
 \*\*\*: ERROR: the number of data in this file is too big/small.  
 \*\*\*: ERROR: the value of data in this file is too big/small.  
 \*\*\*: ERROR: the value for the point x = \*\*\* is missing.  
 \*\*\*: ERROR: the values q and h for the point x = \*\*\* are missing.  
 \*\*\*: ERROR: line \*\*\*.  
 \*\*\*: ERROR: the times are decreasing.  
 (rain\_namefile): ERROR: the first time must be t = 0.

**Returns**

the list of files and time values corresponding to the boundary condition.

**Note**

If the containers cannot be filled correctly, the code will exit with failure termination code.

Definition at line 3037 of file parameters.cpp.

#### 5.54.4 Member Data Documentation

##### **SCALAR Parameters::amortENO [protected]**

Parameter for eno.

Definition at line 463 of file parameters.hpp.

##### **map<int,int> Parameters::Bbound [protected]**

Bottom boundary condition.

Definition at line 411 of file parameters.hpp.

##### **int Parameters::Bdtype\_bc [protected]**

Type (constant or file) of bottom boundary condition

Definition at line 419 of file parameters.hpp.

##### **map<int,SCALAR> Parameters::bottom\_imp\_discharge [protected]**

Imposed discharge on the bottom boundary.

Definition at line 413 of file parameters.hpp.

##### **map<int,SCALAR> Parameters::bottom\_imp\_h [protected]**

Imposed water height on the bottom boundary.

Definition at line 415 of file parameters.hpp.

##### **map<SCALAR,string> Parameters::bottom\_times\_files [protected]**

List of files and time values corresponding to the bottom boundary condition.

Definition at line 417 of file parameters.hpp.

##### **SCALAR Parameters::cfl\_fix [protected]**

Value of the fixed cfl.

Definition at line 369 of file parameters.hpp.

##### **int Parameters::Choice\_dt\_specific\_points [protected]**

Choice between saving specific points at each time or only for a given time step.

Definition at line 539 of file parameters.hpp.

##### **int Parameters::Choice\_points [protected]**

Choice of the number of specific points to be saved.

Definition at line 527 of file parameters.hpp.

##### **SCALAR Parameters::dt\_fix [protected]**

Value of the fixed time step.

Definition at line 371 of file parameters.hpp.

##### **SCALAR Parameters::dt\_specific\_points [protected]**

Time step to save the list of the specific points.

Definition at line 541 of file parameters.hpp.

**SCALAR Parameters::dtheta\_coef [protected]**

Value of dtheta.

Definition at line 475 of file parameters.hpp.

**int Parameters::dtheta\_init [protected]**

Type of initialization of dtheta.

Definition at line 453 of file parameters.hpp.

**string Parameters::dtheta\_namefile [protected]**

Name of the file for dtheta: Inputs/file.

Definition at line 507 of file parameters.hpp.

**string Parameters::dtheta\_NF [protected]**

Name of the file for dtheta without 'Inputs'.

Definition at line 509 of file parameters.hpp.

**SCALAR Parameters::dx [protected]**

Space step in the first (x) direction.

Definition at line 383 of file parameters.hpp.

**SCALAR Parameters::dy [protected]**

Space step in the second (y) direction.

Definition at line 385 of file parameters.hpp.

**int Parameters::flux [protected]**

Numerical flux.

Definition at line 431 of file parameters.hpp.

**int Parameters::fric [protected]**

Friction.

Definition at line 437 of file parameters.hpp.

**int Parameters::fric\_init [protected]**

Type of friction coefficient.

Definition at line 467 of file parameters.hpp.

**string Parameters::fric\_namefile [protected]**

Name of the file for the friction coefficient: Inputs/file.

Definition at line 491 of file parameters.hpp.

**string Parameters::fric\_NF [protected]**

Name of the file for the friction coefficient without 'Inputs'.

Definition at line 493 of file parameters.hpp.



**SCALAR Parameters::friccoef [protected]**

Friction coefficient.

Definition at line 469 of file parameters.hpp.

**int Parameters::huv\_init [protected]**

Type of initial conditions for h and u,v.

Definition at line 445 of file parameters.hpp.

**string Parameters::huv\_namefile [protected]**

Name of the file for the initialization of h and u,v: Inputs/file.

Definition at line 487 of file parameters.hpp.

**string Parameters::huv\_NF [protected]**

Name of the file for the initialization of h and u,v without 'Inputs'.

Definition at line 489 of file parameters.hpp.

**SCALAR Parameters::imax\_coef [protected]**

Value of imax.

Definition at line 481 of file parameters.hpp.

**int Parameters::imax\_init [protected]**

Type of initialization of imax.

Definition at line 459 of file parameters.hpp.

**string Parameters::imax\_namefile [protected]**

Name of the file for imax: Inputs/file.

Definition at line 519 of file parameters.hpp.

**string Parameters::imax\_NF [protected]**

Name of the file for imax without 'Inputs'.

Definition at line 521 of file parameters.hpp.

**int Parameters::inf [protected]**

Type of infiltration.

Definition at line 441 of file parameters.hpp.

**SCALAR Parameters::Kc\_coef [protected]**

Value of Kc.

Definition at line 471 of file parameters.hpp.

**int Parameters::Kc\_init [protected]**

Type of initialization of Kc.

Definition at line 449 of file parameters.hpp.

**string Parameters::Kc\_namefile [protected]**

Name of the file for Kc: Inputs/file.

Definition at line 499 of file parameters.hpp.

**string Parameters::Kc\_NF [protected]**

Name of the file for Kc without 'Inputs'.

Definition at line 501 of file parameters.hpp.

**SCALAR Parameters::Ks\_coef [protected]**

Value of Ks.

Definition at line 473 of file parameters.hpp.

**int Parameters::Ks\_init [protected]**

Type of initialization of Ks.

Definition at line 451 of file parameters.hpp.

**string Parameters::Ks\_namefile [protected]**

Name of the file for Ks: Inputs/file.

Definition at line 503 of file parameters.hpp.

**string Parameters::Ks\_NF [protected]**

Name of the file for Ks without 'Inputs'.

Definition at line 505 of file parameters.hpp.

**SCALAR Parameters::L [protected]**

Length of the domain in the first (x) direction.

Definition at line 387 of file parameters.hpp.

**SCALAR Parameters::l [protected]**

Length of the domain in the second (y) direction.

Definition at line 389 of file parameters.hpp.

**map<int,int> Parameters::Lbound [protected]**

Left boundary condition.

Definition at line 391 of file parameters.hpp.

**int Parameters::Ldtype\_bc [protected]**

Type (constant or file) of left boundary condition

Definition at line 399 of file parameters.hpp.

**map<int,SCALAR> Parameters::left\_imp\_discharge [protected]**

Imposed discharge on the left boundary.

Definition at line 393 of file parameters.hpp.

**map<int,SCALAR> Parameters::left\_imp\_h [protected]**

Imposed water height on the left boundary.

Definition at line 395 of file parameters.hpp.

**map<SCALAR,string> Parameters::left\_times\_files [protected]**

List of files and time values corresponding to the left boundary condition.

Definition at line 397 of file parameters.hpp.

**int Parameters::lim [protected]**

Slope limiter.

Definition at line 439 of file parameters.hpp.

**string Parameters::list\_point\_namefile [protected]**

Name of file containing the list of the specific points without 'Inputs'.

Definition at line 535 of file parameters.hpp.

**string Parameters::list\_point\_NF [protected]**

Name of file containing the list of the specific points.

Definition at line 533 of file parameters.hpp.

**VECT Parameters::list\_points\_x [protected]**

The list of the specific points.

Definition at line 537 of file parameters.hpp.

**VECT Parameters::list\_points\_y [protected]**

Definition at line 537 of file parameters.hpp.

**SCALAR Parameters::modifENO [protected]**

Parameter for eno\_modif.

Definition at line 465 of file parameters.hpp.

**int Parameters::nbtimes [protected]**

Number of times saved.

Definition at line 379 of file parameters.hpp.

**int Parameters::Nxcell [protected]**

Number of cells in space in the first (x) direction.

Definition at line 375 of file parameters.hpp.

**int Parameters::Nycell [protected]**

Number of cells in space in the second (y) direction.

Definition at line 377 of file parameters.hpp.

**int Parameters::order [protected]**

Order of the numerical scheme.

Definition at line 433 of file parameters.hpp.

**string Parameters::output\_directory [protected]**

Name of the output directory Outputs+suffix.

Definition at line 523 of file parameters.hpp.

**int Parameters::output\_format [protected]**

Type of output.

Definition at line 461 of file parameters.hpp.

**string Parameters::path\_input\_directory [protected]**

Name of the input directory

Definition at line 543 of file parameters.hpp.

**SCALAR Parameters::Psi\_coef [protected]**

Value of Psi.

Definition at line 477 of file parameters.hpp.

**int Parameters::Psi\_init [protected]**

Type of initialization of Psi.

Definition at line 455 of file parameters.hpp.

**string Parameters::Psi\_namefile [protected]**

Name of the file for Psi: Inputs/file.

Definition at line 511 of file parameters.hpp.

**string Parameters::Psi\_NF [protected]**

Name of the file for Psi without 'Inputs'.

Definition at line 513 of file parameters.hpp.

**int Parameters::rain [protected]**

Type of rain.

Definition at line 447 of file parameters.hpp.

**string Parameters::rain\_namefile [protected]**

Name of the file for the rain: Inputs/file.

Definition at line 495 of file parameters.hpp.

**string Parameters::rain\_NF [protected]**

Name of the file for the rain without 'Inputs'.

Definition at line 497 of file parameters.hpp.

**map<int,int> Parameters::Rbound [protected]**

Right boundary condition.

Definition at line 401 of file parameters.hpp.

**int Parameters::Rdtype\_bc [protected]**

Type (constant or file) of right boundary condition

Definition at line 409 of file parameters.hpp.

**int Parameters::rec [protected]**

Reconstruction.

Definition at line 435 of file parameters.hpp.

**map<int,SCALAR> Parameters::right\_imp\_discharge [protected]**

Imposed discharge on the right boundary.

Definition at line 403 of file parameters.hpp.

**map<int,SCALAR> Parameters::right\_imp\_h [protected]**

Imposed water height on the right boundary.

Definition at line 405 of file parameters.hpp.

**map<SCALAR,string> Parameters::right\_times\_files [protected]**

List of files and time values corresponding to the right boundary condition.

Definition at line 407 of file parameters.hpp.

**int Parameters::scheme\_type [protected]**

Type of scheme (fixed cfl or time step).

Definition at line 373 of file parameters.hpp.

**string Parameters::suffix\_outputs [protected]**

Suffix for the output directory.

Definition at line 525 of file parameters.hpp.

**SCALAR Parameters::T [protected]**

Final time.

Definition at line 381 of file parameters.hpp.

**map<int,int> Parameters::Tbound [protected]**

Top boundary condition.

Definition at line 421 of file parameters.hpp.

**int Parameters::Tdtype\_bc [protected]**

Type (constant or file) of top boundary condition

Definition at line 429 of file parameters.hpp.

**map<int,SCALAR> Parameters::top\_imp\_discharge [protected]**

Imposed discharge on the top boundary.

Definition at line 423 of file parameters.hpp.

**map<int,SCALAR> Parameters::top\_imp\_h [protected]**

Imposed water height on the top boundary.

Definition at line 425 of file parameters.hpp.

**map<SCALAR,string> Parameters::top\_times\_files [protected]**

List of files and time values corresponding to the top boundary condition.

Definition at line 427 of file parameters.hpp.

**int Parameters::topo [protected]**

Type of topography.

Definition at line 443 of file parameters.hpp.

**string Parameters::topo\_NF [protected]**

Name of the file for the topography without 'Inputs'.

Definition at line 485 of file parameters.hpp.

**string Parameters::topography\_namefile [protected]**

Name of the file for the topography: Inputs/file.

Definition at line 483 of file parameters.hpp.

**SCALAR Parameters::x\_coord [protected]**

x coordinate of the specific point to be saved.

Definition at line 529 of file parameters.hpp.

**SCALAR Parameters::y\_coord [protected]**

y coordinate of the specific point to be saved.

Definition at line 531 of file parameters.hpp.

**SCALAR Parameters::zcrust\_coef [protected]**

Value of zcrust.

Definition at line 479 of file parameters.hpp.

**int Parameters::zcrust\_init [protected]**

Type of initialization of zcrust.

Definition at line 457 of file parameters.hpp.

**string Parameters::zcrust\_namefile [protected]**

Name of the file for zcrust: Inputs/file.

Definition at line 515 of file parameters.hpp.

**string Parameters::zcrust\_NF [protected]**

Name of the file for zcrust without 'Inputs'.

Definition at line 517 of file parameters.hpp.

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

- Headers/libparameters/[parameters.hpp](#)
- Sources/libparameters/[parameters.cpp](#)

**5.55 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.*

**5.55.1 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 80 of file parser.hpp.

**5.55.2 Constructor & Destructor Documentation****Parser::Parser ( const char \* *FILENAME* )**

Constructor.

Constructor: reads the input parameter and copy the data in a tabular.

Parameters

in	<i>FILENAME</i>	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.

Definition at line 57 of file parser.cpp.

**Parser::~~Parser ( ) [virtual]**

Destructor.

Definition at line 161 of file parser.cpp.

### 5.55.3 Member Function Documentation

**string Parser::getValue ( const char \* TAG )**

Returns the value of the variable.

Return the value corresponding to the tag.

**Parameters**

<i>in</i>	<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.

Definition at line 113 of file parser.cpp.

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

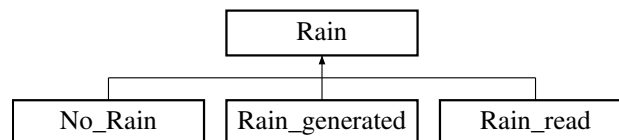
- Headers/libparser/[parser.hpp](#)
- Sources/libparser/[parser.cpp](#)

## 5.56 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](#), [TAB](#) &)=0  
*Function to be specified in each case.*
- virtual [~Rain](#) ()  
*Destructor.*

### Protected Attributes

- const int [NXCELL](#)
- const int [NYCELL](#)
- const [SCALAR](#) [DX](#)
- const [SCALAR](#) [DY](#)



### 5.56.1 Detailed Description

Initialization of the rain.

Class that contains all the common declarations for the initialization of the rain.

Definition at line 70 of file rain.hpp.

### 5.56.2 Constructor & Destructor Documentation

#### Rain::Rain ( Parameters & *par* )

Constructor.

Defines the number of cells and the space steps.

Parameters

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

Definition at line 58 of file rain.cpp.

#### Rain::~~Rain ( ) [virtual]

Destructor.

Definition at line 68 of file rain.cpp.

### 5.56.3 Member Function Documentation

#### virtual void Rain::rain\_func ( SCALAR , TAB & ) [pure virtual]

Function to be specified in each case.

Implemented in [Rain\\_generated](#), [Rain\\_read](#), and [No\\_Rain](#).

### 5.56.4 Member Data Documentation

#### const SCALAR Rain::DX [protected]

Space step in the first (x) direction (unused).

Definition at line 89 of file rain.hpp.

#### const SCALAR Rain::DY [protected]

Space step in the second (y) direction (unused).

Definition at line 91 of file rain.hpp.

#### const int Rain::NXCELL [protected]

Number of cells in space in the first (x) direction.

Definition at line 85 of file rain.hpp.

#### const int Rain::NYCELL [protected]

Number of cells in space in the second (y) direction.

Definition at line 87 of file rain.hpp.

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

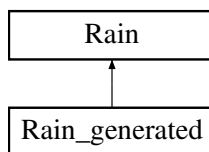
- Headers/librain\_infiltration/[rain.hpp](#)
- Sources/librain\_infiltration/[rain.cpp](#)

## 5.57 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](#), [TAB](#) &)  
*Performs the constant initialization.*
- virtual [~Rain\\_generated](#) ()  
*Destructor.*

### Additional Inherited Members

#### 5.57.1 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.

#### 5.57.2 Constructor & Destructor Documentation

**Rain\_generated::Rain\_generated ( [Parameters](#) & *par* )**

Constructor.

Parameters

<a href="#">in</a>	<a href="#">par</a>	parameter, contains all the values from the parameters file (unused).
--------------------	---------------------	---

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

**Rain\_generated::~~Rain\_generated ( ) [virtual]**

Destructor.

Definition at line 85 of file rain\_generated.cpp.

#### 5.57.3 Member Function Documentation

**void Rain\_generated::rain\_func ( [SCALAR](#) *time*, [TAB](#) & *Tab\_rain* ) [virtual]**

Performs the constant initialization.

Initializes the rain to 0.00001 m/s = 36 mm/h.

Parameters

---

<code>in</code>	<code>time</code>	the current time (unused).
<code>in, out</code>	<code>Tab_rain</code>	rain intensity at the current time on each cell.

Implements [Rain](#).

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

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

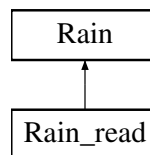
- Headers/librain\_infiltration/[rain\\_generated.hpp](#)
- Sources/librain\_infiltration/[rain\\_generated.cpp](#)

## 5.58 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](#), [TAB](#) &)  
*Performs the initialization.*
- virtual [~Rain\\_read](#) ()  
*Destructor.*

### Additional Inherited Members

#### 5.58.1 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`.

#### 5.58.2 Constructor & Destructor Documentation

**`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**

<code>in</code>	<code>par</code>	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`.

**Rain\_read::~~Rain\_read ( ) [virtual]**

Destructor.

Definition at line 151 of file rain\_read.cpp.

### 5.58.3 Member Function Documentation

**void Rain\_read::rain\_func ( SCALAR *time*, TAB & *Tab\_rain* ) [virtual]**

Performs the initialization.

Initializes the rain to the values read in the corresponding file.

**Parameters**

<i>in</i>	<i>time</i>	current time.
<i>in, out</i>	<i>Tab_rain</i>	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 131 of file rain\_read.cpp.

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

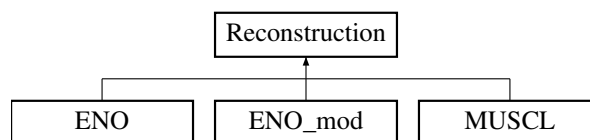
- Headers/librain\_infiltration/[rain\\_read.hpp](#)
- Sources/librain\_infiltration/[rain\\_read.cpp](#)

## 5.59 Reconstruction Class Reference

Reconstruction of the variables

```
#include <reconstruction.hpp>
```

Inheritance diagram for Reconstruction:



### Public Member Functions

- [Reconstruction](#) ([Parameters](#) &, [TAB](#) &)  
*Constructor.*
- virtual void [calcul](#) ([TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &)=0  
*Function to be specified in each reconstruction.*
- virtual [~Reconstruction](#) ()  
*Destructor.*

### Protected Attributes

- const int [NXCELL](#)
- const int [NYCELL](#)
- [TAB](#) [z1r](#)
- [TAB](#) [z1l](#)

- [TAB z2r](#)
- [TAB z2l](#)
- [TAB delta\\_z1](#)
- [TAB delta\\_z2](#)
- [Choice\\_limiter](#) \* [limiter](#)

### 5.59.1 Detailed Description

Reconstruction of the variables

Class that contains all the common declarations for the second order reconstruction in space.

Definition at line 74 of file reconstruction.hpp.

### 5.59.2 Constructor & Destructor Documentation

#### Reconstruction::Reconstruction ( Parameters & *par*, TAB & *z* )

Constructor.

Defines the number of cells, the slope limiter, and initializes [Reconstruction::z1l](#), [Reconstruction::z2l](#), [Reconstruction::z1r](#), [Reconstruction::z2r](#), [Reconstruction::delta\\_z1](#), [Reconstruction::delta\\_z2](#).

Parameters

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

Definition at line 59 of file reconstruction.cpp.

#### Reconstruction::~~Reconstruction ( ) [virtual]

Destructor.

Definition at line 109 of file reconstruction.cpp.

### 5.59.3 Member Function Documentation

**virtual void Reconstruction::calcul ( TAB & , TAB & , TAB & , TAB & , TAB & , TAB & , TAB & , TAB & , TAB & , TAB & , TAB & , TAB & , TAB & , TAB & , TAB & , TAB & , TAB & , TAB & , TAB & ) [pure virtual]**

Function to be specified in each reconstruction.

Implemented in [ENO](#), [ENO\\_mod](#), and [MUSCL](#).

### 5.59.4 Member Data Documentation

#### TAB Reconstruction::delta\_z1 [protected]

Difference between the values of the topography on two adjacent cells (on the right) in the first direction

Definition at line 101 of file reconstruction.hpp.

#### TAB Reconstruction::delta\_z2 [protected]

Difference between the values of the topography on two adjacent cells (on the right) in the second direction

Definition at line 103 of file reconstruction.hpp.

#### Choice\_limiter\* Reconstruction::limiter [protected]

Slope limiter

Definition at line 105 of file reconstruction.hpp.

**const int Reconstruction::NXCELL [protected]**

Number of cells in space in the first (x) direction.

Definition at line 89 of file reconstruction.hpp.

**const int Reconstruction::NYCELL [protected]**

Number of cells in space in the second (y) direction.

Definition at line 91 of file reconstruction.hpp.

**TAB Reconstruction::z1l [protected]**

Reconstructed topography on the left boundary in the first direction

Definition at line 95 of file reconstruction.hpp.

**TAB Reconstruction::z1r [protected]**

Reconstructed topography on the right boundary in the first direction

Definition at line 93 of file reconstruction.hpp.

**TAB Reconstruction::z2l [protected]**

Reconstructed topography on the left boundary in the second direction

Definition at line 99 of file reconstruction.hpp.

**TAB Reconstruction::z2r [protected]**

Reconstructed topography on the right boundary in the second direction

Definition at line 97 of file reconstruction.hpp.

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

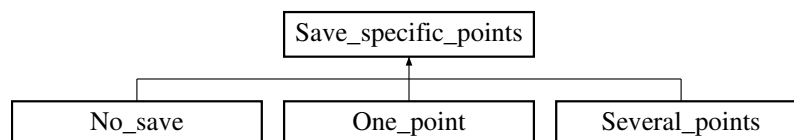
- Headers/libreconstructions/[reconstruction.hpp](#)
- Sources/libreconstructions/[reconstruction.cpp](#)

## 5.60 Save\_specific\_points Class Reference

Specific points to save.

```
#include <save_specific_points.hpp>
```

Inheritance diagram for Save\_specific\_points:



### Public Member Functions

- [Save\\_specific\\_points](#) (Parameters &)  
*Constructor.*
- virtual void [save](#) (const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [SCALAR](#))=0  
*Function which writes in a file the values at the specific points.*
- virtual [~Save\\_specific\\_points](#) ()  
*Destructor.*

## Protected Attributes

- const [SCALAR DX](#)
- const [SCALAR DY](#)
- int [row](#)
- int [column](#)
- [SCALAR T\\_output](#)
- const [SCALAR DT\\_SPECIFIC\\_POINTS](#)

### 5.60.1 Detailed Description

Specific points to save.

Class that contains all the common declarations for the saving of specific points.

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

### 5.60.2 Constructor & Destructor Documentation

#### **Save\_specific\_points::Save\_specific\_points ( Parameters & par )**

Constructor.

Virtual class that defines the common parts for saving one or several specific points.

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

#### **Save\_specific\_points::~~Save\_specific\_points ( ) [virtual]**

Destructor.

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

### 5.60.3 Member Function Documentation

#### **virtual void Save\_specific\_points::save ( const TAB & , const TAB & , const TAB & , const SCALAR ) [pure virtual]**

Function which writes in a file the values at the specific points.

Implemented in [One\\_point](#), [Several\\_points](#), and [No\\_save](#).

### 5.60.4 Member Data Documentation

#### **int Save\_specific\_points::column [protected]**

Second index of the array from the space variable.

Definition at line 91 of file `save_specific_points.hpp`.

#### **const SCALAR Save\_specific\_points::DT\_SPECIFIC\_POINTS [protected]**

Time step to save the list of the specific points.

Definition at line 95 of file `save_specific_points.hpp`.

#### **const SCALAR Save\_specific\_points::DX [protected]**

Space step in the first (x) direction.

Definition at line 85 of file `save_specific_points.hpp`.

#### **const SCALAR Save\_specific\_points::DY [protected]**

Space step in the second (y) direction.

Definition at line 87 of file `save_specific_points.hpp`.

**int Save\_specific\_points::row** [protected]

First index of the array from the space variable.

Definition at line 89 of file save\_specific\_points.hpp.

**SCALAR Save\_specific\_points::T\_output** [protected]

Value of the fixed time step.

Definition at line 93 of file save\_specific\_points.hpp.

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

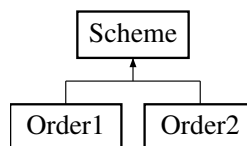
- Headers/libsave/[save\\_specific\\_points.hpp](#)
- Sources/libsave/[save\\_specific\\_points.cpp](#)

## 5.61 Scheme Class Reference

Numerical scheme.

```
#include <scheme.hpp>
```

Inheritance diagram for Scheme:



### Public Member Functions

- [Scheme](#) ([Parameters](#) &)  
*Constructor.*
- virtual void [calcul](#) ()=0  
*Function to be specified in each numerical scheme.*
- void [allocation](#) ()  
*Allocation of spatialized variables.*
- void [deallocation](#) ()  
*Deallocation of variables.*
- void [maincalclflux](#) ([SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#), [SCALAR](#) &)  
*Main calculation of the flux.*
- void [maincalcscheme](#) ([TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [TAB](#) &, [SCALAR](#), [SCALAR](#), int)  
*Main calculation of the scheme.*
- void [boundary](#) ([TAB](#) &, [TAB](#) &, [TAB](#) &, [SCALAR](#), const int, const int)  
*Calls the boundary conditions and affects the boundary values.*
- [SCALAR](#) [froude\\_number](#) ([TAB](#), [TAB](#), [TAB](#))  
*Returns the Froude number.*
- virtual [~Scheme](#) ()  
*Destructor.*



**Protected Attributes**

- const int [NXCELL](#)
- const int [NYCELL](#)
- const int [ORDER](#)
- const [SCALAR T](#)
- const int [NBTIMES](#)
- const int [SCHEME\\_TYPE](#)
- const [SCALAR DX](#)
- const [SCALAR DY](#)
- const [SCALAR CFL\\_FIX](#)
- [SCALAR DT\\_FIX](#)
- [SCALAR tx](#)
- [SCALAR ty](#)
- [SCALAR T\\_output](#)
- [SCALAR dt\\_output](#)
- const [SCALAR FRICCOEF](#)
- map< int, [SCALAR](#) > & [L\\_IMP\\_Q](#)
- map< int, [SCALAR](#) > & [L\\_IMP\\_H](#)
- map< [SCALAR](#), string > [left\\_times\\_files](#)
- map< [SCALAR](#), string >::const\_iterator [p\\_left\\_times\\_files](#)
- map< int, int > [L\\_choice\\_bound](#)
- int [Lbound\\_type](#)
- bool [is\\_Lbound\\_changed](#)
- map< int, [SCALAR](#) > & [R\\_IMP\\_Q](#)
- map< int, [SCALAR](#) > & [R\\_IMP\\_H](#)
- map< [SCALAR](#), string > [right\\_times\\_files](#)
- map< [SCALAR](#), string >::const\_iterator [p\\_right\\_times\\_files](#)
- map< int, int > [R\\_choice\\_bound](#)
- int [Rbound\\_type](#)
- bool [is\\_Rbound\\_changed](#)
- map< int, [SCALAR](#) > & [B\\_IMP\\_Q](#)
- map< int, [SCALAR](#) > & [B\\_IMP\\_H](#)
- map< [SCALAR](#), string > [bottom\\_times\\_files](#)
- map< [SCALAR](#), string >::const\_iterator [p\\_bottom\\_times\\_files](#)
- map< int, int > [B\\_choice\\_bound](#)
- int [Bbound\\_type](#)
- bool [is\\_Bbound\\_changed](#)
- map< int, [SCALAR](#) > & [T\\_IMP\\_Q](#)
- map< int, [SCALAR](#) > & [T\\_IMP\\_H](#)
- map< [SCALAR](#), string > [top\\_times\\_files](#)
- map< [SCALAR](#), string >::const\_iterator [p\\_top\\_times\\_files](#)
- map< int, int > [T\\_choice\\_bound](#)
- int [Tbound\\_type](#)
- bool [is\\_Tbound\\_changed](#)
- [Parameters](#) & [fs2d\\_par](#)
- [TAB z](#)
- [TAB h](#)
- [TAB u](#)

- TAB v
- TAB q1
- TAB q2
- TAB hs
- TAB us
- TAB vs
- TAB qs1
- TAB qs2
- TAB f1
- TAB f2
- TAB f3
- TAB g1
- TAB g2
- TAB g3
- TAB h1left
- TAB h1right
- TAB h2left
- TAB h2right
- TAB delz1
- TAB delz2
- TAB delzc1
- TAB delzc2
- TAB h1r
- TAB u1r
- TAB v1r
- TAB h1l
- TAB u1l
- TAB v1l
- TAB h2r
- TAB u2r
- TAB v2r
- TAB h2l
- TAB u2l
- TAB v2l
- TAB Rain
- TAB Vin\_tot
- time\_t start
- time\_t end
- SCALAR timecomputation
- clock\_t cpu\_time
- int n
- SCALAR Fr
- SCALAR dt1
- SCALAR dt\_max
- SCALAR cur\_time
- SCALAR dt\_first
- SCALAR Volrain\_Tot
- SCALAR Total\_volume\_outflow
- SCALAR height\_of\_tot

- SCALAR height\_Vinf\_tot
- SCALAR Vol\_inf\_tot\_cumul
- SCALAR Vol\_of\_tot
- Choice\_condition \* Lbound
- Choice\_condition \* Rbound
- Choice\_condition \* Bbound
- Choice\_condition \* Tbound
- Choice\_output \* out
- int verif
- Choice\_save\_specific\_points \* out\_specific\_points

### 5.61.1 Detailed Description

Numerical scheme.

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

Definition at line 116 of file scheme.hpp.

### 5.61.2 Constructor & Destructor Documentation

#### Scheme::Scheme ( Parameters & par )

Constructor.

Initializations and allocations.

Parameters

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

Definition at line 60 of file scheme.cpp.

#### Scheme::~Scheme ( ) [virtual]

Destructor.

Definition at line 860 of file scheme.cpp.

### 5.61.3 Member Function Documentation

#### void Scheme::allocation ( )

Allocation of spatialized variables.

Allocation of [Scheme::z](#), [Scheme::h](#), [Scheme::u](#), [Scheme::v](#), [Scheme::q1](#), [Scheme::q2](#), [Scheme::Vin\\_tot](#), [Scheme::hs](#), [Scheme::us](#), [Scheme::vs](#), [Scheme::qs1](#), [Scheme::qs2](#), [Scheme::f1](#), [Scheme::f2](#), [Scheme::f3](#), [Scheme::g1](#), [Scheme::g2](#), [Scheme::g3](#), [Scheme::h1left](#), [Scheme::h1l](#), [Scheme::u1l](#), [Scheme::v1l](#), [Scheme::h1right](#), [Scheme::h1r](#), [Scheme::u1r](#), [Scheme::v1r](#), [Scheme::h2left](#), [Scheme::h2l](#), [Scheme::u2l](#), [Scheme::v2l](#), [Scheme::h2right](#), [Scheme::h2r](#), [Scheme::u2r](#), [Scheme::v2r](#), [Scheme::delz1](#), [Scheme::delz2](#), [Scheme::delzc1](#), [Scheme::delzc2](#), [Scheme::Rain](#).

Definition at line 585 of file scheme.cpp.

#### void Scheme::boundary ( TAB & h\_tmp, TAB & u\_tmp, TAB & v\_tmp, SCALAR time\_tmp, const int NODEX, const int NODEY )

Calls the boundary conditions and affects the boundary values.

**Parameters**

in, out	<i>h_tmp</i>	water height.
in, out	<i>u_tmp</i>	first component of the velocity.
in, out	<i>v_tmp</i>	second component of the velocity.
in	<i>time_tmp</i>	current time.
in	<i>NODEX</i>	number of space cells in the first (x) direction.
in	<i>NODEY</i>	number of space cells in the second (y) direction.

Definition at line 386 of file scheme.cpp.

**virtual void Scheme::calcul ( ) [pure virtual]**

Function to be specified in each numerical scheme.

Implemented in [Order1](#), and [Order2](#).

**void Scheme::deallocation ( )**

Deallocation of variables.

Deallocation of [Scheme::z](#), [Scheme::h](#), [Scheme::u](#), [Scheme::v](#), [Scheme::q1](#), [Scheme::q2](#), [Scheme::Vin](#), [Scheme::tot](#), [Scheme::hs](#), [Scheme::us](#), [Scheme::vs](#), [Scheme::qs1](#), [Scheme::qs2](#), [Scheme::f1](#), [Scheme::f2](#), [Scheme::f3](#), [Scheme::g1](#), [Scheme::g2](#), [Scheme::g3](#), [Scheme::h1left](#), [Scheme::h1l](#), [Scheme::u1l](#), [Scheme::v1l](#), [Scheme::h1right](#), [Scheme::h1r](#), [Scheme::u1r](#), [Scheme::v1r](#), [Scheme::h2left](#), [Scheme::h2l](#), [Scheme::u2l](#), [Scheme::v2l](#), [Scheme::h2right](#), [Scheme::h2r](#), [Scheme::u2r](#), [Scheme::v2r](#), [Scheme::delz1](#), [Scheme::delz2](#), [Scheme::delzc1](#), [Scheme::delzc2](#), [Scheme::Rain](#).

Definition at line 723 of file scheme.cpp.

**SCALAR Scheme::froude\_number ( TAB *h\_s*, TAB *u\_s*, TAB *v\_s* )**

Returns the Froude number.

Mean value in space of the Froude number at the final time.

**Parameters**

in	<i>h_s</i>	water height.
in	<i>u_s</i>	first component of the velocity.
in	<i>v_s</i>	second component of the velocity.

Returns

The mean Froude number  $\frac{\sqrt{u_s^2 + v_s^2}}{\sqrt{gh_s}}$ .

Definition at line 548 of file scheme.cpp.

**void Scheme::maincalcflux ( SCALAR *cflfix*, SCALAR *T*, SCALAR *curtime*, SCALAR *dt\_max*, SCALAR *dt*, SCALAR & *dt\_cal* )**

Main calculation of the flux.

First part. Construction of variables for hydrostatic reconstruction. Fluxes in the two directions. Computation of the time step for the fixed cfl. This calculation is called once at the order 1, and twice at the second order.

**Parameters**

in	<i>cflfix</i>	fixed cfl.
----	---------------	------------

in	<i>T</i>	final time (unused).
in	<i>curtime</i>	current time.
in	<i>dt_max</i>	maximum value of the time step.
in	<i>dt</i>	time step.
out	<i>dt_cal</i>	effective time step.

#### Warning

the CFL condition is not satisfied:  $CFL > ***$

Definition at line 174 of file scheme.cpp.

**void Scheme::maincalcscheme ( TAB & *he*, TAB & *ve1*, TAB & *ve2*, TAB & *qe1*, TAB & *qe2*, TAB & *hes*, TAB & *ves1*, TAB & *ves2*, TAB & *qes1*, TAB & *qes2*, TAB & *Vin*, SCALAR *curtime*, SCALAR *dt*, int *n* )**

Main calculation of the scheme.

Second part. Computation of h, u and v. This calculation is called once at the order 1, and twice at the second order.

#### Parameters

in	<i>he</i>	water height.
in	<i>ve1</i>	first component of the velocity.
in	<i>ve2</i>	second component of the velocity.
in	<i>qe1</i>	first component of the discharge (unused).
in	<i>qe2</i>	second component of the discharge (unused).
out	<i>hes</i>	water height.
out	<i>ves1</i>	first component of the velocity.
out	<i>ves2</i>	second component of the velocity.
out	<i>qes1</i>	first component of the discharge.
out	<i>qes2</i>	second component of the discharge.
out	<i>Vin</i>	infiltrated volume
in	<i>curtime</i>	current time.
in	<i>dt</i>	time step.
in	<i>n</i>	number of iterations (unused).

#### Note

In DEBUG mode, the programme will save three other files with boundaries fluxes.

Definition at line 254 of file scheme.cpp.

### 5.61.4 Member Data Documentation

**map<int,int> Scheme::B\_choice\_bound [protected]**

Bottom boundary condition.

Definition at line 216 of file scheme.hpp.

**map<int,SCALAR>& Scheme::B\_IMP\_H [protected]**

Imposed water height on the bottom boundary.

Definition at line 210 of file scheme.hpp.

**map<int,SCALAR>& Scheme::B\_IMP\_Q [protected]**

Imposed discharge on the bottom boundary.  
Definition at line 208 of file scheme.hpp.

**Choice\_condition\* Scheme::Bbound [protected]**

The choice of the bottom boundary condition.  
Definition at line 352 of file scheme.hpp.

**int Scheme::Bbound\_type [protected]**

Type (constant or file) of bottom boundary condition  
Definition at line 218 of file scheme.hpp.

**map<SCALAR,string> Scheme::bottom\_times\_files [protected]**

List of files and time values corresponding to the bottom boundary condition.  
Definition at line 212 of file scheme.hpp.

**const SCALAR Scheme::CFL\_FIX [protected]**

Value of the fixed cfl.  
Definition at line 166 of file scheme.hpp.

**clock\_t Scheme::cpu\_time [protected]**

CPU time.  
Definition at line 322 of file scheme.hpp.

**SCALAR Scheme::cur\_time [protected]**

The current simulation time.  
Definition at line 332 of file scheme.hpp.

**TAB Scheme::delz1 [protected]**

Variations of the topography along x.  
Definition at line 280 of file scheme.hpp.

**TAB Scheme::delz2 [protected]**

Variations of the topography along y.  
Definition at line 282 of file scheme.hpp.

**TAB Scheme::delzc1 [protected]**

Difference between the reconstructed topographies on the left and on the right boundary of a cell along x.  
Definition at line 284 of file scheme.hpp.

**TAB Scheme::delzc2 [protected]**

Difference between the reconstructed topographies on the left and on the right boundary of a cell along y.  
Definition at line 286 of file scheme.hpp.

**SCALAR Scheme::dt1 [protected]**

Time step in case of fixed cfl.

Definition at line 328 of file scheme.hpp.

**SCALAR Scheme::dt\_first [protected]**

Space step in the first step in the method Heun.

Definition at line 334 of file scheme.hpp.

**SCALAR Scheme::DT\_FIX [protected]**

Value of the fixed time step.

Definition at line 168 of file scheme.hpp.

**SCALAR Scheme::dt\_max [protected]**

Maximum time step in case of fixed cfl.

Definition at line 330 of file scheme.hpp.

**SCALAR Scheme::dt\_output [protected]**

Time step to save the data (evolution file).

Definition at line 176 of file scheme.hpp.

**const SCALAR Scheme::DX [protected]**

Space step in the first (x) direction.

Definition at line 162 of file scheme.hpp.

**const SCALAR Scheme::DY [protected]**

Space step in the second (y) direction.

Definition at line 164 of file scheme.hpp.

**time\_t Scheme::end [protected]**

End of timer.

Definition at line 318 of file scheme.hpp.

**TAB Scheme::f1 [protected]**

First component of the numerical flux along x.

Definition at line 260 of file scheme.hpp.

**TAB Scheme::f2 [protected]**

Second component of the numerical flux along x.

Definition at line 262 of file scheme.hpp.

**TAB Scheme::f3 [protected]**

Third component of the numerical flux along x.

Definition at line 264 of file scheme.hpp.

**SCALAR Scheme::Fr [protected]**

Mean Froude number.

Definition at line 326 of file scheme.hpp.

**const SCALAR Scheme::FRICCOEF [protected]**

Friction coefficient.

Definition at line 178 of file scheme.hpp.

**Parameters& Scheme::fs2d\_par [protected]**

Parameters object to read the files of boundary conditions

Definition at line 236 of file scheme.hpp.

**TAB Scheme::g1 [protected]**

First component of the numerical flux along y.

Definition at line 266 of file scheme.hpp.

**TAB Scheme::g2 [protected]**

Second component of the numerical flux along y.

Definition at line 268 of file scheme.hpp.

**TAB Scheme::g3 [protected]**

Third component of the numerical flux along y.

Definition at line 270 of file scheme.hpp.

**TAB Scheme::h [protected]**

Water height.

Definition at line 240 of file scheme.hpp.

**TAB Scheme::h1l [protected]**

Water height on the cell located at the left of the boundary along x.

Definition at line 294 of file scheme.hpp.

**TAB Scheme::h1left [protected]**

Hydrostatic reconstruction on the left along x.

Definition at line 272 of file scheme.hpp.

**TAB Scheme::h1r [protected]**

Water height on the cell located at the right of the boundary along x.

Definition at line 288 of file scheme.hpp.

**TAB Scheme::h1right [protected]**

Hydrostatic reconstruction on the right along x.

Definition at line 274 of file scheme.hpp.



**TAB Scheme::h2l [protected]**

Water height on the cell located at the left of the boundary along y.  
Definition at line 306 of file scheme.hpp.

**TAB Scheme::h2left [protected]**

Hydrostatic reconstruction on the left along y.  
Definition at line 276 of file scheme.hpp.

**TAB Scheme::h2r [protected]**

Water height on the cell located at the right of the boundary along y.  
Definition at line 300 of file scheme.hpp.

**TAB Scheme::h2right [protected]**

Hydrostatic reconstruction on the right along y.  
Definition at line 278 of file scheme.hpp.

**SCALAR Scheme::height\_of\_tot [protected]**

Cumulative water height on the whole domain  
Definition at line 340 of file scheme.hpp.

**SCALAR Scheme::height\_Vinf\_tot [protected]**

Cumulative height of infiltrated water on the whole domain  
Definition at line 342 of file scheme.hpp.

**TAB Scheme::hs [protected]**

Water height after one step of the scheme.  
Definition at line 250 of file scheme.hpp.

**bool Scheme::is\_Bbound\_changed [protected]**

This variable is true if the boundary has been updated  
Definition at line 220 of file scheme.hpp.

**bool Scheme::is\_Lbound\_changed [protected]**

This variable is true if the boundary has been updated  
Definition at line 192 of file scheme.hpp.

**bool Scheme::is\_Rbound\_changed [protected]**

This variable is true if the boundary has been updated  
Definition at line 206 of file scheme.hpp.

**bool Scheme::is\_Tbound\_changed [protected]**

This variable is true if the boundary has been updated  
Definition at line 234 of file scheme.hpp.

**map<int,int> Scheme::L\_choice\_bound [protected]**

Right boundary condition.

Definition at line 188 of file scheme.hpp.

**map<int,SCALAR>& Scheme::L\_IMP\_H [protected]**

Imposed water height on the left boundary.

Definition at line 182 of file scheme.hpp.

**map<int,SCALAR>& Scheme::L\_IMP\_Q [protected]**

Imposed discharge on the left boundary.

Definition at line 180 of file scheme.hpp.

**Choice\_condition\* Scheme::Lbound [protected]**

The choice of the left boundary condition.

Definition at line 348 of file scheme.hpp.

**int Scheme::Lbound\_type [protected]**

Type (constant or file) of left boundary condition

Definition at line 190 of file scheme.hpp.

**map<SCALAR,string> Scheme::left\_times\_files [protected]**

List of files and time values corresponding to the left boundary condition.

Definition at line 184 of file scheme.hpp.

**int Scheme::n [protected]**

Iterator for the loop in time.

Definition at line 324 of file scheme.hpp.

**const int Scheme::NBTIMES [protected]**

Number of times saved.

Definition at line 158 of file scheme.hpp.

**const int Scheme::NXCELL [protected]**

Number of cells in space in the first (x) direction.

Definition at line 150 of file scheme.hpp.

**const int Scheme::NYCELL [protected]**

Number of cells in space in the second (y) direction.

Definition at line 152 of file scheme.hpp.

**const int Scheme::ORDER [protected]**

Order of the numerical scheme.

Definition at line 154 of file scheme.hpp.

**Choice\_output\* Scheme::out [protected]**

The choice of output.

Definition at line 356 of file scheme.hpp.

**Choice\_save\_specific\_points\* Scheme::out\_specific\_points [protected]**

The choice of output for the specific points.

Definition at line 360 of file scheme.hpp.

**map<SCALAR,string>::const\_iterator Scheme::p\_bottom\_times\_files [protected]**

Iterator pointing to a file and time value corresponding to the bottom boundary condition

Definition at line 214 of file scheme.hpp.

**map<SCALAR,string>::const\_iterator Scheme::p\_left\_times\_files [protected]**

Iterator pointing to a file and time value corresponding to the left boundary condition

Definition at line 186 of file scheme.hpp.

**map<SCALAR,string>::const\_iterator Scheme::p\_right\_times\_files [protected]**

Iterator pointing to a file and time value corresponding to the right boundary condition

Definition at line 200 of file scheme.hpp.

**map<SCALAR,string>::const\_iterator Scheme::p\_top\_times\_files [protected]**

Iterator pointing to a file and time value corresponding to the top boundary condition

Definition at line 228 of file scheme.hpp.

**TAB Scheme::q1 [protected]**

First component of the discharge.

Definition at line 246 of file scheme.hpp.

**TAB Scheme::q2 [protected]**

Second component of the discharge.

Definition at line 248 of file scheme.hpp.

**TAB Scheme::qs1 [protected]**

First component of the discharge after one step of the scheme.

Definition at line 256 of file scheme.hpp.

**TAB Scheme::qs2 [protected]**

Second component of the discharge after one step of the scheme.

Definition at line 258 of file scheme.hpp.

**map<int,int> Scheme::R\_choice\_bound [protected]**

Right boundary condition.

Definition at line 202 of file scheme.hpp.

**map<int,SCALAR>& Scheme::R\_IMP\_H [protected]**

Imposed water height on the right boundary.  
Definition at line 196 of file scheme.hpp.

**map<int,SCALAR>& Scheme::R\_IMP\_Q [protected]**

Imposed discharge on the right boundary.  
Definition at line 194 of file scheme.hpp.

**TAB Scheme::Rain [protected]**

Rain intensity.  
Definition at line 312 of file scheme.hpp.

**Choice\_condition\* Scheme::Rbound [protected]**

The choice of the right boundary condition.  
Definition at line 350 of file scheme.hpp.

**int Scheme::Rbound\_type [protected]**

Type (constant or file) of right boundary condition  
Definition at line 204 of file scheme.hpp.

**map<SCALAR,string> Scheme::right\_times\_files [protected]**

List of files and time values corresponding to the right boundary condition.  
Definition at line 198 of file scheme.hpp.

**const int Scheme::SCHEME\_TYPE [protected]**

Type of scheme (fixed cfl or time step).  
Definition at line 160 of file scheme.hpp.

**time\_t Scheme::start [protected]**

Beginning of timer.  
Definition at line 316 of file scheme.hpp.

**const SCALAR Scheme::T [protected]**

Final time.  
Definition at line 156 of file scheme.hpp.

**map<int,int> Scheme::T\_choice\_bound [protected]**

Top boundary condition.  
Definition at line 230 of file scheme.hpp.

**map<int,SCALAR>& Scheme::T\_IMP\_H [protected]**

Imposed water height on the top boundary.  
Definition at line 224 of file scheme.hpp.

**map<int,SCALAR>& Scheme::T\_IMP\_Q [protected]**

Imposed discharge on the top boundary.

Definition at line 222 of file scheme.hpp.

**SCALAR Scheme::T\_output [protected]**

Time to save the data (evolution file).

Definition at line 174 of file scheme.hpp.

**Choice\_condition\* Scheme::Tbound [protected]**

The choice of the top boundary condition.

Definition at line 354 of file scheme.hpp.

**int Scheme::Tbound\_type [protected]**

Type (constant or file) of top boundary condition

Definition at line 232 of file scheme.hpp.

**SCALAR Scheme::timecomputation [protected]**

Duration of the computation.

Definition at line 320 of file scheme.hpp.

**map<SCALAR,string> Scheme::top\_times\_files [protected]**

List of files and time values corresponding to the top boundary condition.

Definition at line 226 of file scheme.hpp.

**SCALAR Scheme::Total\_volume\_outflow [protected]**

Cumulative outflow volume at the boundary.

Definition at line 338 of file scheme.hpp.

**SCALAR Scheme::tx [protected]**

Ratio dt/dx.

Definition at line 170 of file scheme.hpp.

**SCALAR Scheme::ty [protected]**

Ratio dt/dy.

Definition at line 172 of file scheme.hpp.

**TAB Scheme::u [protected]**

First component of the velocity.

Definition at line 242 of file scheme.hpp.

**TAB Scheme::u1l [protected]**

First component of the velocity on the cell located at the left of the boundary along x.

Definition at line 296 of file scheme.hpp.

**TAB Scheme::u1r [protected]**

First component of the velocity on the cell located at the right of the boundary along x.  
Definition at line 290 of file scheme.hpp.

**TAB Scheme::u2l [protected]**

First component of the velocity on the cell located at the left of the boundary along y.  
Definition at line 308 of file scheme.hpp.

**TAB Scheme::u2r [protected]**

First component of the velocity on the cell located at the right of the boundary along y.  
Definition at line 302 of file scheme.hpp.

**TAB Scheme::us [protected]**

First component of the velocity after one step of the scheme.  
Definition at line 252 of file scheme.hpp.

**TAB Scheme::v [protected]**

Second component of the velocity.  
Definition at line 244 of file scheme.hpp.

**TAB Scheme::v1l [protected]**

Second component of the velocity on the cell located at the left of the boundary along x.  
Definition at line 298 of file scheme.hpp.

**TAB Scheme::v1r [protected]**

Second component of the velocity on the cell located at the right of the boundary along x.  
Definition at line 292 of file scheme.hpp.

**TAB Scheme::v2l [protected]**

Second component of the velocity on the cell located at the left of the boundary along y.  
Definition at line 310 of file scheme.hpp.

**TAB Scheme::v2r [protected]**

Second component of the velocity on the cell located at the right of the boundary along y.  
Definition at line 304 of file scheme.hpp.

**int Scheme::verif [protected]**

Flag for the time step.  
Definition at line 358 of file scheme.hpp.

**TAB Scheme::Vin\_tot [protected]**

Cumulative volume of infiltrated water (at each point).  
Definition at line 314 of file scheme.hpp.

**SCALAR Scheme::Vol\_inf\_tot\_cumul [protected]**

Cumulative volume of water infiltrated.

Definition at line 344 of file scheme.hpp.

**SCALAR Scheme::Vol\_of\_tot [protected]**

Cumulative streammed volume.

Definition at line 346 of file scheme.hpp.

**SCALAR Scheme::Volrain\_Tot [protected]**

Cumulative volume of rain on the whole domain.

Definition at line 336 of file scheme.hpp.

**TAB Scheme::vs [protected]**

Second component of the velocity after one step of the scheme.

Definition at line 254 of file scheme.hpp.

**TAB Scheme::z [protected]**

Topography.

Definition at line 238 of file scheme.hpp.

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

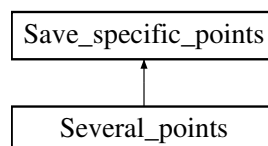
- Headers/libschemas/[scheme.hpp](#)
- Sources/libschemas/[scheme.cpp](#)

## 5.62 Several\_points Class Reference

Several points output.

```
#include <several_points.hpp>
```

Inheritance diagram for Several\_points:



### Public Member Functions

- [Several\\_points](#) ([Parameters](#) &)  
*Constructor.*
- void [save](#) (const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [SCALAR](#))  
*Saves the values at the specific points.*
- virtual [~Several\\_points](#) ()  
*Destructor.*

## Additional Inherited Members

### 5.62.1 Detailed Description

Several points output.

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

Definition at line 73 of file several\_points.hpp.

### 5.62.2 Constructor & Destructor Documentation

#### Several\_points::Several\_points ( Parameters & *par* )

Constructor.

Writes the header of the file 'hu\_specific\_points.dat'.

Parameters

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

Warning

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

\*\*\*: WARNING: line \*\*\* ; a commentary should begin with the # symbol.

Note

If hu\_specific\_points.dat cannot be opened, the code will exit with failure termination code.

x coordinate of the specific point to be saved.

y coordinate of the specific point to be saved.

Name of file containing the list of the specific points.

Definition at line 60 of file several\_points.cpp.

#### Several\_points::~~Several\_points ( ) [virtual]

Destructor.

Definition at line 188 of file several\_points.cpp.

### 5.62.3 Member Function Documentation

#### void Several\_points::save ( const TAB & *h*, const TAB & *u*, const TAB & *v*, const SCALAR *time* ) [virtual]

Saves the values at the specific points.

Writes the values of [Scheme::h](#), [Scheme::u](#) ( $=q1/h$ ), [Scheme::v](#) ( $=q2/h$ ), [Scheme::h](#)+ [Scheme::z](#) (free surface), [Scheme::z](#),  $|U| = \sqrt{u^2 + v^2}$ , the Froude number  $\frac{|U|}{\sqrt{gh}}$ , [Scheme::q1](#), [Scheme::q2](#), and  $h|U|$  at the current time in "hu\_specific\_points.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

<i>in</i>	<i>h</i>	the water height.
<i>in</i>	<i>u</i>	first component of the velocity.
<i>in</i>	<i>v</i>	second component of the velocity.



<code>in</code>	<code>time</code>	the current time.
-----------------	-------------------	-------------------

Implements [Save\\_specific\\_points](#).

Definition at line 141 of file `several_points.cpp`.

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

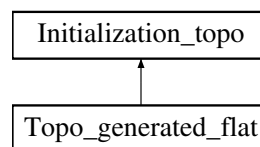
- Headers/libsave/[several\\_points.hpp](#)
- Sources/libsave/[several\\_points.cpp](#)

## 5.63 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](#) ([TAB](#) &)  
*Performs the initialization.*
- virtual [~Topo\\_generated\\_flat](#) ()  
*Destructor.*

### Additional Inherited Members

#### 5.63.1 Detailed Description

Flat configuration.

Class that initializes a flat topography, with value 0.

Definition at line 73 of file `topo_generated_flat.hpp`.

#### 5.63.2 Constructor & Destructor Documentation

**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 60 of file `topo_generated_flat.cpp`.

**Topo\_generated\_flat::~Topo\_generated\_flat ( ) [[virtual](#)]**

Destructor.

Definition at line 84 of file `topo_generated_flat.cpp`.

### 5.63.3 Member Function Documentation

**void Topo\_generated\_flat::initialization ( TAB & topo ) [virtual]**

Performs the initialization.

Initializes the topography to 0.

Parameters

<i>in, out</i>	<i>topo</i>	topography.
----------------	-------------	-------------

Implements [Initialization\\_topo](#).

Definition at line 69 of file topo\_generated\_flat.cpp.

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

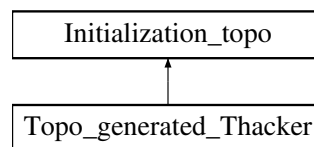
- Headers/libinitializations/[topo\\_generated\\_flat.hpp](#)
- Sources/libinitializations/[topo\\_generated\\_flat.cpp](#)

## 5.64 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](#) ([TAB](#) &)  
*Performs the initialization.*
- virtual [~Topo\\_generated\\_Thacker](#) ()  
*Destructor.*

### Additional Inherited Members

#### 5.64.1 Detailed Description

Thacker configuration.

Class that initializes a topography for Thacker's benchmark (shape of a paraboloid of revolution).

Definition at line 73 of file topo\_generated\_thacker.hpp.

#### 5.64.2 Constructor & Destructor Documentation

**Topo\_generated\_Thacker::Topo\_generated\_Thacker ( Parameters & par )**

Constructor.

Defines the parameters of the paraboloid.

**Parameters**

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

Definition at line 60 of file `topo_generated_thacker.cpp`.

**Topo\_generated\_Thacker::~Topo\_generated\_Thacker ( ) [virtual]**

Destructor.

Definition at line 98 of file `topo_generated_thacker.cpp`.

**5.64.3 Member Function Documentation**

**void Topo\_generated\_Thacker::initialization ( TAB & topo ) [virtual]**

Performs the initialization.

Initializes the topography to  $h_0 \left( \frac{(x-Lx/2)^2 + (y-Ly/2)^2}{a^2} - 1 \right)$ , see [Thacker \[1981\]](#).

**Parameters**

<code>in, out</code>	<code>topo</code>	topography.
----------------------	-------------------	-------------

Implements [Initialization\\_topo](#).

Definition at line 78 of file `topo_generated_thacker.cpp`.

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

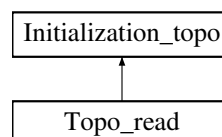
- Headers/libinitializations/[topo\\_generated\\_thacker.hpp](#)
- Sources/libinitializations/[topo\\_generated\\_thacker.cpp](#)

**5.65 Topo\_read Class Reference**

File configuration.

```
#include <topo_read.hpp>
```

Inheritance diagram for Topo\_read:

**Public Member Functions**

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

**Additional Inherited Members****5.65.1 Detailed Description**

File configuration.

Class that initializes the topography to the values read in a file.

Definition at line 72 of file `topo_read.hpp`.

### 5.65.2 Constructor & Destructor Documentation

#### Topo\_read::Topo\_read ( Parameters & *par* )

Constructor.

Defines the name of the file for the initialization.

Parameters

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

Definition at line 60 of file topo\_read.cpp.

#### Topo\_read::~~Topo\_read ( ) [virtual]

Destructor.

Definition at line 187 of file topo\_read.cpp.

### 5.65.3 Member Function Documentation

#### void Topo\_read::initialization ( TAB & *topo* ) [virtual]

Performs the initialization.

Initializes the topography to the values read in the corresponding file.

Parameters

<i>in, out</i>	<i>topo</i>	topography.
----------------	-------------	-------------

Warning

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

Note

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

Implements [Initialization\\_topo](#).

Definition at line 72 of file topo\_read.cpp.

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

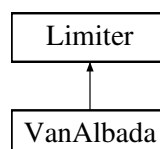
- Headers/libinitializations/[topo\\_read.hpp](#)
- Sources/libinitializations/[topo\\_read.cpp](#)

## 5.66 VanAlbada Class Reference

Van Albada slope limiter.

```
#include <vanalbada.hpp>
```

Inheritance diagram for VanAlbada:



## Public Member Functions

- [VanAlbada](#) ()  
*Constructor.*
- void [calcul](#) (SCALAR, SCALAR)  
*Calculates the value of the slope limiter.*
- virtual [~VanAlbada](#) ()  
*Destructor.*

## Additional Inherited Members

### 5.66.1 Detailed Description

Van Albada slope limiter.

Class that calculates Van Albada slope limiter.

Definition at line 70 of file vanalbada.hpp.

### 5.66.2 Constructor & Destructor Documentation

#### VanAlbada::VanAlbada ( )

Constructor.

Definition at line 59 of file vanalbada.cpp.

#### VanAlbada::~~VanAlbada ( ) [virtual]

Destructor.

Definition at line 85 of file vanalbada.cpp.

### 5.66.3 Member Function Documentation

#### void VanAlbada::calcul ( 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**

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

**Modifies**

[Limiter::rec](#) recontructed value.

Implements [Limiter](#).

Definition at line 62 of file vanalbada.cpp.

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

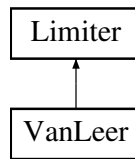
- Headers/liblimitations/[vanalbada.hpp](#)
- Sources/liblimitations/[vanalbada.cpp](#)

## 5.67 VanLeer Class Reference

Van Leer slope limiter.

```
#include <vanleer.hpp>
```

Inheritance diagram for VanLeer:



### Public Member Functions

- `VanLeer()`  
*Constructor.*
- `void calcul(SCALAR, SCALAR)`  
*Calculates the value of the slope limiter.*
- `virtual ~VanLeer()`  
*Destructor.*

### Additional Inherited Members

#### 5.67.1 Detailed Description

Van Leer slope limiter.

Class that calculates Van Leer slope limiter.

Definition at line 70 of file vanleer.hpp.

#### 5.67.2 Constructor & Destructor Documentation

**VanLeer::VanLeer ( )**

Constructor.

Definition at line 59 of file vanleer.cpp.

**VanLeer::~~VanLeer ( ) [virtual]**

Destructor.

Definition at line 84 of file vanleer.cpp.

#### 5.67.3 Member Function Documentation

**void VanLeer::calcul ( 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**

<code>in</code>	<code>a</code>	slope on the left of the cell.
<code>in</code>	<code>b</code>	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:

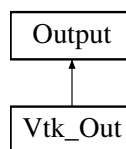
- Headers/liblimitations/[vanleer.hpp](#)
- Sources/liblimitations/[vanleer.cpp](#)

**5.68 Vtk\_Out Class Reference**

VTK output.

```
#include <vtk_out.hpp>
```

Inheritance diagram for `Vtk_Out`:

**Public Member Functions**

- [Vtk\\_Out](#) ([Parameters](#) &)  
*Constructor.*
- void [write](#) (const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [TAB](#) &, const [SCALAR](#) &)  
*Saves one time step.*
- virtual [~Vtk\\_Out](#) ()  
*Destructor.*

**Additional Inherited Members****5.68.1 Detailed Description**

VTK output.

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

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

**5.68.2 Constructor & Destructor Documentation**

**`Vtk_Out::Vtk_Out ( Parameters & par )`**

Constructor.

Defines the output name `huz_evolution.dat`

**Parameters**

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

Definition at line 60 of file vtk\_out.cpp.

**Vtk\_Out::~Vtk\_Out ( ) [virtual]**

Destructor.

Definition at line 259 of file vtk\_out.cpp.

**5.68.3 Member Function Documentation**

**void Vtk\_Out::write ( const TAB & *h*, const TAB & *u*, const TAB & *v*, const TAB & *z*, const SCALAR & *time* ) [virtual]**

Saves one time step.

Writes the values of [Scheme::z](#), [Scheme::h](#), [Scheme::u](#) (=q1/h), [Scheme::v](#) (=q2/h), [Scheme::h](#)+ [Scheme::z](#) (free surface),  $|U| = \sqrt{u^2 + v^2}$ , the Froude number  $\frac{|U|}{\sqrt{gh}}$ , [Scheme::q1](#), [Scheme::q2](#), and  $h|U|$  at the current time in huz\_evolution.dat\*\*\*.vtk.

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

**Parameters**

<i>in</i>	<i>h</i>	the water height.
<i>in</i>	<i>u</i>	first component of the velocity.
<i>in</i>	<i>v</i>	second component of the velocity.
<i>in</i>	<i>z</i>	the topography.
<i>in</i>	<i>time</i>	the current time.

**Note**

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

Implements [Output](#).

Definition at line 76 of file vtk\_out.cpp.

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

- Headers/libsave/[vtk\\_out.hpp](#)
- Sources/libsave/[vtk\\_out.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

Ulrich Razafison [ulrich.razafison@math.cnrs.fr](mailto:ulrich.razafison@math.cnrs.fr) (2011)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.01

Date

2015-10-29

Boundary condition: imposed discharge (and water height if necessary).

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### 6.1.2 Macro Definition Documentation

**#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)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2010-2015)

Version

1.06.00

Date

2015-02-19

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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## 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)  
Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Boundary condition: Neumann condition (the normal derivative is null).

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## 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)  
Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Boundary condition: periodic condition.

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## 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)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Boundary condition: wall condition (the discharge at the boundary is null).

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## 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)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2017-03-20

Common part for all the boundary conditions.

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## 6.7 Headers/libboundaryconditions/choice\_condition.hpp File Reference

Choice of boundary condition.

```
#include "boundary_condition.hpp"
#include "bc_imp_height.hpp"
#include "bc_wall.hpp"
#include "bc_neumann.hpp"
#include "bc_periodic.hpp"
#include "bc_imp_discharge.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)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-04-12

From the value of the corresponding parameter, calls the chosen boundary condition.

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### 6.7.2 Macro Definition Documentation

**#define CHOICE\_CONDITION\_HPP**

Definition at line 84 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_hll.hpp"
#include "f_hll2.hpp"
#include "f_hllc.hpp"
#include "f_hllc2.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) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.01

Date

2016-01-04

From the value of the corresponding parameter, calls the chosen numerical flux.

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### 6.8.2 Macro Definition Documentation

**#define CHOICE\_FLUX\_HPP**

Definition at line 84 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)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Numerical flux: Harten, Lax, van Leer reduced formulation.

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## 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)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Numerical flux: Harten, Lax, van Leer reduced formulation.

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## 6.11 Headers/libflux/f\_hllc.hpp File Reference

HLLC flux.

```
#include "flux.hpp"
```



**Classes**

- class [F\\_HLLC](#)  
*HLLC flux.*

**6.11.1 Detailed Description**

HLLC flux.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.01

Date

2016-01-04

Numerical flux: Harten, Lax, van Leer reduced formulation with restoration of the Contact Surface.

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**6.12 Headers/libflux/f\_hllc2.hpp File Reference**

HLLC flux.

```
#include "flux.hpp"
```

**Classes**

- class [F\\_HLLC2](#)

**6.12.1 Detailed Description**

HLLC flux.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.01

Date

2016-01-04

Numerical flux: Harten, Lax, van Leer reduced formulation.

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## 6.13 Headers/libflux/f\_rusanov.hpp File Reference

Rusanov flux.

```
#include "flux.hpp"
```

### Classes

- class [F\\_Rusanov](#)

*Rusanov flux.*

### 6.13.1 Detailed Description

Rusanov flux.

#### Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

#### Version

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#### Date

2015-02-19

Numerical flux: Rusanov formulation.

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## 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)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Common part for all the numerical fluxes.

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## 6.15 Headers/libfrictions/choice\_friction.hpp File Reference

Choice of friction law.

```
#include "friction.hpp"
#include "fr_manning.hpp"
#include "fr_darcy_weisbach.hpp"
#include "no_friction.hpp"
#include "fr_laminar.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)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

From the value of the corresponding parameter, calls the chosen friction law.

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### 6.15.2 Macro Definition Documentation

**#define CHOICE\_FRICTION\_HPP**

Definition at line 80 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)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Friction law: Darcy-Weisbach.

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## 6.17 Headers/libfrictions/fr\_laminar.hpp File Reference

laminar law

```
#include "friction.hpp"
```

### Classes

- class [Fr\\_Laminar](#)

*Laminar law.*

### 6.17.1 Detailed Description

laminar law

Author

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2014-2015)

Version

1.06.00

Date

2015-02-19

Friction law: laminar.

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## 6.18 Headers/libfrictions/fr\_manning.hpp File Reference

Manning law.

```
#include "friction.hpp"
```

### Classes

- class [Fr\\_Manning](#)

*Manning law.*

### 6.18.1 Detailed Description

Manning law.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

## Version

1.06.00

## Date

2015-02-19

Friction law: Manning.

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## 6.19 Headers/libfrictions/friction.hpp File Reference

## Friction law

```
#include "parameters.hpp"
```

### Classes

- class [Friction](#)  
*Friction law*

### 6.19.1 Detailed Description

## Friction law

## Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

## Version

1.06.00

## Date

2015-02-19

Common part for all the friction laws.

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## 6.20 Headers/libfrictions/no\_friction.hpp File Reference

## No friction.

```
#include "friction.hpp"
```

**Classes**

- class [No\\_Friction](#)

*No friction.*

**6.20.1 Detailed Description**

No friction.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Friction law: does no computation.

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**6.21 Headers/libinitializations/choice\_init\_huv.hpp File Reference**

Choice of initialization for h, u and v.

```
#include "initialization_huv.hpp"
#include "huv_read.hpp"
#include "huv_generated.hpp"
#include "huv_generated_thacker.hpp"
#include "huv_generated_radial_dam_dry.hpp"
#include "huv_generated_radial_dam_wet.hpp"
```

**Classes**

- class [Choice\\_init\\_huv](#)

*Choice of initialization for h and  $U=(u,v)$*

**Macros**

- #define [CHOICE\\_INIT\\_HUV\\_HPP](#)

### 6.21.1 Detailed Description

Choice of initialization for h, u and v.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

From the value of the corresponding parameter, calls the chosen initialization of the water height and of the velocity.

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### 6.21.2 Macro Definition Documentation

**#define CHOICE\_INIT\_HUV\_HPP**

Definition at line 83 of file choice\_init\_huv.hpp.

## 6.22 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"
```

### Classes

- class [Choice\\_init\\_topo](#)  
*Choice of initialization for the topography.*

### Macros

- #define [CHOICE\\_INIT\\_TOPO\\_HPP](#)



### 6.22.1 Detailed Description

Choice of initialization for the topography.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

From the value of the corresponding parameter, calls the chosen initialization of the topography.

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### 6.22.2 Macro Definition Documentation

**#define CHOICE\_INIT\_TOPO\_HPP**

Definition at line 75 of file choice\_init\_topo.hpp.

## 6.23 Headers/libinitializations/huv\_generated.hpp File Reference

No water configuration.

```
#include "initialization_huv.hpp"
```

### Classes

- class [Huv\\_generated](#)

*No water configuration.*

### 6.23.1 Detailed Description

No water configuration.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Initialization of the water height and of the velocity: case of a dry domain.

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## 6.24 Headers/libinitializations/huv\_generated\_radial\_dam\_dry.hpp File Reference

Dry radial dam break configuration.

```
#include "initialization_huv.hpp"
```

### Classes

- class [Huv\\_generated\\_Radial\\_Dam\\_dry](#)  
*Dry radial dam break configuration.*

### 6.24.1 Detailed Description

Dry radial dam break configuration.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Initialization of the water height and of the velocity: case of a radial dam break on a dry domain.

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## 6.25 Headers/libinitializations/huv\_generated\_radial\_dam\_wet.hpp File Reference

Wet radial dam break configuration.

```
#include "initialization_huv.hpp"
```

## Classes

- class [Huv\\_generated\\_Radial\\_Dam\\_wet](#)  
*Wet radial dam break configuration.*

### 6.25.1 Detailed Description

Wet radial dam break configuration.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

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## 6.26 Headers/libinitializations/huv\_generated\_thacker.hpp File Reference

Thacker configuration.

```
#include "initialization_huv.hpp"
```

## Classes

- class [Huv\\_generated\\_Thacker](#)  
*Thacker configuration.*

### 6.26.1 Detailed Description

Thacker configuration.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

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Initialization of the water height and of the velocity: case of Thacker's benchmark.

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## 6.27 Headers/libinitializations/huv\_read.hpp File Reference

File configuration.

```
#include "initialization_huv.hpp"
```

### Classes

- class [Huv\\_read](#)

*File configuration.*

### 6.27.1 Detailed Description

File configuration.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Initialization of the water height and of the velocity: the values are read in a file.

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## 6.28 Headers/libinitializations/initialization\_huv.hpp File Reference

Initialization of h, u and v

```
#include "parameters.hpp"
```

## Classes

- class [Initialization\\_huv](#)  
*Initialization of  $h$ ,  $u$  and  $v$ .*

### 6.28.1 Detailed Description

Initialization of  $h$ ,  $u$  and  $v$

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Common part for all the initialization of the water height and of the velocity.

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## 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)  
Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-201())

Version

1.06.00

Date

2015-02-19

Common part for all the initialization of the topography.

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## 6.30 Headers/libinitializations/topo\_generated\_flat.hpp File Reference

Flat configuration.

```
#include "initialization_topo.hpp"
```

### Classes

- class [Topo\\_generated\\_flat](#)

*Flat configuration.*

### 6.30.1 Detailed Description

Flat configuration.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Initialization of the topography: the topography is flat, its value is 0.

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## 6.31 Headers/libinitializations/topo\_generated\_thacker.hpp File Reference

Thacker configuration.

```
#include "initialization_topo.hpp"
```

## Classes

- class [Topo\\_generated\\_Thacker](#)  
*Thacker configuration.*

### 6.31.1 Detailed Description

Thacker configuration.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

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2015-02-19

Initialization of the topography: topography with a shape of a paraboloid of revolution for Thacker's Benchmark.

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## 6.32 Headers/libinitializations/topo\_read.hpp File Reference

File configuration.

```
#include "initialization_topo.hpp"
```

## Classes

- class [Topo\\_read](#)  
*File configuration.*

### 6.32.1 Detailed Description

File configuration.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

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Initialization of the topography: the values are read in a file.

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### 6.33 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](#)

#### 6.33.1 Detailed Description

Choice of slope limiter.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

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From the value of the corresponding parameter, calls the chosen slope limiter.

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### 6.33.2 Macro Definition Documentation

#### **#define CHOICE\_LIMITER\_HPP**

Definition at line 75 of file choice\_limiter.hpp.

## 6.34 Headers/liblimitations/limiter.hpp File Reference

Slope limiter.

```
#include "parameters.hpp"
```

### Classes

- class [Limiter](#)  
*Slope limiter.*

### 6.34.1 Detailed Description

Slope limiter.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Common part for all the slope limiters.

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## 6.35 Headers/liblimitations/minmod.hpp File Reference

Minmod limiter

```
#include "limiter.hpp"
```

### Classes

- class [Minmod](#)  
*Minmod slope limiter*

### 6.35.1 Detailed Description

Minmod limiter

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

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Date

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Slope limiter: minmod.

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## 6.36 Headers/liblimitations/vanalbada.hpp File Reference

Van Albada limiter.

```
#include "limiter.hpp"
```

### Classes

- class [VanAlbada](#)

*Van Albada slope limiter.*

### 6.36.1 Detailed Description

Van Albada limiter.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

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Date

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Slope limiter: Van Albada.

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## 6.37 Headers/liblimitations/vanleer.hpp File Reference

Van Leer limiter.

```
#include "limiter.hpp"
```

### Classes

- class [VanLeer](#)

*Van Leer slope limiter.*

### 6.37.1 Detailed Description

Van Leer limiter.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

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Slope limiter: Van Leer.

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## 6.38 Headers/libparameters/misc.hpp File Reference

Definitions.

```
#include <vector>
#include <iostream>
#include <cmath>
#include <fstream>
#include <string>
#include <cstring>
#include <cstdlib>
#include <iomanip>
#include <sstream>
#include <cstdio>
#include <unistd.h>
#include <ctime>
#include <map>
```

## 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 CONST_CFL_X 0.5`
- `#define CONST_CFL_Y 0.5`
- `#define HE_CA 1.e-12`
- `#define VE_CA 1.e-12`
- `#define MAX_CFL_X 0.`
- `#define MAX_CFL_Y 0.`
- `#define MAX_ITER 1000000000`
- `#define NB_CHAR 256`
- `#define ZERO 0.`
- `#define IE_CA 1.e-8`
- `#define EPSILON 1.e-13`
- `#define VERSION "FullSWOF_2D version 1.07.01, 2017-05-09"`
- `#define RATIO_CLOSE_CELL 1.e-3`
- `#define MAX_SCAL DBL_MAX`

## Typedefs

- `typedef double SCALAR`
- `typedef vector< vector< SCALAR > > TAB`
- `typedef vector< SCALAR > VECT`

### 6.38.1 Detailed Description

Definitions.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
 Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-05-09

Defines the constants, the types used in the code and contains the 'include'.

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### 6.38.2 Macro Definition Documentation

**#define CONST\_CFL\_X 0.5**

Definition at line 75 of file misc.hpp.

**#define CONST\_CFL\_Y 0.5**

Definition at line 76 of file misc.hpp.

**#define EPSILON 1.e-13**

Definition at line 86 of file misc.hpp.

**#define GRAV 9.81**

Definition at line 73 of file misc.hpp.

**#define GRAV\_DEM 4.905**

Definition at line 74 of file misc.hpp.

**#define HE\_CA 1.e-12**

Definition at line 77 of file misc.hpp.

**#define IE\_CA 1.e-8**

Definition at line 85 of file misc.hpp.

**#define max( a, b ) (a>=b?a:b)**

Definition at line 70 of file misc.hpp.

**#define MAX\_CFL\_X 0.**

Definition at line 79 of file misc.hpp.

**#define MAX\_CFL\_Y 0.**

Definition at line 80 of file misc.hpp.

**#define MAX\_ITER 1000000000**

Definition at line 81 of file misc.hpp.

**#define MAX\_SCAL DBL\_MAX**

Definition at line 97 of file misc.hpp.

**#define min( a, b ) (a<=b?a:b)**

Definition at line 71 of file misc.hpp.

**#define NB\_CHAR 256**

Definition at line 83 of file misc.hpp.

**#define** **RATIO\_CLOSE\_CELL** 1.e-3

Definition at line 90 of file misc.hpp.

**#define** **VE\_CA** 1.e-12

Definition at line 78 of file misc.hpp.

**#define** **VERSION** "FullSWOF\_2D version 1.07.01, 2017-05-09"

Definition at line 87 of file misc.hpp.

**#define** **ZERO** 0.

Definition at line 84 of file misc.hpp.

### 6.38.3 Typedef Documentation

**typedef** **double** **SCALAR**

Definition at line 94 of file misc.hpp.

**typedef** **vector**< **vector**< **SCALAR** > > **TAB**

Definition at line 99 of file misc.hpp.

**typedef** **vector**<**SCALAR**> **VECT**

Definition at line 101 of file misc.hpp.

## 6.39 Headers/libparameters/parameters.hpp File Reference

Gets parameters.

```
#include "misc.hpp"
#include "parser.hpp"
```

### Classes

- class [Parameters](#)  
*Gets parameters.*

### 6.39.1 Detailed Description

Gets parameters.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2011-2017)

Version

1.07.01

Date

2017-05-09

Reads the parameters, checks their values.

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## 6.40 Headers/libparser/parser.hpp File Reference

Parser

```
#include "misc.hpp"
```

### Classes

- class [Parser](#)

*Parser to read the entries*

### 6.40.1 Detailed Description

Parser

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2010-2015)

Version

1.06.00

Date

2015-02-19

Reads the input file.

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## 6.41 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](#)

### 6.41.1 Detailed Description

Choice of infiltration law.

Author

Marie Rousseau [M.Rousseau@brgm.fr](mailto:M.Rousseau@brgm.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

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From the value of the corresponding parameter: calls the chosen infiltration law.

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### 6.41.2 Macro Definition Documentation

**#define CHOICE\_INFILTRATION\_HPP**

Definition at line 72 of file choice\_infiltration.hpp.

## 6.42 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](#)



### 6.42.1 Detailed Description

Choice of initialization for the rain.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

From the value of the corresponding parameter, calls the chosen initialization of the rain.

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### 6.42.2 Macro Definition Documentation

**#define CHOICE\_RAIN\_HPP**

Definition at line 75 of file choice\_rain.hpp.

## 6.43 Headers/librain\_infiltration/greenampt.hpp File Reference

Green-Ampt law.

```
#include "infiltration.hpp"
```

### Classes

- class [GreenAmpt](#)  
*Green-Ampt law.*

### 6.43.1 Detailed Description

Green-Ampt law.

Author

Marie Rousseau [M.Rousseau@brgm.fr](mailto:M.Rousseau@brgm.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

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Infiltration law: bi-layer Green-Ampt.

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## 6.44 Headers/librain\_infiltration/infiltration.hpp File Reference

Infiltration law

```
#include "parameters.hpp"
```

### Classes

- class [Infiltration](#)

*Definition of infiltration law.*

### 6.44.1 Detailed Description

Infiltration law

Author

Marie Rousseau [M.Rousseau@brgm.fr](mailto:M.Rousseau@brgm.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

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Date

2015-02-19

Common part for the infiltration.

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## 6.45 Headers/librain\_infiltration/no\_infiltration.hpp File Reference

No infiltration.

```
#include "infiltration.hpp"
```

## Classes

- class [No\\_Infiltration](#)  
*No infiltration.*

### 6.45.1 Detailed Description

No infiltration.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Infiltration: there is no infiltration.

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## 6.46 Headers/librain\_infiltration/no\_rain.hpp File Reference

No rain.

```
#include "rain.hpp"
```

## Classes

- class [No\\_Rain](#)  
*No rain.*

### 6.46.1 Detailed Description

No rain.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Rain: there is no rain.

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## 6.47 Headers/librain\_infiltration/rain.hpp File Reference

Rain

```
#include "parameters.hpp"
```

### Classes

- class [Rain](#)

*Initialization of the rain.*

### 6.47.1 Detailed Description

Rain

Author

Marie Rousseau [ma.rousseau@brgm.fr](mailto:ma.rousseau@brgm.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Common part for the initialization of the rain.

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## 6.48 Headers/librain\_infiltration/rain\_generated.hpp File Reference

Constant rain configuration.

```
#include "rain.hpp"
```

### Classes

- class [Rain\\_generated](#)

*Constant rain configuration.*

### 6.48.1 Detailed Description

Constant rain configuration.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Initialization of the rain: the value is equals to 0.00001 m/s = 36 mm/h, constant during the simulation.

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## 6.49 Headers/librain\_infiltration/rain\_read.hpp File Reference

File configuration.

```
#include "rain.hpp"
```

### Classes

- class [Rain\\_read](#)  
*File configuration.*

### 6.49.1 Detailed Description

File configuration.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Initialization of the rain: the values are read in a file.

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## 6.50 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`

### 6.50.1 Detailed Description

Choice of reconstruction.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

From the value of the corresponding parameter, calls the chosen reconstruction.

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### 6.50.2 Macro Definition Documentation

`#define CHOICE_RECONSTRUCTION`

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

## 6.51 Headers/libreconstructions/eno.hpp File Reference

ENO reconstruction

```
#include "reconstruction.hpp"
```

## Classes

- class `ENO`  
*ENO reconstruction*

### 6.51.1 Detailed Description

ENO reconstruction

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Linear reconstruction: ENO.

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## 6.52 Headers/libreconstructions/eno\_mod.hpp File Reference

Modified ENO reconstruction.

```
#include "reconstruction.hpp"
```

### Classes

- class [ENO\\_mod](#)

*Modified ENO reconstruction.*

### 6.52.1 Detailed Description

Modified ENO reconstruction.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Linear reconstruction: modified ENO.

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## 6.53 Headers/libreconstructions/hydrostatic.hpp File Reference

Hydrostatic reconstruction

```
#include "misc.hpp"
```

### Classes

- class [Hydrostatic](#)  
*Hydrostatic reconstruction*

### 6.53.1 Detailed Description

Hydrostatic reconstruction

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

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## 6.54 Headers/libreconstructions/muscl.hpp File Reference

MUSCL reconstruction

```
#include "reconstruction.hpp"
```

### Classes

- class [MUSCL](#)  
*MUSCL reconstruction*

### 6.54.1 Detailed Description

MUSCL reconstruction

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)



## Version

1.06.00

## Date

2015-02-19

Linear reconstruction: MUSCL.

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## 6.55 Headers/libreconstructions/reconstruction.hpp File Reference

## Reconstruction

```
#include "parameters.hpp"
#include "choice_limiter.hpp"
```

### Classes

- class [Reconstruction](#)  
*Reconstruction of the variables*

### 6.55.1 Detailed Description

## Reconstruction

## Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

## Version

1.06.00

## Date

2015-02-19

Common part for all the reconstructions.

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## 6.56 Headers/libsave/choice\_output.hpp File Reference

Choice of output format.

```
#include "output.hpp"
#include "gnuplot.hpp"
#include "vtk_out.hpp"
#include "no_evolution_file.hpp"
```

### Classes

- class [Choice\\_output](#)  
*Choice of output format.*

### Macros

- #define [CHOICE\\_OUTPUT\\_HPP](#)

#### 6.56.1 Detailed Description

Choice of output format.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-02-28

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

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#### 6.56.2 Macro Definition Documentation

**#define CHOICE\_OUTPUT\_HPP**

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

## 6.57 Headers/libsave/choice\_save\_specific\_points.hpp File Reference

Choice of the output of the specific points.

```
#include "save_specific_points.hpp"
#include "one_point.hpp"
#include "several_points.hpp"
#include "no_save.hpp"
```

**Classes**

- class [Choice\\_save\\_specific\\_points](#)  
*Choice of the output of the specific points.*

**Macros**

- #define [CHOICE\\_SAVE\\_SPECIFIC\\_POINTS\\_HPP](#)

**6.57.1 Detailed Description**

Choice of the output of the specific points.

**Author**

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2017)

**Version**

1.07.01

**Date**

2017-02-03

From the value of the corresponding parameter, calls the savings at the specific points.

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**6.57.2 Macro Definition Documentation**

**#define CHOICE\_SAVE\_SPECIFIC\_POINTS\_HPP**

Definition at line 74 of file choice\_save\_specific\_points.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

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-02-28

Output format: optimized for Gnuplot.

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## 6.59 Headers/libsave/no\_evolution\_file.hpp File Reference

No output.

```
#include "output.hpp"
```

### Classes

- class [No\\_Evolution\\_File](#)

*No output.*

### 6.59.1 Detailed Description

No output.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-02-28

No output files with time evolution

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## 6.60 Headers/libsave/no\_save.hpp File Reference

No save.

```
#include "save_specific_points.hpp"
```

### Classes

- class [No\\_save](#)

*No output.*

#### 6.60.1 Detailed Description

No save.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2017)

Version

1.07.01

Date

2017-02-03

No specific point to save

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## 6.61 Headers/libsave/one\_point.hpp File Reference

One point output.

```
#include "save_specific_points.hpp"
```

### Classes

- class [One\\_point](#)

*One point output.*

#### 6.61.1 Detailed Description

One point output.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2017)

## Version

1.07.01

## Date

2017-02-03

Output format: optimized for Gnuplot.

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## 6.62 Headers/libsave/output.hpp File Reference

## Output format

```
#include "parameters.hpp"
```

### Classes

- class [Output](#)

*Output format*

### 6.62.1 Detailed Description

## Output format

## Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

## Version

1.07.01

## Date

2017-02-28

Common part for all the output formats.

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## 6.63 Headers/libsave/save\_specific\_points.hpp File Reference

## Specific points to save.

```
#include "parameters.hpp"
```

## Classes

- class [Save\\_specific\\_points](#)  
*Specific points to save.*

### 6.63.1 Detailed Description

Specific points to save.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2017)

Version

1.07.01

Date

2017-02-03

Common part for all the output of the specific points.

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## 6.64 Headers/libsave/several\_points.hpp File Reference

Saving several specific points.

```
#include "save_specific_points.hpp"
```

## Classes

- class [Several\\_points](#)  
*Several points output.*

### 6.64.1 Detailed Description

Saving several specific points.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2017)

Version

1.07.01

Date

2017-02-03

Output format: optimized for Gnuplot.

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## 6.65 Headers/libsave/vtk\_out.hpp File Reference

VTK output

```
#include "output.hpp"
```

### Classes

- class [Vtk\\_Out](#)

*VTK output.*

### 6.65.1 Detailed Description

VTK output

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-02-28

Output format: optimized for software compatible with vtk format (example: paraview).

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## 6.66 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](#)



### 6.66.1 Detailed Description

Choice of numerical scheme.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

From the value of the corresponding parameter, calls the chosen numerical scheme.

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### 6.66.2 Macro Definition Documentation

#### **#define CHOICE\_SCHEME\_HPP**

Definition at line 72 of file choice\_scheme.hpp.

## 6.67 Headers/libschemas/order1.hpp File Reference

Order 1 scheme.

```
#include "scheme.hpp"
```

### Classes

- class [Order1](#)

*Order 1 scheme.*

### 6.67.1 Detailed Description

Order 1 scheme.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

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Date

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Numerical scheme: at order 1.

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## 6.68 Headers/libschemas/order2.hpp File Reference

Order 2 scheme.

```
#include "scheme.hpp"
```

### Classes

- class [Order2](#)

*Order 2 scheme.*

### 6.68.1 Detailed Description

Order 2 scheme.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

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Date

2015-02-19

Numerical scheme: at order 2.

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## 6.69 Headers/libschemas/scheme.hpp File Reference

Numerical scheme.

```
#include "parameters.hpp"
#include "hydrostatic.hpp"
#include "choice_condition.hpp"
#include "choice_flux.hpp"
#include "choice_friction.hpp"
#include "choice_infiltration.hpp"
#include "choice_init_topo.hpp"
#include "choice_init_huv.hpp"
#include "choice_rain.hpp"
#include "choice_output.hpp"
#include "choice_reconstruction.hpp"
#include "choice_save_specific_points.hpp"
```

### Classes

- class [Scheme](#)  
*Numerical scheme.*

### 6.69.1 Detailed Description

Numerical scheme.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)  
Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-05-09

Common part for all the numerical schemes.

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## 6.70 Sources/FullSWOF\_2D.cpp File Reference

Main function.

```
#include "choice_scheme.hpp"
```

### Functions

- int [main](#) (int argc, char \*\*argv)

### 6.70.1 Detailed Description

Main function.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Runs the programm.

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### 6.70.2 Function Documentation

**int main ( int *argc*, char \*\* *argv* )**

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 58 of file FullSWOF\_2D.cpp.

## 6.71 Sources/libboundaryconditions/bc\_imp\_discharge.cpp File Reference

Imposed discharge.

```
#include "bc_imp_discharge.hpp"
```

### 6.71.1 Detailed Description

Imposed discharge.

Author

Ulrich Razafison [ulrich.razafison@math.cnrs.fr](mailto:ulrich.razafison@math.cnrs.fr) (2011)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-03-20

Boundary condition: imposed discharge (and water height if necessary).

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## 6.72 Sources/libboundaryconditions/bc\_imp\_height.cpp File Reference

Imposed water height.

```
#include "bc_imp_height.hpp"
```

### 6.72.1 Detailed Description

Imposed water height.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2010-2015)

Version

1.07.01

Date

2017-03-20

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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## 6.73 Sources/libboundaryconditions/bc\_neumann.cpp File Reference

Neumann condition.

```
#include "bc_neumann.hpp"
```

### 6.73.1 Detailed Description

Neumann condition.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-03-20

Boundary condition: Neumann condition (the normal derivative is null).

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## 6.74 Sources/libboundaryconditions/bc\_periodic.cpp File Reference

Periodic condition.

```
#include "bc_periodic.hpp"
```

### 6.74.1 Detailed Description

Periodic condition.

Author

Pierre-Antoine Ksinant [pierreantoine.ksinantgarcia@gmail.com](mailto:pierreantoine.ksinantgarcia@gmail.com) (2010)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-03-20

Boundary condition: periodic condition.

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## 6.75 Sources/libboundaryconditions/bc\_wall.cpp File Reference

Wall condition.

```
#include "bc_wall.hpp"
```

### 6.75.1 Detailed Description

Wall condition.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-03-20

Boundary condition: wall condition (the discharge at the boundary is null).

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## 6.76 Sources/libboundaryconditions/boundary\_condition.cpp File Reference

Boundary condition.

```
#include "boundary_condition.hpp"
```

### 6.76.1 Detailed Description

Boundary condition.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-05-09

Common part for all the boundary conditions.

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## 6.77 Sources/libboundaryconditions/choice\_condition.cpp File Reference

Choice of boundary condition.

```
#include "choice_condition.hpp"
```

### 6.77.1 Detailed Description

Choice of boundary condition.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-04-12

From the value of the corresponding parameter, calls the chosen boundary condition.

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## 6.78 Sources/libflux/choice\_flux.cpp File Reference

Choice of numerical flux.

```
#include "choice_flux.hpp"
```

### 6.78.1 Detailed Description

Choice of numerical flux.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2016-12-22

From the value of the corresponding parameter, calls the chosen numerical flux.

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## 6.79 Sources/libflux/f\_hll.cpp File Reference

HLL flux.

```
#include "f_hll.hpp"
```

### 6.79.1 Detailed Description

HLL flux.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2016-12-22

Numerical flux: Harten, Lax, van Leer formulation.

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## 6.80 Sources/libflux/f\_hll2.cpp File Reference

HLL flux.

```
#include "f_hll2.hpp"
```

### 6.80.1 Detailed Description

HLL flux.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2016-12-22

Numerical flux: Harten, Lax, van Leer reduced formulation.

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## 6.81 Sources/libflux/f\_hllc.cpp File Reference

HLLC flux.

```
#include "f_hllc.hpp"
```

### 6.81.1 Detailed Description

HLLC flux.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2016-12-22

Numerical flux: Harten, Lax, van Leer formulation with restoration of the Contact Surface.

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## 6.82 Sources/libflux/f\_hllc2.cpp File Reference

```
#include "f_hllc2.hpp"
```

## 6.83 Sources/libflux/f\_rusanov.cpp File Reference

Rusanov flux.

```
#include "f_rusanov.hpp"
```

### 6.83.1 Detailed Description

Rusanov flux.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

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Date

2016-12-22

Numerical flux: Rusanov formulation.

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## 6.84 Sources/libflux/flux.cpp File Reference

Numerical flux.

```
#include "flux.hpp"
```

### 6.84.1 Detailed Description

Numerical flux.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

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Date

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## 6.85 Sources/libfrictions/choice\_friction.cpp File Reference

Choice of friction law.

```
#include "choice_friction.hpp"
```

### 6.85.1 Detailed Description

Choice of friction law.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

From the value of the corresponding parameter, calls the chosen friction law.

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## 6.86 Sources/libfrictions/fr\_darcy\_weisbach.cpp File Reference

Darcy-Weisbach law.

```
#include "fr_darcy_weisbach.hpp"
```

### 6.86.1 Detailed Description

Darcy-Weisbach law.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

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Date

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Friction law: Darcy-Weisbach.

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## 6.87 Sources/libfrictions/fr\_laminar.cpp File Reference

Laminar law.

```
#include "fr_laminar.hpp"
```

### 6.87.1 Detailed Description

Laminar law.

Author

Carine Lucas [carine.lucas@univ-orleans.fr](mailto:carine.lucas@univ-orleans.fr) (2014-2015)

Version

1.06.00

Date

2015-02-19

Friction law: laminar.

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## 6.88 Sources/libfrictions/fr\_manning.cpp File Reference

Manning law.

```
#include "fr_manning.hpp"
```

### 6.88.1 Detailed Description

Manning law.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

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Friction law: Manning.

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## 6.89 Sources/libfrictions/friction.cpp File Reference

Friction law

```
#include "friction.hpp"
```

### 6.89.1 Detailed Description

Friction law

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

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## 6.90 Sources/libfrictions/no\_friction.cpp File Reference

No friction.

```
#include "no_friction.hpp"
```

### 6.90.1 Detailed Description

No friction.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

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Date

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**Friction** law: does no computation.

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## 6.91 Sources/libinitializations/choice\_init\_huv.cpp File Reference

Choice of initialization for h, u and v.

```
#include "choice_init_huv.hpp"
```

### 6.91.1 Detailed Description

Choice of initialization for h, u and v.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2016-12-22

From the value of the corresponding parameter, calls the chosen initialization of the water height and of the velocity.

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## 6.92 Sources/libinitializations/choice\_init\_topo.cpp File Reference

Choice of initialization for the topography.

```
#include "choice_init_topo.hpp"
```

### 6.92.1 Detailed Description

Choice of initialization for the topography.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

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From the value of the corresponding parameter, calls the chosen initialization of the topography.

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## 6.93 Sources/libinitializations/huv\_generated.cpp File Reference

No water configuration.

```
#include "huv_generated.hpp"
```

### 6.93.1 Detailed Description

No water configuration.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2016-12-22

Initialization of the water height and of the velocity: case of a dry domain.

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## 6.94 Sources/libinitializations/huv\_generated\_radial\_dam\_dry.cpp File Reference

Dry radial dam break configuration.

```
#include "huv_generated_radial_dam_dry.hpp"
```

### 6.94.1 Detailed Description

Dry radial dam break configuration.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2016-12-22

Initialization of the water height and of the velocity: case of a radial dam break on a dry domain.

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## 6.95 Sources/libinitializations/huv\_generated\_radial\_dam\_wet.cpp File Reference

Wet radial dam break configuration.

```
#include "huv_generated_radial_dam_wet.hpp"
```

### 6.95.1 Detailed Description

Wet radial dam break configuration.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

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Initialization of the water height and of the velocity: case of a radial dam break on a wet domain.

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## 6.96 Sources/libinitializations/huv\_generated\_thacker.cpp File Reference

Thacker configuration.

```
#include "huv_generated_thacker.hpp"
```

### 6.96.1 Detailed Description

Thacker configuration.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2016-12-22

Initialization of the water height and of the velocity: case of Thacker's benchmark.

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## 6.97 Sources/libinitializations/huv\_read.cpp File Reference

File configuration.

```
#include "huv_read.hpp"
```

### 6.97.1 Detailed Description

File configuration.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2016-12-22

Initialization of the water height and of the velocity: the values are read in a file.

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## 6.98 Sources/libinitializations/initialization\_huv.cpp File Reference

Initialization of h, u and v

```
#include "initialization_huv.hpp"
```

### 6.98.1 Detailed Description

Initialization of h, u and v

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Common part for all the initialization of the water height and of the velocity.

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## 6.99 Sources/libinitializations/initialization\_topo.cpp File Reference

Initialization of z

```
#include "initialization_topo.hpp"
```

### 6.99.1 Detailed Description

Initialization of z

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Common part for all the initialization of the topography.

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## 6.100 Sources/libinitializations/topo\_generated\_flat.cpp File Reference

Flat configuration.

```
#include "topo_generated_flat.hpp"
```

### 6.100.1 Detailed Description

Flat configuration.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Initialization of the topography: the topography is flat, its value is 0.

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## 6.101 Sources/libinitializations/topo\_generated\_thacker.cpp File Reference

Thacker configuration.

```
#include "topo_generated_thacker.hpp"
```

### 6.101.1 Detailed Description

Thacker configuration.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Initialization of the topography: topography with a shape of a paraboloid of revolution for Thacker's Benchmark.

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## 6.102 Sources/libinitializations/topo\_read.cpp File Reference

File configuration.

```
#include "topo_read.hpp"
```

### 6.102.1 Detailed Description

File configuration.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Initialization of the topography: the values are read in a file.

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## 6.103 Sources/liblimitations/choice\_limiter.cpp File Reference

Choice of slope limiter.

```
#include "choice_limiter.hpp"
```

### 6.103.1 Detailed Description

Choice of slope limiter.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

From the value of the corresponding parameter, calls the chosen slope limiter.

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## 6.104 Sources/liblimitations/limiter.cpp File Reference

Slope limiter.

```
#include "limiter.hpp"
```

### 6.104.1 Detailed Description

Slope limiter.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Common part for all the slope limiters.

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## 6.105 Sources/liblimitations/minmod.cpp File Reference

Minmod limiter

```
#include "minmod.hpp"
```

### 6.105.1 Detailed Description

Minmod limiter

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Slope limiter: minmod.

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## 6.106 Sources/liblimitations/vanalbada.cpp File Reference

Van Albada limiter.

```
#include "vanalbada.hpp"
```

### 6.106.1 Detailed Description

Van Albada limiter.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Slope limiter: Van Albada.

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## 6.107 Sources/liblimitations/vanleer.cpp File Reference

Van Leer limiter.

```
#include "vanleer.hpp"
```

### 6.107.1 Detailed Description

Van Leer limiter.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Slope limiter: Van Leer.

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## 6.108 Sources/libparameters/parameters.cpp File Reference

Gets parameters.

```
#include "parameters.hpp"
```

### 6.108.1 Detailed Description

Gets parameters.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2011-2017)

Frederic Darboux [frederic.darboux@orleans.inra.fr](mailto:frederic.darboux@orleans.inra.fr) (2014)

Version

1.07.01

Date

2017-04-12

Reads the parameters, checks their values.

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## 6.109 Sources/libparser/parser.cpp File Reference

Parser

```
#include "parser.hpp"
```

### 6.109.1 Detailed Description

Parser

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2010-2015)

Version

1.06.00

Date

2015-02-19

Reads the input file.

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## 6.110 Sources/librain\_infiltration/choice\_infiltration.cpp File Reference

Choice of infiltration law.

```
#include "choice_infiltration.hpp"
```

### 6.110.1 Detailed Description

Choice of infiltration law.

Author

Marie Rousseau [M.Rousseau@brgm.fr](mailto:M.Rousseau@brgm.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

From the value of the corresponding parameter: calls the chosen infiltration law.

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## 6.111 Sources/librain\_infiltration/choice\_rain.cpp File Reference

Choice of initialization for the rain.

```
#include "choice_rain.hpp"
```

### 6.111.1 Detailed Description

Choice of initialization for the rain.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

From the value of the corresponding parameter, calls the chosen initialization of the rain.

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## 6.112 Sources/librain\_infiltration/greenampt.cpp File Reference

Green-Ampt law.

```
#include "greenampt.hpp"
```

### 6.112.1 Detailed Description

Green-Ampt law.

Author

Marie Rousseau [M.Rousseau@brgm.fr](mailto:M.Rousseau@brgm.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

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Date

2015-02-19

Infiltration law: bi-layer Green-Ampt.

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## 6.113 Sources/librain\_infiltration/infiltration.cpp File Reference

Infiltration law

```
#include "infiltration.hpp"
```

### 6.113.1 Detailed Description

Infiltration law

Author

Marie Rousseau [M.Rousseau@brgm.fr](mailto:M.Rousseau@brgm.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.01

Date

2015-03-10

Common part for the infiltration.

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## 6.114 Sources/librain\_infiltration/no\_infiltration.cpp File Reference

No infiltration.

```
#include "no_infiltration.hpp"
```

### 6.114.1 Detailed Description

No infiltration.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Infiltration: there is no infiltration.

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## 6.115 Sources/librain\_infiltration/no\_rain.cpp File Reference

No rain.

```
#include "no_rain.hpp"
```

### 6.115.1 Detailed Description

No rain.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Rain: there is no rain.

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## 6.116 Sources/librain\_infiltration/rain.cpp File Reference

Rain

```
#include "rain.hpp"
```

### 6.116.1 Detailed Description

Rain

Author

Marie Rousseau [ma.rousseau@brgm.fr](mailto:ma.rousseau@brgm.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Common part for the initialization of the rain.

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## 6.117 Sources/librain\_infiltration/rain\_generated.cpp File Reference

Constant rain configuration.

```
#include "rain_generated.hpp"
```

### 6.117.1 Detailed Description

Constant rain configuration.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Initialization of the rain: the value is equals to 0.00001 m/s = 36 mm/h, constant during the simulation.

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## 6.118 Sources/librain\_infiltration/rain\_read.cpp File Reference

File configuration.

```
#include "rain_read.hpp"
```

### 6.118.1 Detailed Description

File configuration.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Initialization of the rain: the values are read in a file.

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## 6.119 Sources/libreconstructions/choice\_reconstruction.cpp File Reference

Choice of reconstruction.

```
#include "choice_reconstruction.hpp"
```

### 6.119.1 Detailed Description

Choice of reconstruction.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2016-12-22

From the value of the corresponding parameter, calls the chosen reconstruction.

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## 6.120 Sources/libreconstructions/eno.cpp File Reference

ENO reconstruction

```
#include "eno.hpp"
```

### 6.120.1 Detailed Description

ENO reconstruction

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2016-12-22

Linear reconstruction: ENO.

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## 6.121 Sources/libreconstructions/eno\_mod.cpp File Reference

Modified ENO reconstruction.

```
#include "eno_mod.hpp"
```

### 6.121.1 Detailed Description

Modified ENO reconstruction.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2016-12-22

Linear reconstruction: modified ENO.

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## 6.122 Sources/libreconstructions/hydrostatic.cpp File Reference

Hydrostatic reconstruction

```
#include "hydrostatic.hpp"
```

### 6.122.1 Detailed Description

Hydrostatic reconstruction

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

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Date

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## 6.123 Sources/libreconstructions/muscl.cpp File Reference

MUSCL reconstruction

```
#include "muscl.hpp"
```

### 6.123.1 Detailed Description

MUSCL reconstruction

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2016-12-22

Linear reconstruction: MUSCL.

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## 6.124 Sources/libreconstructions/reconstruction.cpp File Reference

Reconstruction

```
#include "reconstruction.hpp"
```

### 6.124.1 Detailed Description

Reconstruction

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

Common part for all the reconstructions.

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## 6.125 Sources/libsave/choice\_output.cpp File Reference

Choice of output format.

```
#include "choice_output.hpp"
```

### 6.125.1 Detailed Description

Choice of output format.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-02-28

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

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## 6.126 Sources/libsave/choice\_save\_specific\_points.cpp File Reference

Choice of the output of the specific points.

```
#include "choice_save_specific_points.hpp"
```

### 6.126.1 Detailed Description

Choice of the output of the specific points.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2017)

Version

1.07.01

Date

2017-02-03

From the value of the corresponding parameter, calls the savings at the specific points.

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## 6.127 Sources/libsave/gnuplot.cpp File Reference

Gnuplot output

```
#include "gnuplot.hpp"
```

### 6.127.1 Detailed Description

Gnuplot output

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-02-28

Output format: optimized for Gnuplot (for huz\_evolution.dat).

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## 6.128 Sources/libsave/no\_evolution\_file.cpp File Reference

No output.

```
#include "no_evolution_file.hpp"
```

### 6.128.1 Detailed Description

No output.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-02-28

No output files with time evolution

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## 6.129 Sources/libsave/no\_save.cpp File Reference

No output.

```
#include "no_save.hpp"
```

### 6.129.1 Detailed Description

No output.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2017)

Version

1.07.01

Date

2017-02-03

No specific point to save

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## 6.130 Sources/libsave/one\_point.cpp File Reference

One point output.

```
#include "one_point.hpp"
```

### 6.130.1 Detailed Description

One point output.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2017)

Version

1.07.01

Date

2017-02-16

Output format: optimized for Gnuplot .

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## 6.131 Sources/libsave/output.cpp File Reference

Output format

```
#include "output.hpp"
```

### 6.131.1 Detailed Description

Output format

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-02-28

Common part for all the output formats.

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## 6.132 Sources/libsave/save\_specific\_points.cpp File Reference

Specific points to save.

```
#include "save_specific_points.hpp"
```

### 6.132.1 Detailed Description

Specific points to save.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2017)

Version

1.07.01

Date

2017-02-03

Common part for all the outputs of the specific points.

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### 6.133 Sources/libsave/several\_points.cpp File Reference

Saving several specific points.

```
#include "several_points.hpp"
```

#### 6.133.1 Detailed Description

Saving several specific points.

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2017)

Version

1.07.01

Date

2017-02-16

Output format: optimized for Gnuplot (for hu\_specific\_points.dat).

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### 6.134 Sources/libsave/vtk\_out.cpp File Reference

VTK output

```
#include "vtk_out.hpp"
```

#### 6.134.1 Detailed Description

VTK output

Author

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-02-28

Output format: optimized for software compatible with vtk format (example: paraview).

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## 6.135 Sources/libschemas/choice\_scheme.cpp File Reference

Choice of numerical scheme.

```
#include "choice_scheme.hpp"
```

### 6.135.1 Detailed Description

Choice of numerical scheme.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.06.00

Date

2015-02-19

From the value of the corresponding parameter, calls the chosen numerical scheme.

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## 6.136 Sources/libschemas/order1.cpp File Reference

Order 1 scheme.

```
#include "order1.hpp"
```

### 6.136.1 Detailed Description

Order 1 scheme.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-01-05

Numerical scheme: at order 1.

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## 6.137 Sources/libschemas/order2.cpp File Reference

Order 2 scheme.

```
#include "order2.hpp"
```

### 6.137.1 Detailed Description

Order 2 scheme.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-01-05

Numerical scheme: at order 2.

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## 6.138 Sources/libschemas/scheme.cpp File Reference

Numerical scheme.

```
#include "scheme.hpp"
```

### 6.138.1 Detailed Description

Numerical scheme.

Author

Olivier Delestre [olivierdelestre41@yahoo.fr](mailto:olivierdelestre41@yahoo.fr) (2008)

Christian Laguerre [christian.laguerre@math.cnrs.fr](mailto:christian.laguerre@math.cnrs.fr) (2012-2015)

Version

1.07.01

Date

2017-04-12

Common part for all the numerical schemes.

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