

# Modelo numérico DELFT 3D:

## WAVE

Ingeniería de Costas 2015-2016

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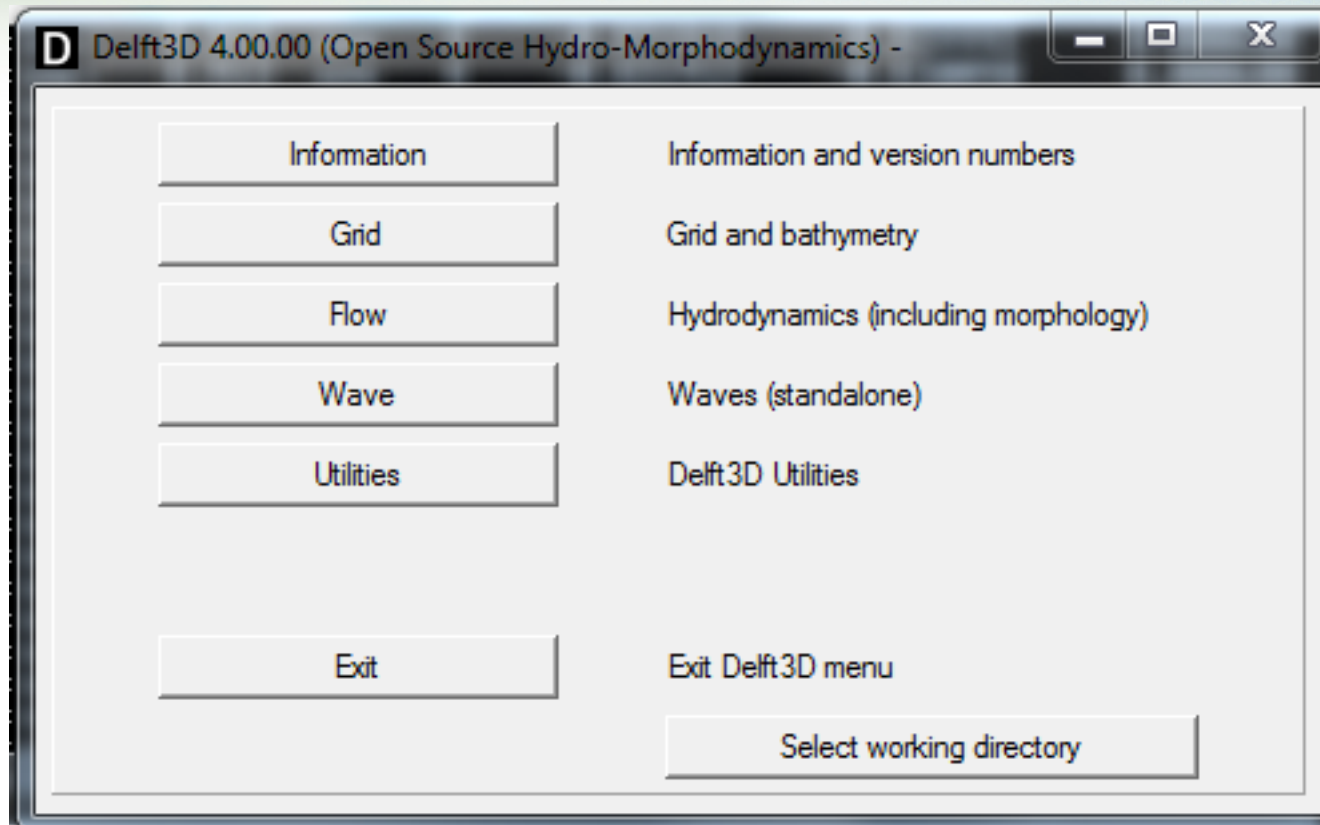
ugr

Universidad  
de Granada

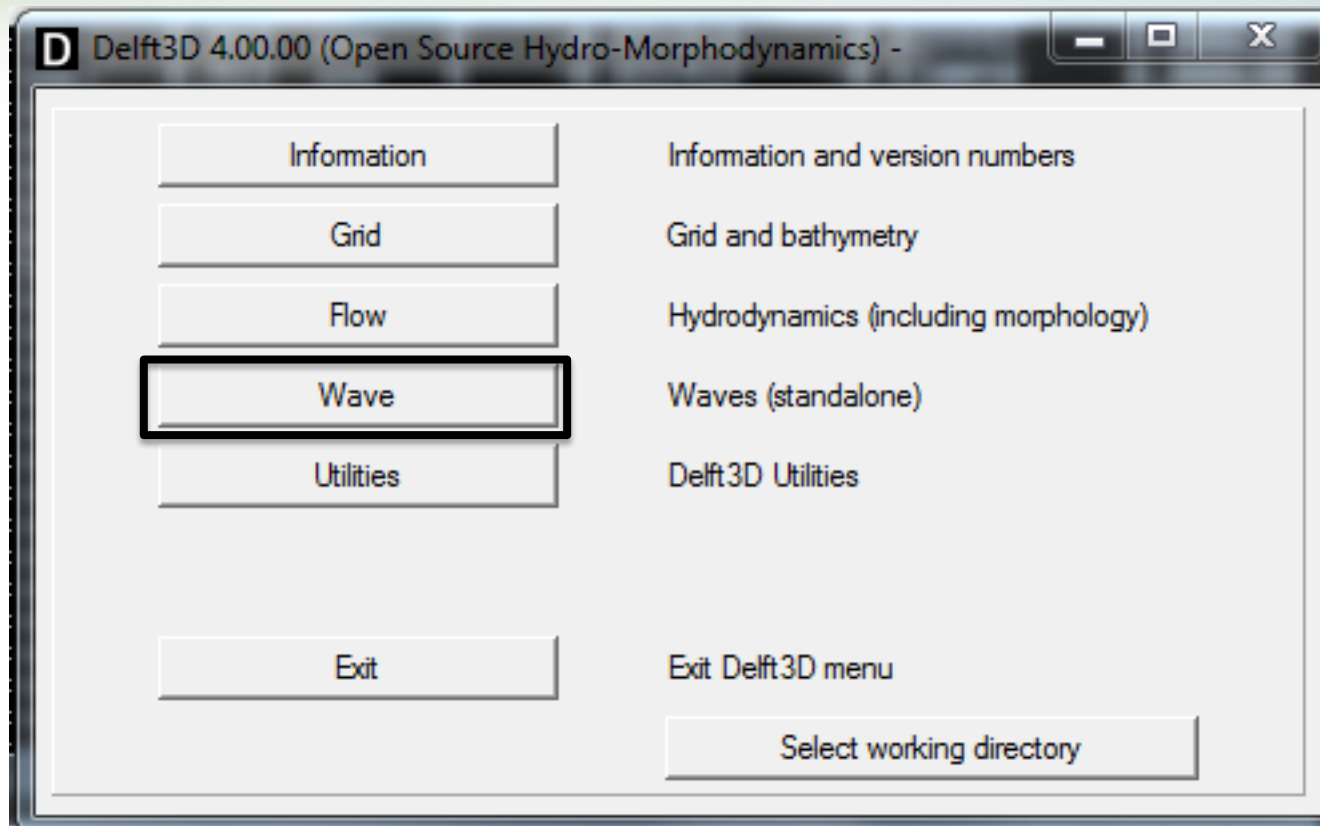


Dinámica Ambiental  
UNIVERSIDAD DE GRANADA

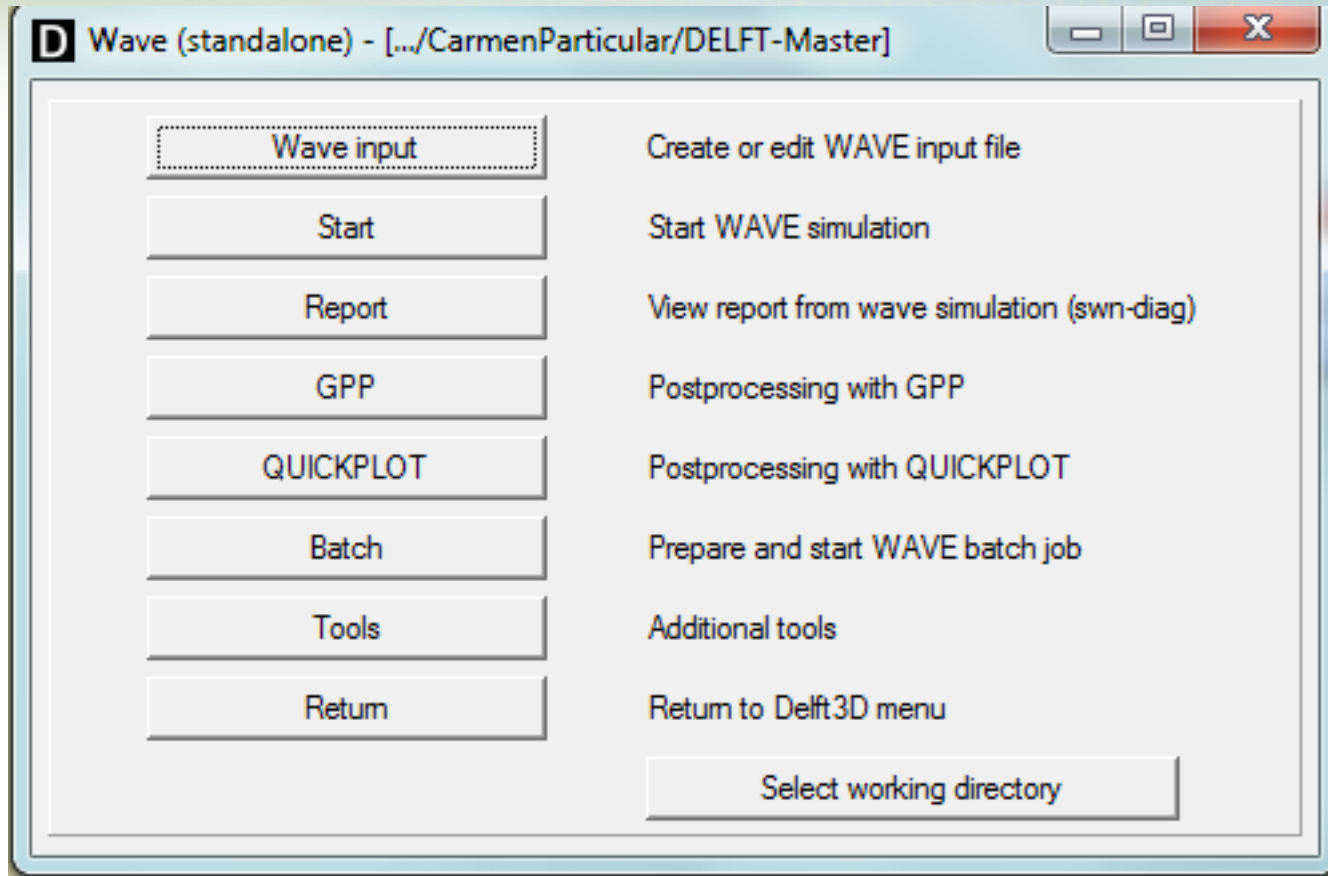
# Modelo numérico DELFT 3D: WAVE



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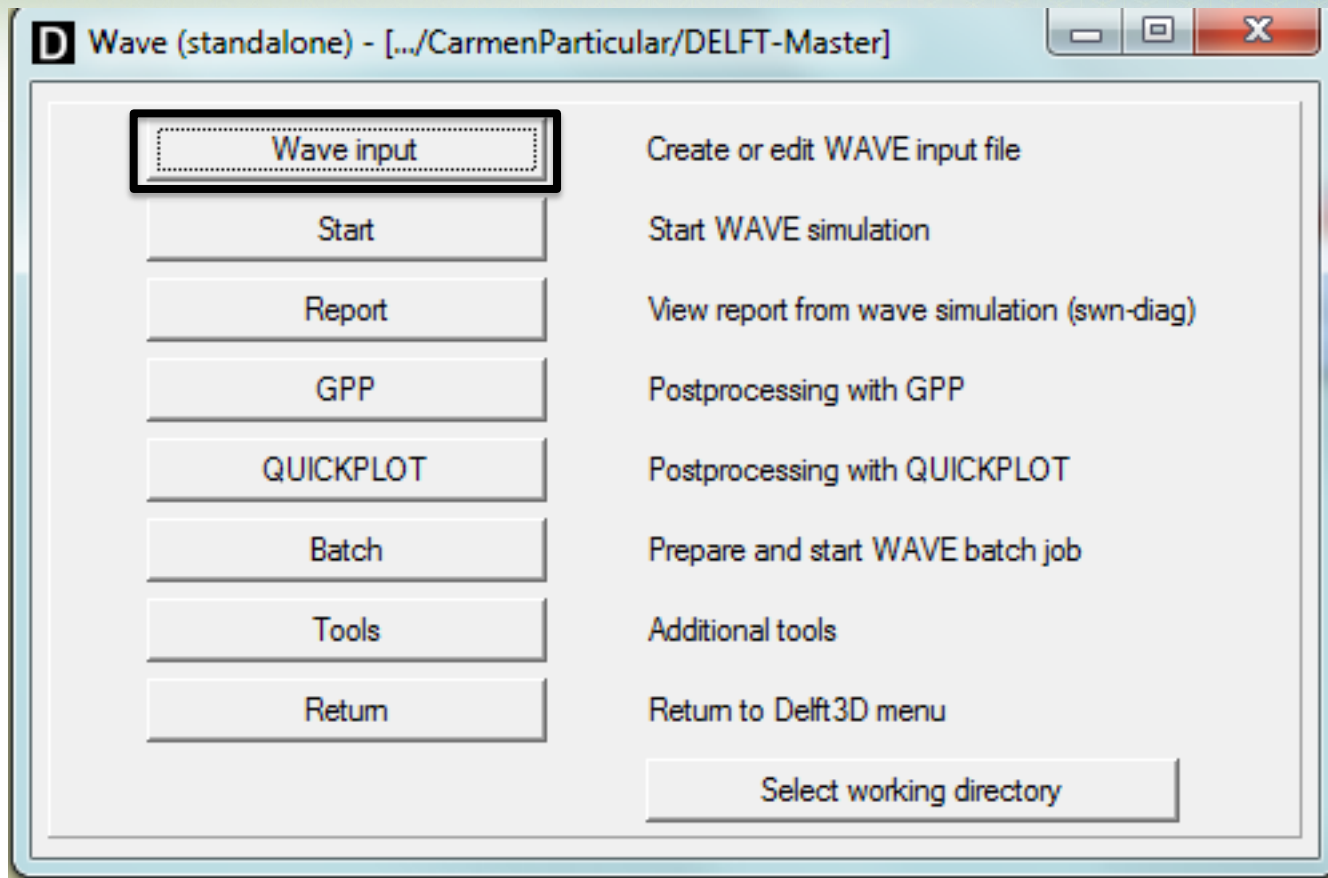


# Modelo numérico DELFT 3D: WAVE

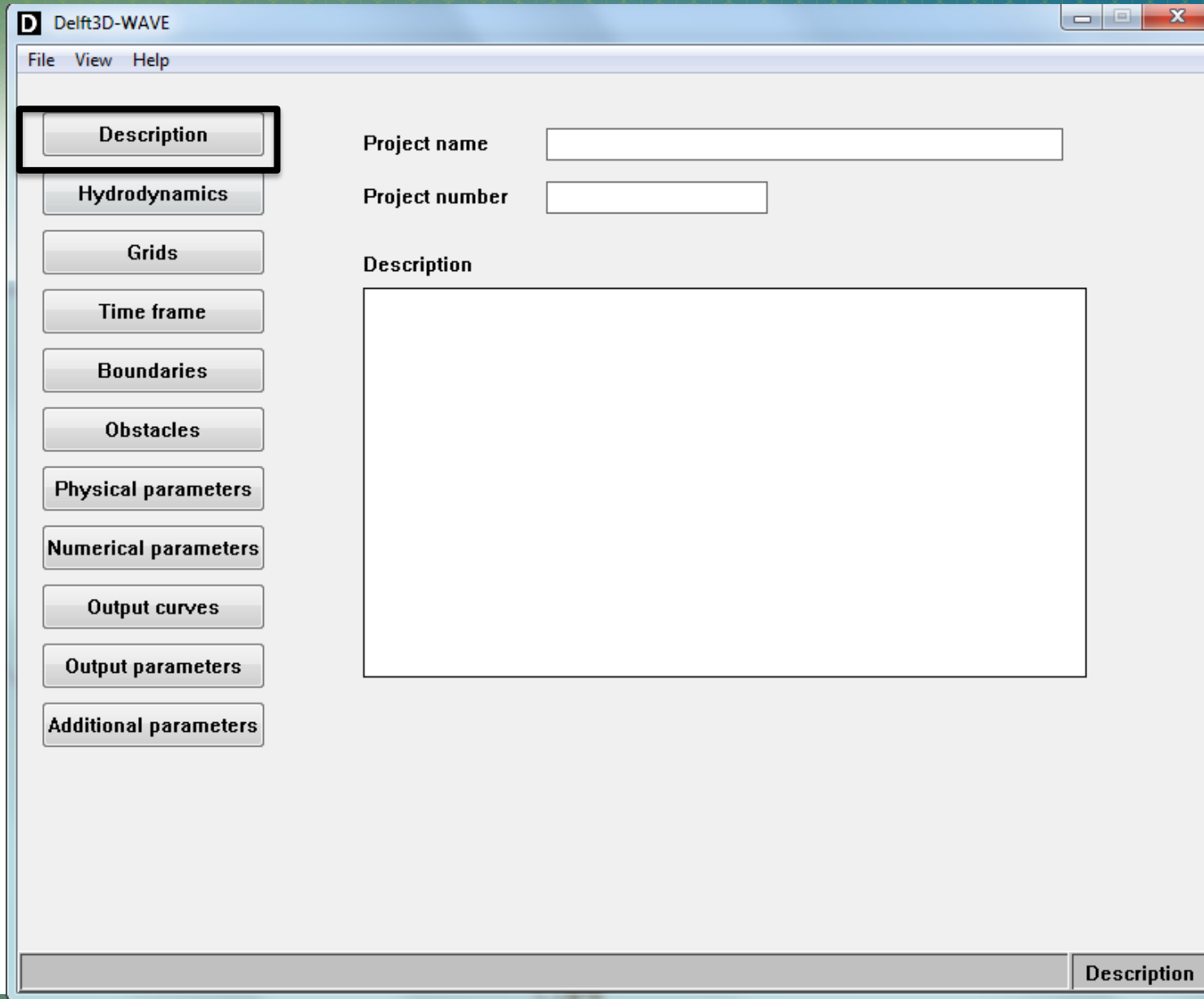




# Modelo numérico DELFT 3D: WAVE



# Modelo numérico DELFT 3D: WAVE



The screenshot shows the Delft3D-WAVE software interface. The window title is "Delft3D-WAVE". The menu bar includes "File", "View", and "Help". On the left side, there is a vertical sidebar with several menu items: "Description", "Hydrodynamics", "Grids", "Time frame", "Boundaries", "Obstacles", "Physical parameters", "Numerical parameters", "Output curves", "Output parameters", and "Additional parameters". The "Description" menu item is highlighted with a black border. To the right of the sidebar, there are two text input fields: "Project name" and "Project number". Below these fields is a large text area labeled "Description". At the bottom right of the window, there is a tab labeled "Description".

**D** Delft3D-WAVE

File View Help

Description

Hydrodynamics

Grids

Time frame

Boundaries

Obstacles

Physical parameters

Numerical parameters

Output curves

Output parameters

Additional parameters

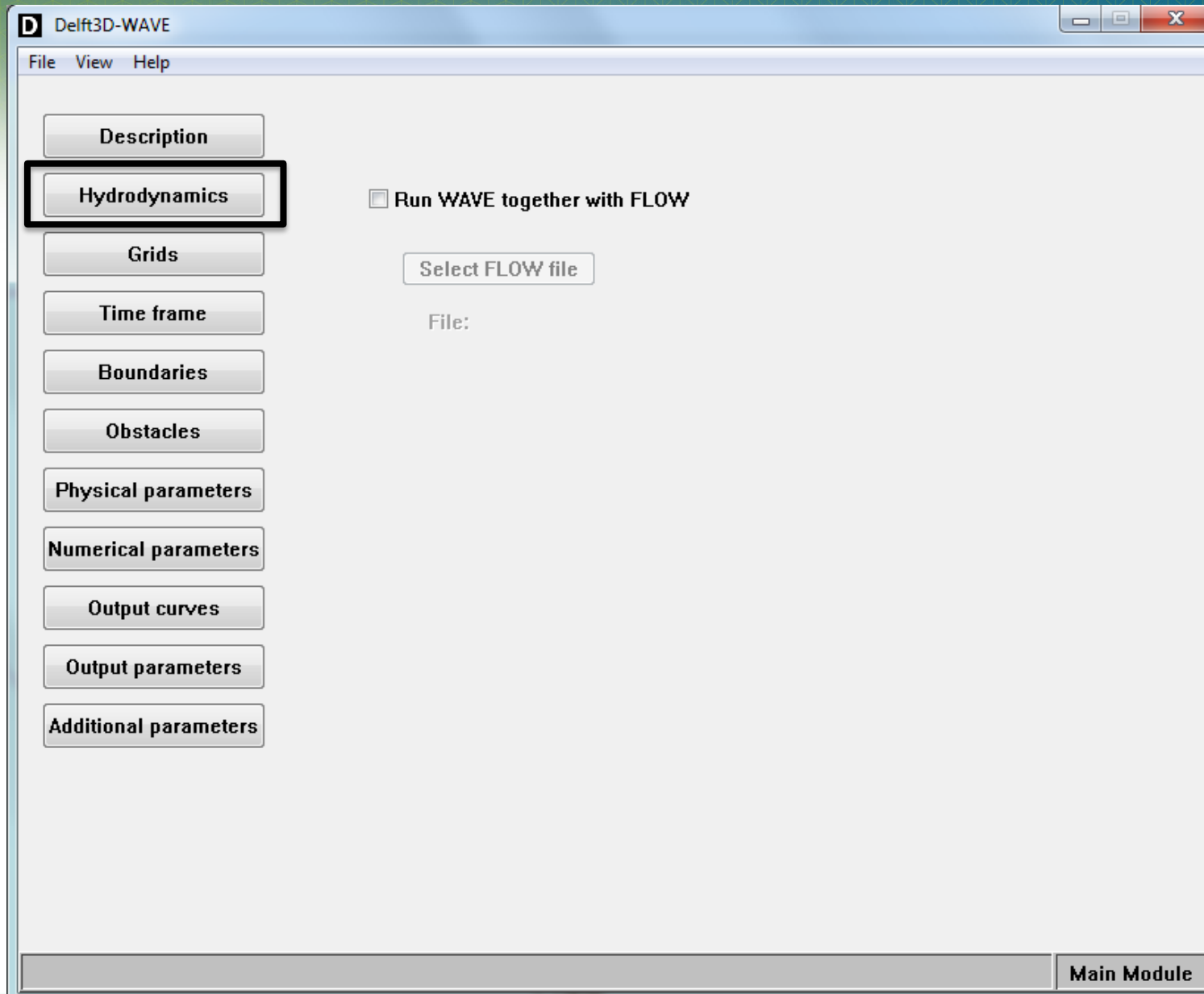
Project name

Project number

Description

Description

# Modelo numérico DELFT 3D: WAVE



# Modelo numérico DELFT 3D: WAVE

The screenshot shows the Delft3D-WAVE software interface. The title bar reads "Delft3D-WAVE - D:\Carmen\DELFT\pruebasdelft\Nuevo\_PER...\_2012 03 01 00 a 2012 03 03 18\wcad.mdw". The menu bar includes "File", "View", and "Help". On the left, a vertical toolbar contains buttons for "Description", "Hydrodynamics", "Grids" (highlighted with a black border), "Time frame", "Boundaries", "Obstacles", "Physical parameters", "Numerical parameters", "Output curves", "Output parameters", and "Additional parameters". The main window is titled "Computational grids" and contains a list with "wcad" and "9712". To the right of the list are "Import" and "Delete" buttons, and below them, the text "Co-ordinate system: Cartesian". Below the list is a section titled "Data for grid wcad" with tabs for "Computational grid", "Bathymetry", "Spectral resolution", "Nesting", and "Hydrodynamics". The "Computational grid" tab is active, showing the following information:  
Associated bathymetry grid: Same [wcad]  
Associated bathymetry data: ...\\wcad.dep  
Nested in: Cannot nest this grid  
Grid specifications  
Grid filename: ...\\wcad.grd  
Number of points: M: 244  
N: 244



# Modelo numérico DELFT 3D: WAVE

The screenshot displays the Delft3D-WAVE software interface. The window title is "Delft3D-WAVE - D:\Carmen\DELFT\pruebasdelft\Nuevo\_PER...\_2012 03 01 00 a 2012 03 03 18\wcad.mdw". The interface includes a menu bar (File, View, Help) and a left-hand sidebar with several configuration buttons: Description, Hydrodynamics, **Grids** (highlighted with a black border), Time frame, Boundaries, Obstacles, Physical parameters, Numerical parameters, Output curves, Output parameters, and Additional parameters.

The main area is titled "Computational grids" and contains a list with two entries: "wcad" and "9712". The "wcad" entry is selected and highlighted in blue. To the right of this list are "Import" and "Delete" buttons. Below the list, it states "Co-ordinate system: Cartesian".

Below the grid list is a section titled "Data for grid wcad" with four tabs: "Computational grid", "Bathymetry", "Spectral resolution", "Nesting", and "Hydrodynamics". The "Bathymetry" tab is active. It contains the following options:

- Bathymetry data is based on:
  - Computational grid (wcad)
  - Other grid (must be rectangular)
- A "Select bathymetry data" button with a "File name: ...\wcad.dep" field.
- A "Select bathymetry grid" button.
- A "Bathymetry grid specifications" section with the following fields:
  - Grid filename:
  - Angle: [deg]
  - X origin: [m]      Y origin: [m]
  - X grid size: [m]      Y grid size: [m]
  - Number of M points:      Number of N points:

# Modelo numérico DELFT 3D: WAVE

The screenshot shows the Delft3D-WAVE software interface. The title bar reads "Delft3D-WAVE - D:\Carmen\DELFT\pruebasdelft\Nuevo\_PER...\_2012 03 01 00 a 2012 03 03 18\wcad.mdw". The menu bar includes "File", "View", and "Help".

On the left side, there is a vertical menu with several buttons: "Description", "Hydrodynamics", "Grids" (highlighted with a black border), "Time frame", "Boundaries", "Obstacles", "Physical parameters", "Numerical parameters", "Output curves", "Output parameters", and "Additional parameters".

The main area is titled "Computational grids" and contains a list with "wcad" and "9712". To the right of this list are "Import" and "Delete" buttons. Below the list, it says "Co-ordinate system: Cartesian".

Below the grid list is the "Data for grid wcad" section, which has several tabs: "Computational grid" (selected), "Bathymetry", "Spectral resolution", "Nesting", and "Hydrodynamics".

Under the "Computational grid" tab, there are two sections:

- Directional space:** Includes radio buttons for "Circle" (selected) and "Sector". Below them are input fields for "Start direction: 0 [deg] [counter clockwise]" and "End direction: 0 [deg] [counter clockwise]". A "Number of directions:" field contains the value "72".
- Frequency space:** Includes input fields for "Lowest frequency: 0.03 [Hz]", "Highest frequency: 1 [Hz]", and "Number of frequency bins: 37".

At the bottom right of the window, there is a "Grids" button.

# Modelo numérico DELFT 3D: WAVE

| Parameter                | Lower limit | Upper limit | Default | Unit   |
|--------------------------|-------------|-------------|---------|--------|
| Start direction          | -360        | 360         | 0       | degree |
| End direction            | -360        | 360         | 0       | degree |
| Number of directions     | 4           | 500         | 36      | -      |
| Lowest frequency         | 0.0         | -           | 0.05    | Hz     |
| Highest frequency        | 0.0         | -           | 1       | Hz     |
| Number of frequency bins | 4           | -           | 24      | -      |

# Modelo numérico DELFT 3D: WAVE

The screenshot displays the Delft3D-WAVE software interface. The title bar reads "Delft3D-WAVE - D:\Carmen\DELFT\pruebasdelft\Nuevo\_PER...\_2012 03 01 00 a 2012 03 03 18\wcad.mdw". The menu bar includes "File", "View", and "Help". On the left, a vertical sidebar contains buttons for "Description", "Hydrodynamics", "Grids" (highlighted with a black border), "Time frame", "Boundaries", "Obstacles", "Physical parameters", "Numerical parameters", "Output curves", "Output parameters", and "Additional parameters". The main window is titled "Computational grids" and shows a list with "wcad" and "9712" (selected). To the right are "Import" and "Delete" buttons, and the text "Co-ordinate system: Cartesian". Below this is a section for "Data for grid 9712" with tabs for "Computational grid", "Bathymetry", "Spectral resolution", "Nesting", and "Hydrodynamics". The "Nesting" tab is active, showing "Grid 9712 is nested in" set to "wcad". Below this, "Specifications for grid wcad" are listed: "Grid filename: ...\\wcad.grd", "Associated bathymetry grid: Same (wcad)", "Associated bathymetry data: ...\\wcad.dep", "Nested in: Not nested", "X, Y origin: 757138.9 4044969 [m]", and "Number of points M, N: 244 244". A "Grids" button is located in the bottom right corner of the window.

# Modelo numérico DELFT 3D: WAVE

The screenshot displays the Delft3D-WAVE software interface. The window title is "Delft3D-WAVE - D:\Carmen\cloud\Privado\Simulacion\_1\_202.5\Simulacion\_1\_202.5\wcad.mdw". The interface includes a menu bar with "File", "View", and "Help". On the left, a vertical sidebar contains several tabs: "Description", "Hydrodynamics", "Grids" (highlighted with a black border), "Time frame", "Boundaries", "Obstacles", "Physical parameters", "Numerical parameters", "Output curves", "Output parameters", and "Additional parameters". The main area is titled "Computational grids" and contains a list with "wcad" and "9712", where "wcad" is selected. To the right of this list are "Import" and "Delete" buttons, and below them, the text "Co-ordinate system: Cartesian". Below the "Computational grids" section is a "Data for grid wcad" section with five tabs: "Computational grid", "Bathymetry", "Spectral resolution", "Nesting", and "Hydrodynamics" (which is active). Under the "Hydrodynamics" tab, the text "Use hydrodynamic FLOW results" is displayed. Below this text are four rows, each with a parameter name and a dropdown menu set to "Don't use": "Water level", "Current", "Bathymetry", and "Wind". A "Grids" button is located in the bottom right corner of the window.



# Modelo numérico DELFT 3D: WAVE

The screenshot displays the Delft3D-WAVE software interface. The window title is "Delft3D-WAVE - D:\Carmen\cloud\Privado\Simulacion\_1\_202.5\Simulacion\_1\_202.5\wcad.mdw". The interface includes a menu bar with "File", "View", and "Help". On the left side, there is a vertical navigation pane with buttons for "Description", "Hydrodynamics", "Grids", "Time frame" (highlighted with a black border), "Boundaries", "Obstacles", "Physical parameters", "Numerical parameters", "Output curves", "Output parameters", and "Additional parameters".

The main area of the window is divided into several sections:

- Water level correction:** A text input field containing "0" followed by "[m]".
- Time points for WAVE computation:** A list box containing the following dates and times:
  - 16 04 2013 15 00 00
  - 16 04 2013 16 00 00
  - 16 04 2013 17 00 00
  - 16 04 2013 18 00 00
  - 16 04 2013 19 00 00
  - 16 04 2013 20 00 00
  - 16 04 2013 21 00 00
  - 16 04 2013 22 00 00 (highlighted in blue)
  - 16 04 2013 23 00 00Buttons for "Add" and "Delete" are located to the right of the list.
- Hydrodynamic data for selected time point:** A section for configuring data for the selected time point. The "Time" field is set to "16 04 2013 22 00 00" with the format "[ dd mm yyyy hh mm ss ]". Below it are input fields for "Water level" (0 [m]), "X-velocity" (0 [m/s]), and "Y-velocity" (0 [m/s]).

The bottom right corner of the window has a tab labeled "Time frame".

# Modelo numérico DELFT 3D: WAVE

D Delft3D-WAVE - D:\Carmen\cloud\Privado\Simulacion\_1\_202.5\Simulacion\_1\_202.5\wcad.mdw

File View Help

Description

Hydrodynamics

Grids

Time frame

**Boundaries**

Obstacles

Physical parameters

Numerical parameters

Output curves

Output parameters

Additional parameters

### Boundaries

SW

Add

Delete

### Data for selected boundary

Boundary name: SW

Define boundary by: Orientation

Boundary orientation: Southwest

Boundary start: [ ] [ ] [m]

Boundary end: [ ] [ ] [m]

### Boundary conditions

Conditions along boundary:  Uniform  Space-varying

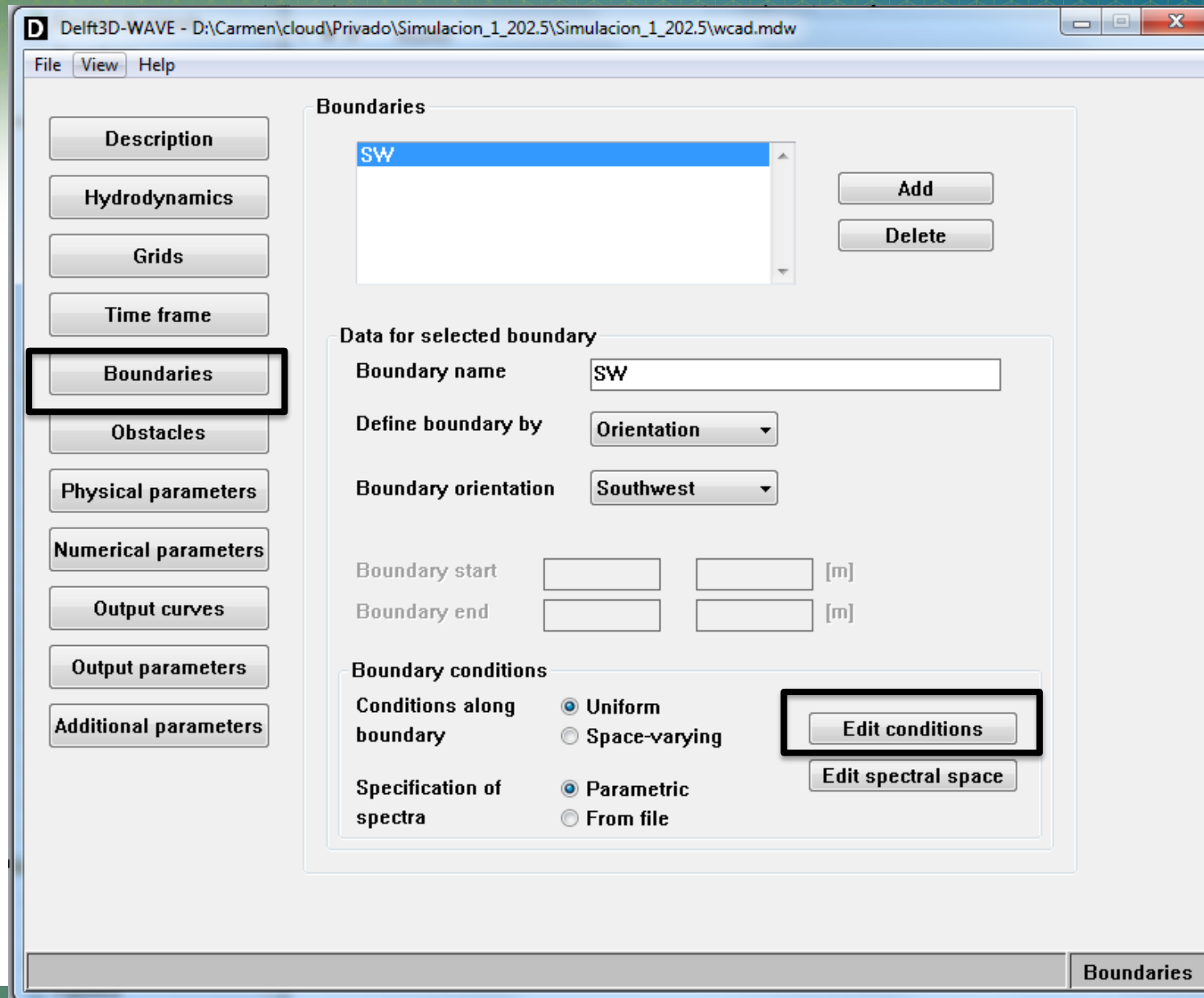
Specification of spectra:  Parametric  From file

Edit conditions

Edit spectral space

Boundaries

# Modelo numérico DELFT 3D: WAVE



# Modelo numérico DELFT 3D: WAVE

**Uniform boundary conditions**

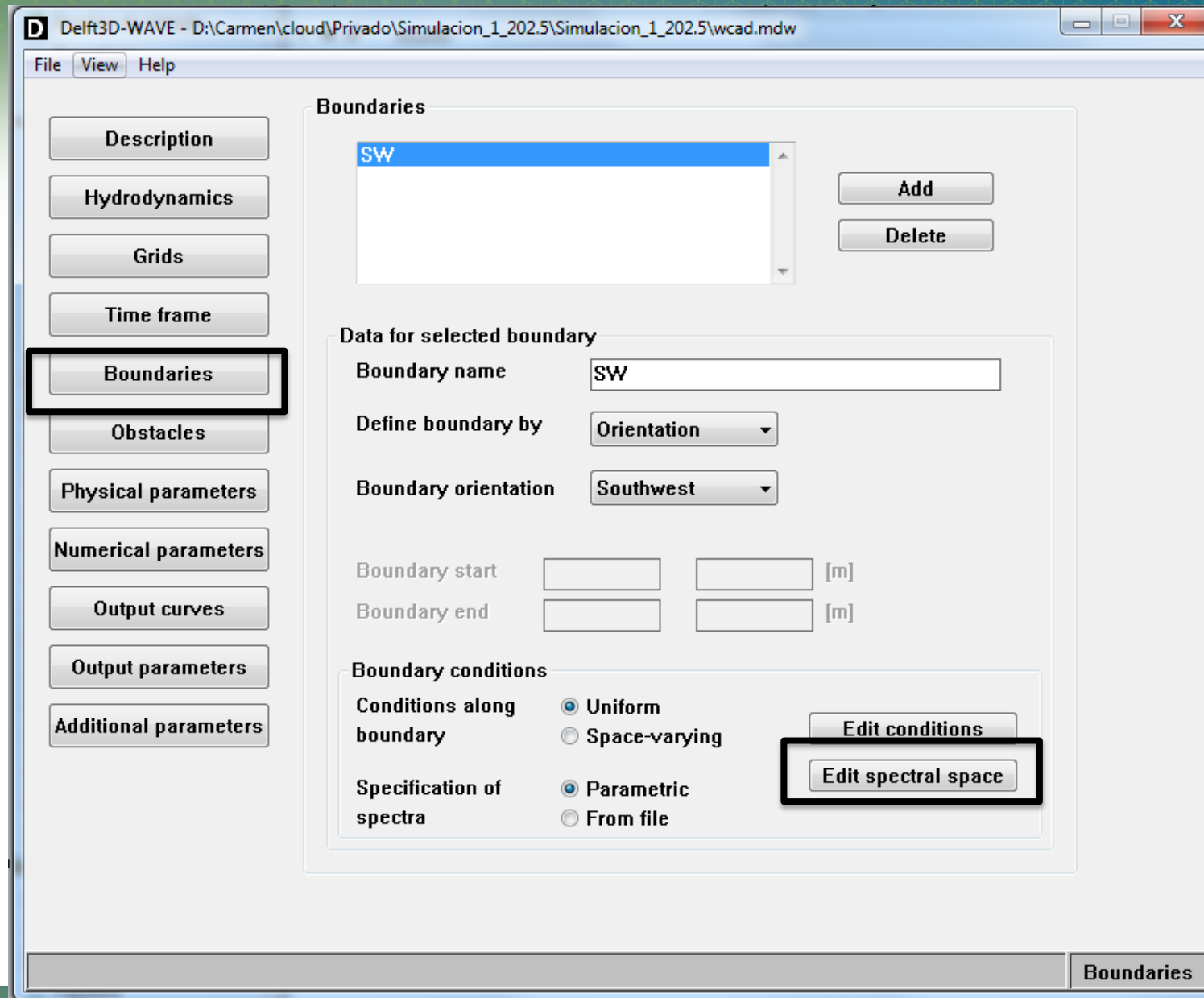
Significant wave height:  [m]

Peak period  $T_p$ :  [s]

Direction (nautical):  [deg]

Directional spreading:  [-]

# Modelo numérico DELFT 3D: WAVE





# Modelo numérico DELFT 3D: WAVE

Space-varying boundary conditions

Section 1  
Section 2

Add

Delete

Direction of distance measurements for all segments

Clockwise

Counter clockwise

Distance from corner point: 1500 [m]

Significant wave height: 0 [m]

Peak period  $T_p$ : 5 [s]

Direction (nautical): 255 [deg]

Directional spreading: 4 [deg]

OK

# Modelo numérico DELFT 3D: WAVE

| Parameter                            | Lower limit | Upper limit | Default | Unit |
|--------------------------------------|-------------|-------------|---------|------|
| Number of points to specify boundary | 0           | 300         | 0       | -    |
| Spectral peak factor                 | 1.          | 10.         | 3.3.    | -    |
| Distance from corner point           | 0.          | Y-length    | 0.      | m    |
| Significant wave height              | 0.          | 25.         | 0.      | m    |
| Spectral peak period                 | 0.1         | 20.         | 1.      | s    |
| Wave direction                       | -360        | 360.        | 0.      | °    |
| Directional width (m)                | 1.          | 100.        | 4.      | -    |

# Modelo numérico DELFT 3D: WAVE

D Delft3D-WAVE - D:\Carmen\DELFT\pruebasdelft\Nuevo2\_PE...\_2012 03 01 00 a 2012 03 03 18\wcad.mdw \*

File View Help

Description

Hydrodynamics

Grids

Time frame

Boundaries

**Obstacles**

Physical parameters

Numerical parameters

Output curves

Output parameters

Additional parameters

### Obstacles

Cadiz  
Desemb. 1  
Desemb. 2  
Puerto SM

Add  
Delete  
Open  
Save

Obstacle type:  Sheet  Dam

Reflections: Diffuse

Reflection coefficient: 0.9 [H]

Transm. coefficient: [H]

Height: 3 [m]

Alpha: 2.6 [H]

Beta: 0.15 [H]

Obstacles file: ...\\cad.obt

Add from file Save to file

Most recently used segments file: ...\\Puerto SM.pol

### Obstacle segments

Segment 1  
Segment 2  
Segment 3  
Segment 4  
Segment 5  
Segment 6  
Segment 7

Add  
Delete

Segment co-ordinates

X-start: 744992.5 [m]

Y-start: 4041987 [m]

X-end: 744502.7 [m]

Y-end: 4042498 [m]

Obstacles

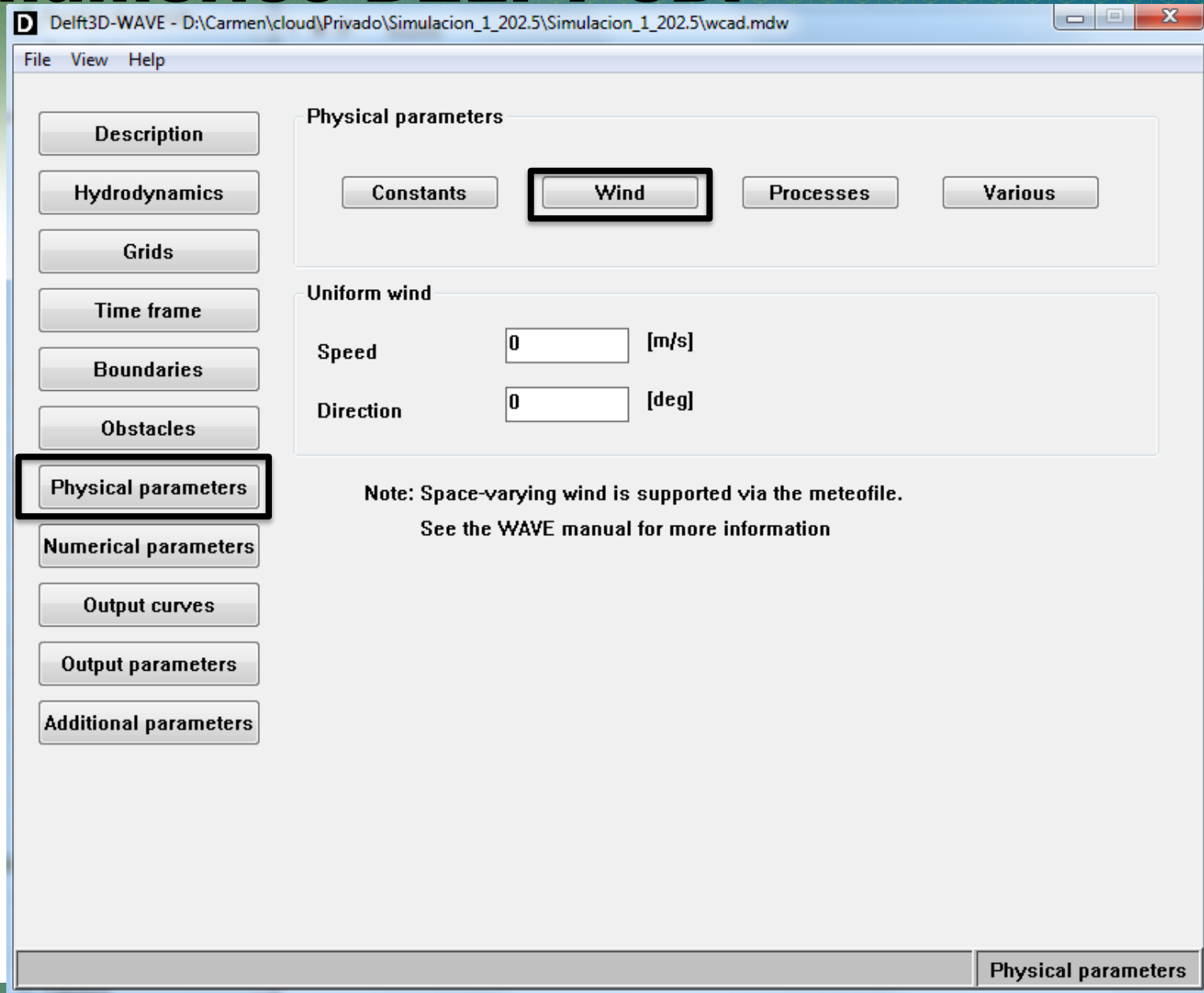
# Modelo numérico DELFT 3D: WAVE

The screenshot shows the Delft3D-WAVE software interface. The window title is "Delft3D-WAVE - D:\Carmen\cloud\Privado\Simulacion\_1\_202.5\Simulacion\_1\_202.5\wcad.mdw". The menu bar includes "File", "View", and "Help". On the left, a vertical sidebar contains buttons for "Description", "Hydrodynamics", "Grids", "Time frame", "Boundaries", "Obstacles", "Physical parameters" (highlighted with a black box), "Numerical parameters", "Output curves", "Output parameters", and "Additional parameters". The main area is titled "Physical parameters" and contains sub-sections: "Constants" (highlighted with a black box), "Wind", "Processes", and "Various". The "Constants" section lists the following parameters:

| Parameter           | Value   | Unit                 |
|---------------------|---|----------------------|
| Gravity             | 9.81  | [m/s <sup>2</sup> ]  |
| Water density       | 1025  | [kg/m <sup>3</sup> ] |
| North w.r.t. x-axis | 90  | [deg]                |
| Minimum depth       | 0.05  | [m]                  |
| Convention          | <input checked="" type="radio"/> nautical<br><input type="radio"/> cartesian                            |                      |
| Forces              | <input type="radio"/> wave energy dissipation rate<br><input checked="" type="radio"/> radiation stress |                      |
| Wave set-up         | <input type="radio"/> none<br><input checked="" type="radio"/> activated                                |                      |

At the bottom right of the window, a tab labeled "Physical parameters" is visible.

# Modelo numérico DELFT 3D: WAVE





# Modelo numérico DELFT 3D: WAVE

D Delft3D-WAVE - D:\Carmen\cloud\Privado\Simulacion\_1\_202.5\Simulacion\_1\_202.5\wcad.mdw

File View Help

Description

Hydrodynamics

Grids

Time frame

Boundaries

Obstacles

**Physical parameters**

Numerical parameters

Output curves

Output parameters

Additional parameters

Physical parameters

Constants Wind **Processes** Various

Generation mode for physics 3-rd generation

Depth-induced breaking (B&J model) Alpha 1 Gamma 1.1

Non-linear triad interactions (LTA) Alpha 0.1 Beta 2.2

Bottom friction Type Collins Coefficient 0.002

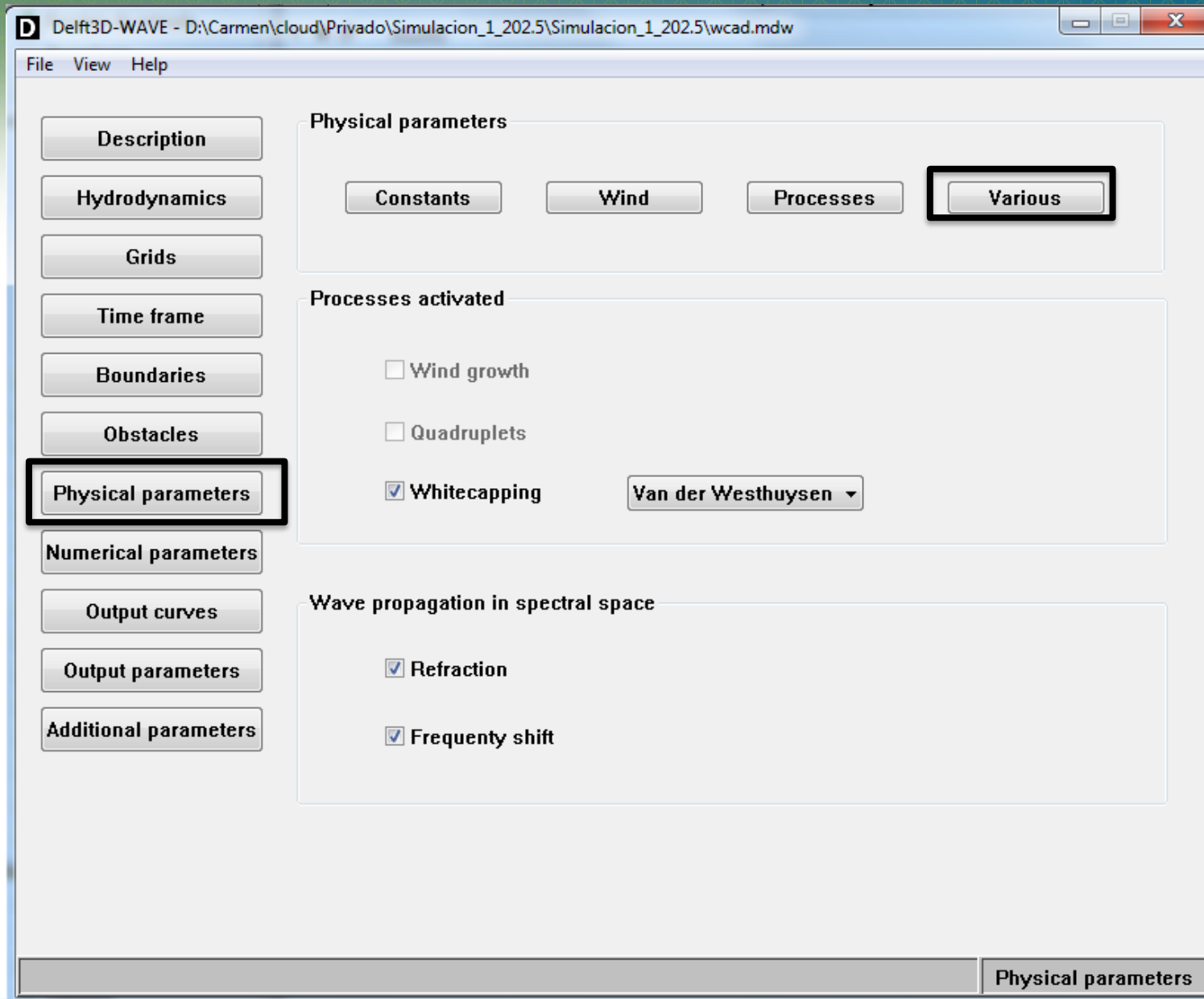
Diffraction Smoothing coef. 0.9 Smoothing steps 900  Adapt propagation

Physical parameters

# Modelo numérico DELFT 3D: WAVE

| Parameter                     | Lower limit | Upper limit | Default        | Unit                           |
|-------------------------------|-------------|-------------|----------------|--------------------------------|
| Generation mode               |             |             | 3rd generation |                                |
| Depth-induced breaking:       |             |             | B&J model      |                                |
| Alfa                          | 0.1         | 10          | 1.0            | -                              |
| Gamma                         | 0.55        | 1.2         | 0.73           | -                              |
| Non-linear triad interactions |             |             | inactive       |                                |
| Alfa                          | 0.001       | 10          | 0.10           | -                              |
| Beta                          | 0.001       | 10          | 2.2            | -                              |
| Bottom friction               |             |             | JONSWAP        |                                |
| Bottom friction coefficient   |             |             | 0.067          | m <sup>2</sup> /s <sup>3</sup> |
| Diffraction                   |             |             | inactive       |                                |
| Smoothing coefficient         | 0           | 1.0         | 0.2            | -                              |
| Smoothing steps               | 1           | 999         | 5              | -                              |
| Adapt propation               |             |             | active         |                                |

# Modelo numérico DELFT 3D: WAVE



# Modelo numérico DELFT 3D: WAVE

Delft3D-WAVE - D:\Carmen\DELFT\pruebasdelft\Nuevo2\_PE...\_2012 03 01 00 a 2012 03 03 18\wcad.mdw \*

File View Help

Description

Hydrodynamics

Grids

Time frame

Boundaries

Obstacles

Physical parameters

**Numerical parameters**

Output curves

Output parameters

Additional parameters

**Geographical space**

First-order (SWAN 40.01) / Second-order (SWAN 40.11)

Third-order (not yet operational)

**Spectral space**

Directional space (CDD):  [-] (0.0-1.0)

Frequency space (CSS):  [-] (0.0-1.0)

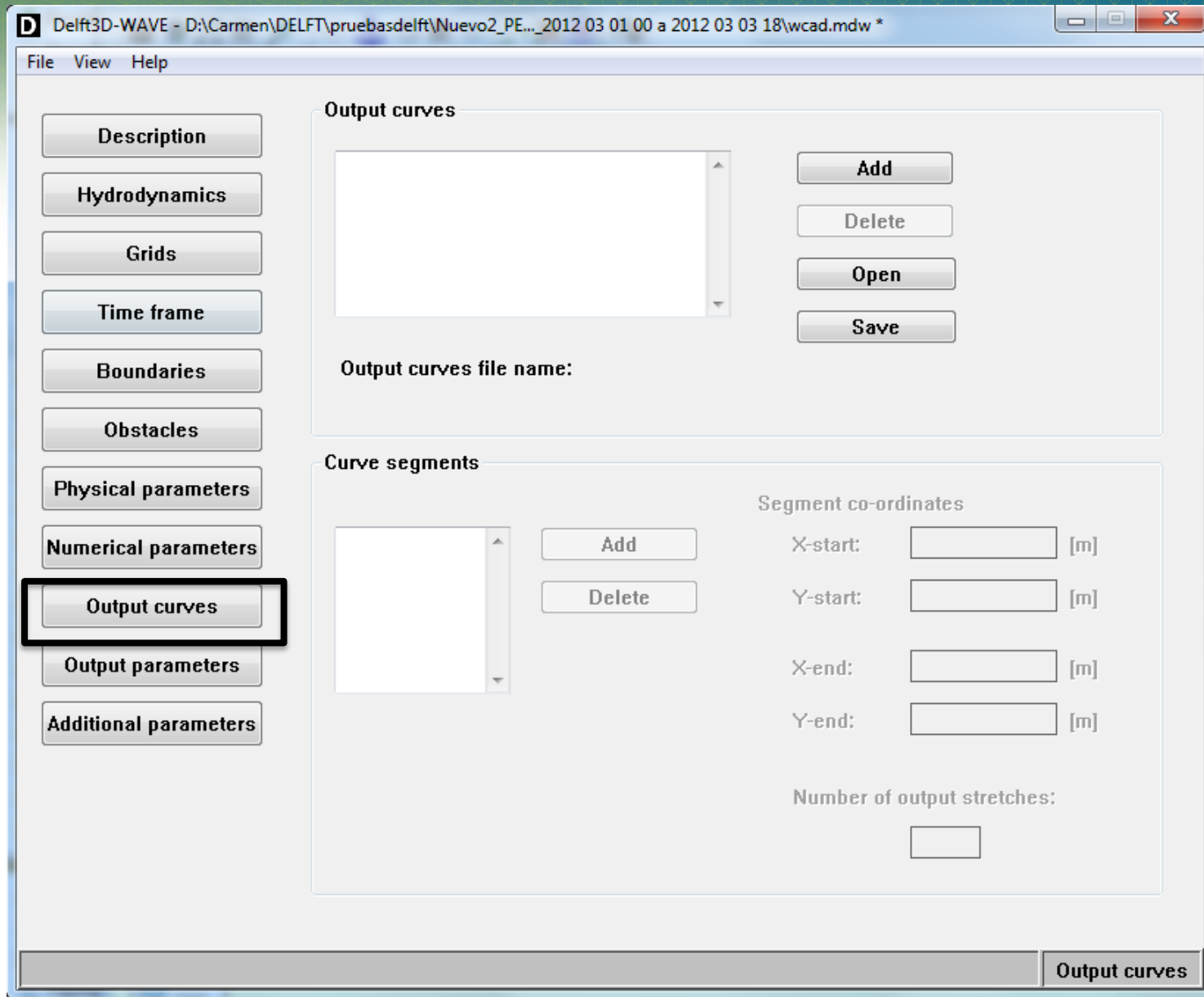
CDD and CSS determine the numerical scheme: 0 = central, 1 = upwind

**Accuracy criteria (to terminate the iterative computations)**

|  |                                     |
|--|-------------------------------------|
| Relative change                                | Percentage of wet grid points       |
| Hs-Tm01: <input type="text" value="0.02"/> [-] | <input type="text" value="97"/> [%] |
| Relative change w.r.t. mean value              | Maximum number of iterations        |
| Hs: <input type="text" value="0.02"/> [-]      | <input type="text" value="50"/>     |
| Tm01: <input type="text" value="0.02"/> [-]    |                                     |

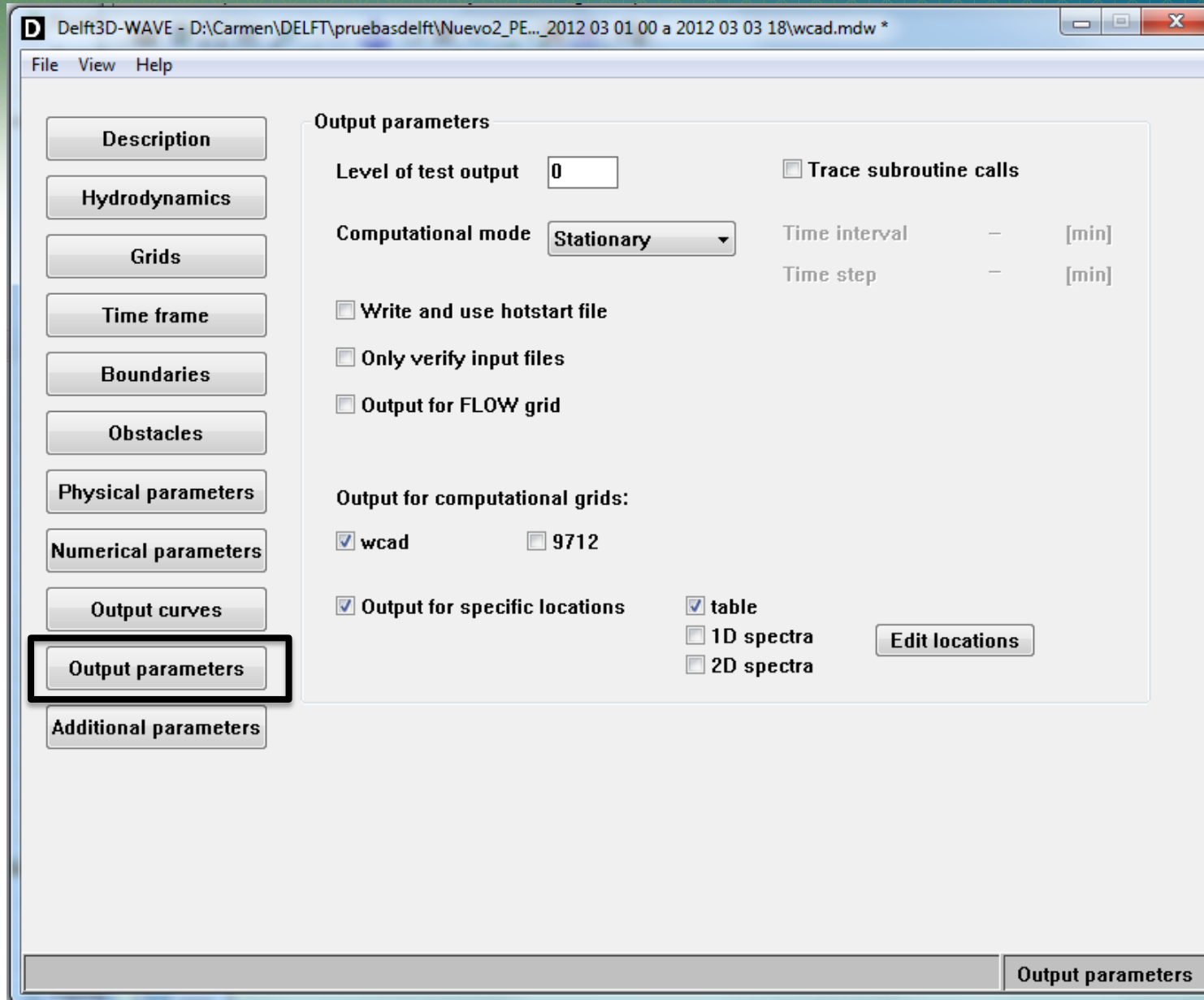
Numerical parameters

# Modelo numérico DELFT 3D: WAVE

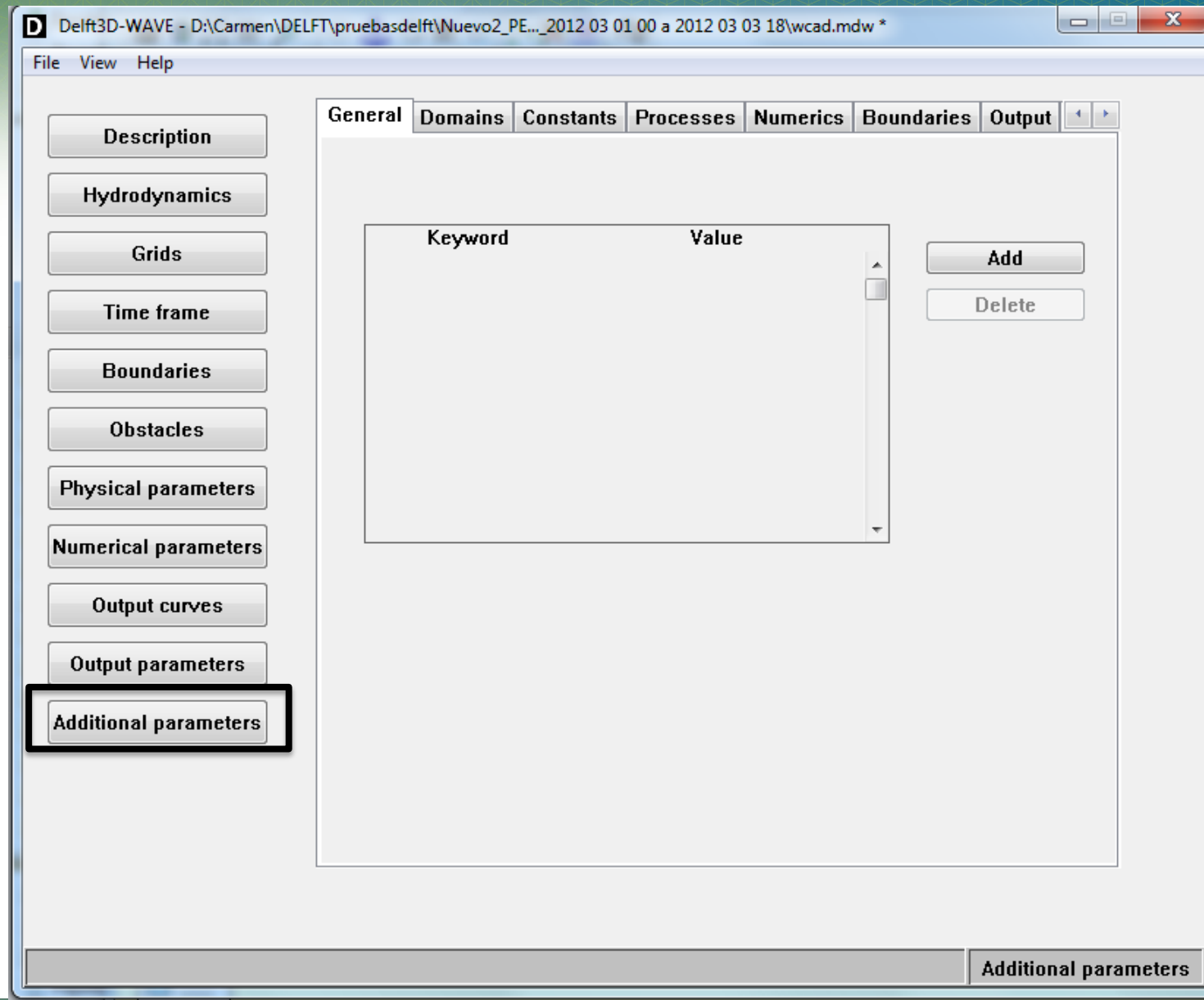




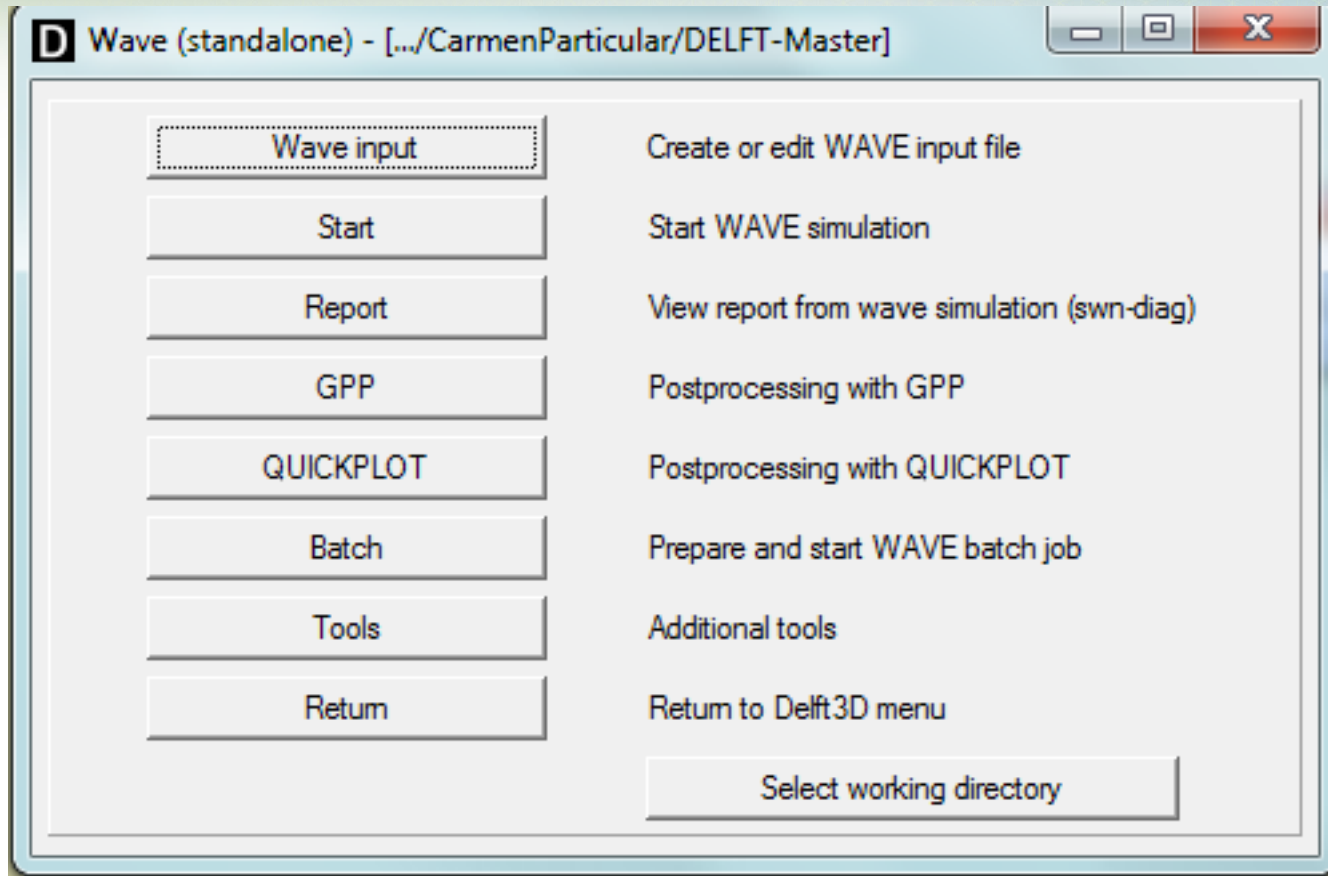
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