

MoSV-1D
(MOMentum conservation Saint-Venant 1
Dimension)

Manual Book

MoSV 1D

By

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Version 1.0

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1. Introduction

This document is a guide to using and running MoSV 1D (Momentum Conservation Saint-Venant 1 Dimension) software. MoSV 1D software is based on the One Dimensional Shallow Water Equation (SWE 1D) model which is implemented numerically using the Finite Volume method with a staggered-grid scheme. The SWE equation and its numerical implementation, have been published in the following Journals and Proceedings:

1. Adytia, D. (2019). Momentum Conservative Scheme for Simulating Wave Runup and Underwater Landslide. Indonesian Journal on Computing (Indo-JC), 4(1), 29. <https://doi.org/10.21108/indojc.2019.4.1.250>
2. Adytia, D., Husrin, S., & Latifah, A. L. (2019). Dissipation of Solitary Wave Due To Mangrove Forest: A Numerical Study by Using Non-Dispersive Wave Model. ILMU KELAUTAN: Indonesian Journal of Marine Sciences, 24(1), 41. <https://doi.org/10.14710/ik.ijms.24.1.41-50>
3. Alfikri, M. Z., Adytia, D., & Subasita, N. (2019). Shock capturing staggered grid scheme for simulating dam-break flow and runup. Journal of Physics: Conference Series, 1192(1). <https://doi.org/10.1088/1742-6596/1192/1/012041>

2. Requirements

The requirements needed to run MoSV 1D are as follows :

2.1. System Requirements

2.1.1. Windows 10 All Version

Windows 10 is the operating system needed to run this application. This operating system is used because it is considered compatible on every user's device when using this application.

2.2. Program Requirements

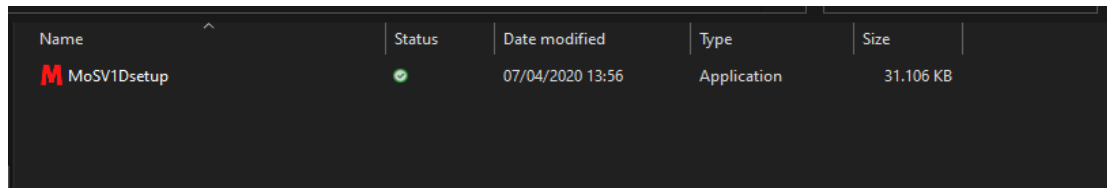
2.2.1. MoSV 1D Setup

MoSV Setup.exe is a program that needs to be installed to be able to run the MoSV 1D application. This application program is in the form of setup and is the main file for installation..

3. Installing

Before using the MoSV 1D application, we must first install the application. Following are the steps to install the MoSV 1D application :

3.1. First double-click the MoSV 1D setup file and press **Run Administrator**.





Name	Status	Date modified	Type	Size
 MoSV1Dsetup		07/04/2020 13:56	Application	31.106 KB

Illustration 1 Setup MoSV 1D

3.2. Secondly click **Next**, the installation has been saved default in storage C.

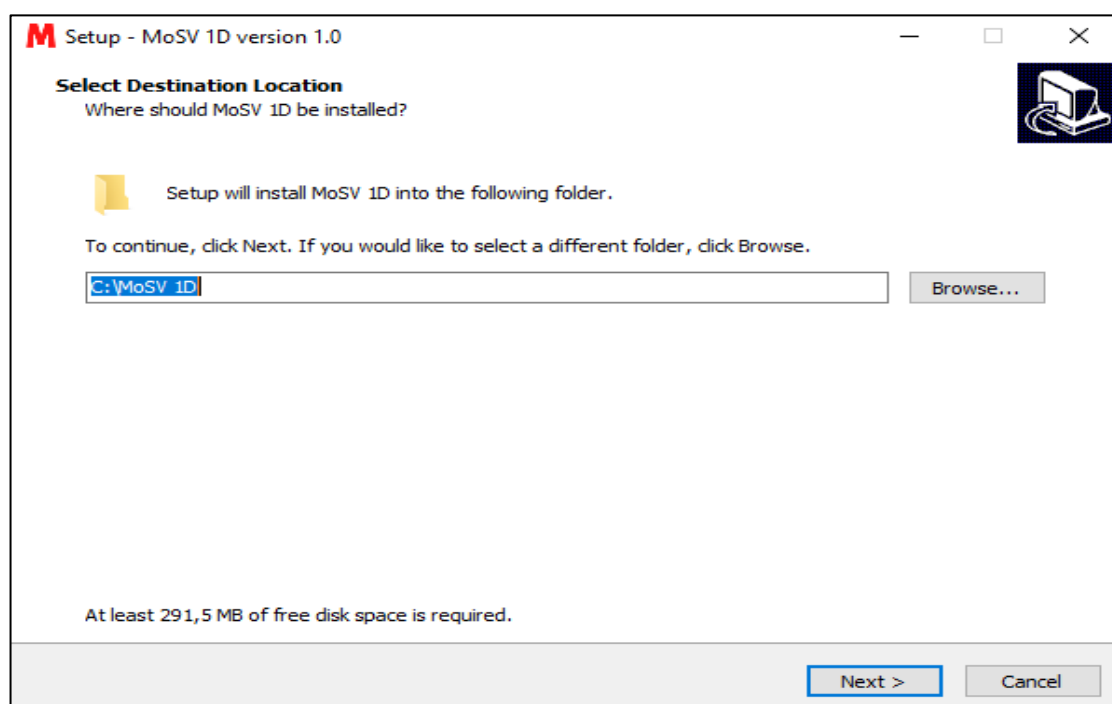


Illustration 2 Installation 1

3.3. Third click **Next** and check additional shortcuts to create applications on the your desktop.

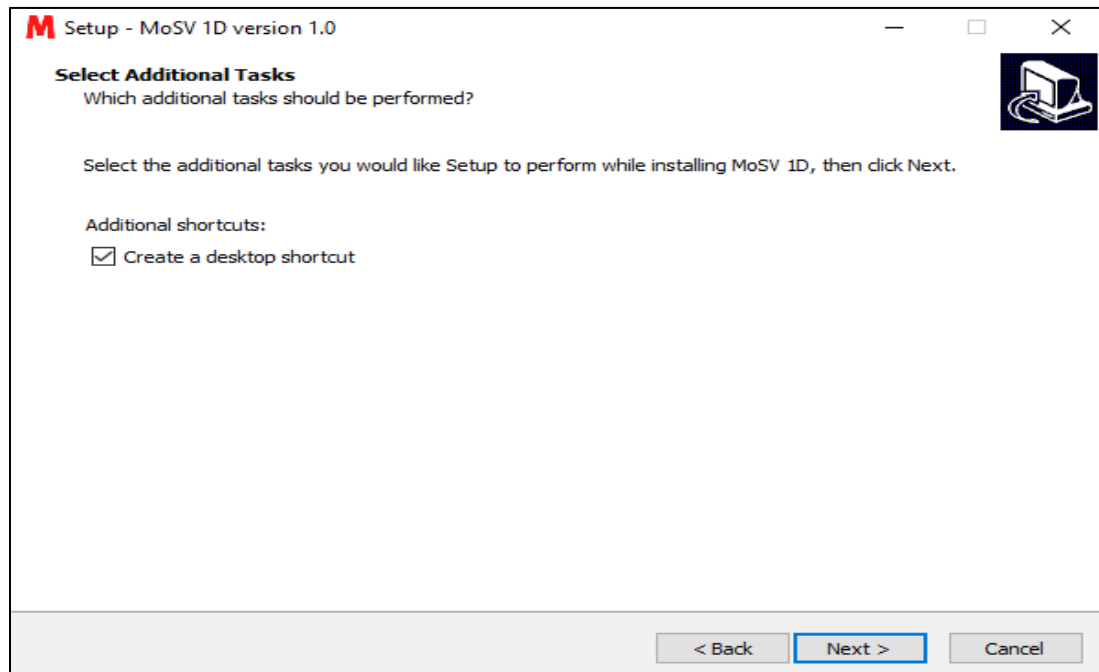


Illustration 3 Installation 2

3.4. Fourth, press **Install** to install the MoSV 1D application.

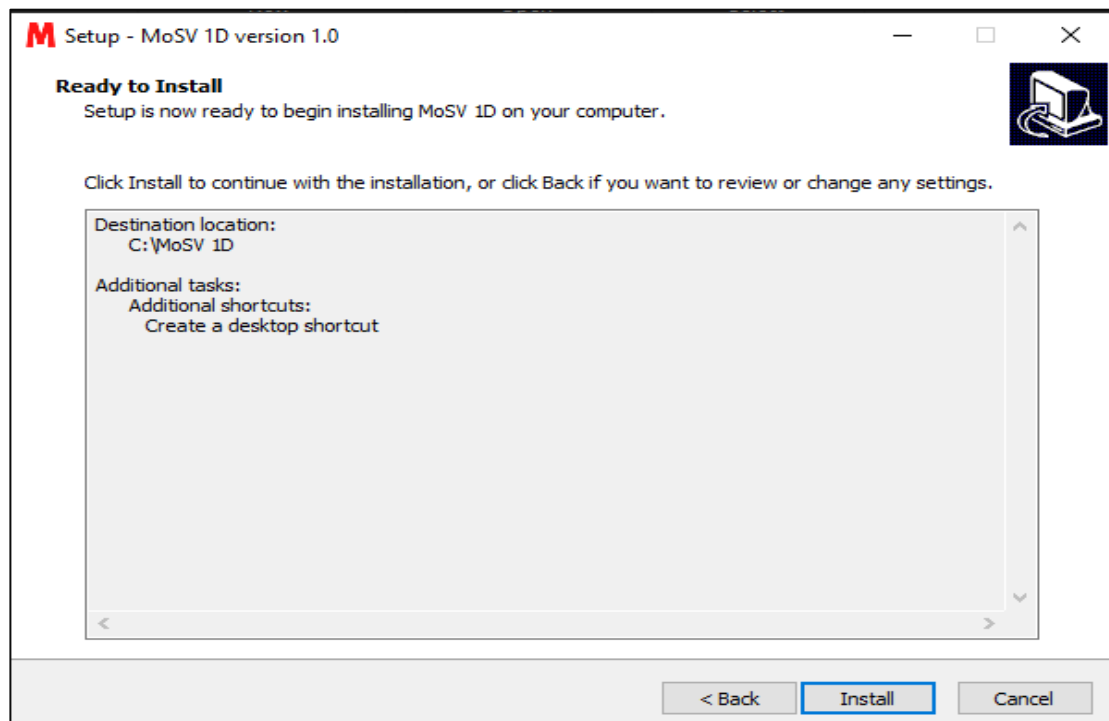


Illustration 4 Installation 3

3.5. Finally press **Finish** when the installation process is complete.

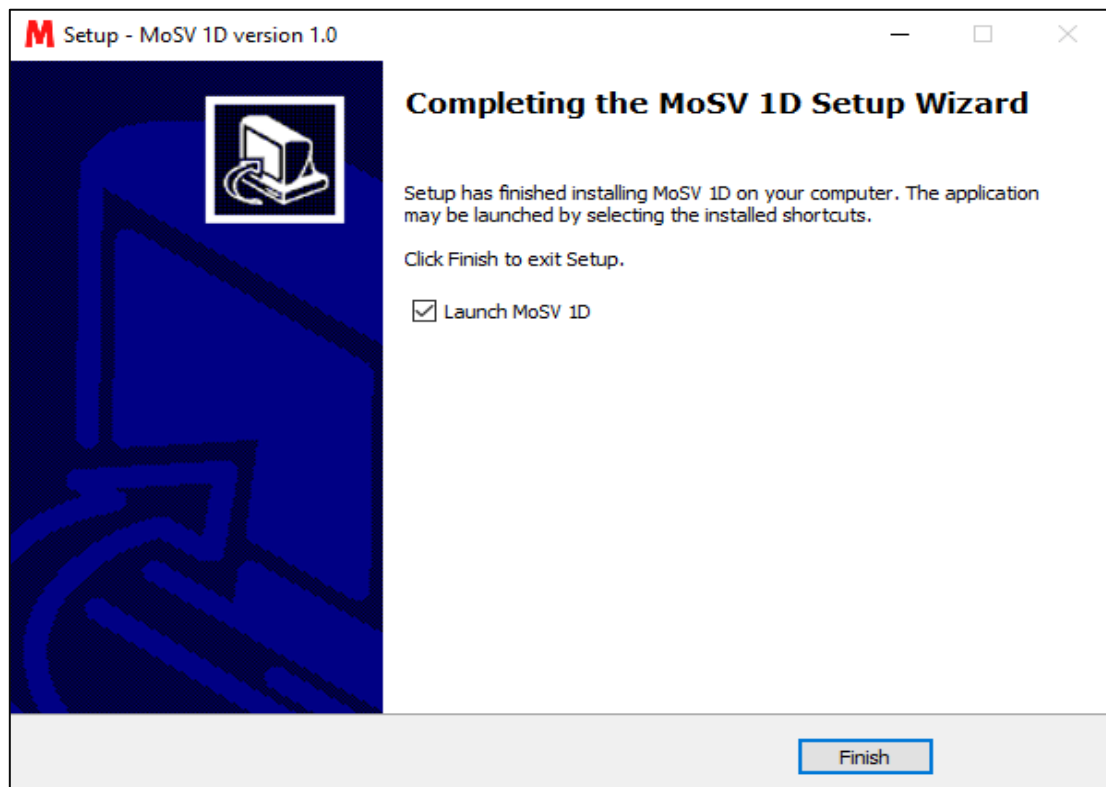


Illustration 5 Installation 4

4. Graphic User Interface (GUI)

The following are the parts of the MoSV 1D GUI (Graphical User Interface) :

4.1. Main GUI

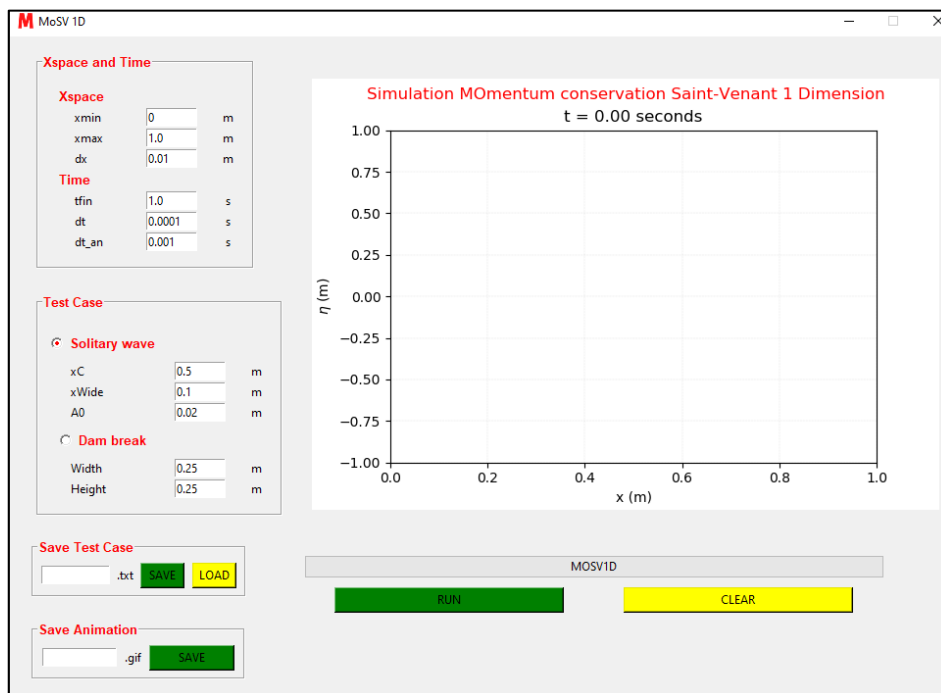


Illustration 6 Homepage

The picture above is the main display of the MoSV 1D application, there are 2 labels for input parameter namely Xspace & Time and Test Case. Then have several input entries and buttons.

4.2. Xspace and Time

Xspace and Time		
Xspace		
xmin	0	m
xmax	1.0	m
dx	0.01	m
Time		
tfin	1.0	s
dt	0.0001	s
dt_an	0.001	s

Illustration 7 Xspace and Time

Xspace and Time have 2 labels namely Xspace and Time, each of which has a different entry. Fill in all data in the provided entry fields using integer or float format. The Xspace section in illustration 7 contains three entry fields that must be filled. Xmin and Xmax in meters are the position of Xawal and Xakhir. For dx entries, it is a value that has a meter.

4.3. Test Case

Test Case		
<input checked="" type="radio"/> Solitary wave		
xC	0.5	m
xWide	0.1	m
A0	0.02	m
<input type="radio"/> Dam break		
Width	0.25	m
Height	0.25	m

Illustration 8 Test Case

The Test Case section in illustration 8, has 2 choices namely Solitary Wave and Dam Break. In the Solitary Wave option there is A0 in meters which means amplitude, xC in meters means position from the peak of Soliton and xWide is width in meters. Then the second option Dam Break is Width which is the width has meters and Height is height has units of meters

4.4. Save Test Case

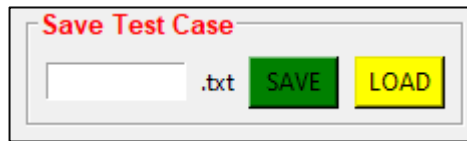


Illustration 9 Save Test Case

The Save Test Case section in illustration 9 has a function to save and load the parameter file that was filled in earlier. Before saving parameters, the user must fill in the file name. The file that is saved and loaded is in the .txt extension.

4.5. Save Animation

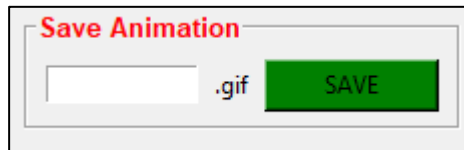


Illustration 10 Save Animation

The Save Animation section in illustration 10 has a function for saving files in the form of animation. In storing the animation file has an extension that is gif

4.6. Button

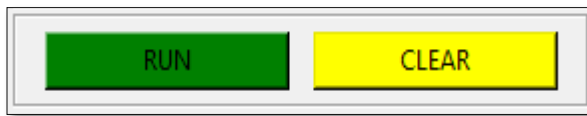


Illustration 11 Button

In the illustration section 11 has 2 buttons namely the RUN button and the CLEAR button. Run button functions to run the animation in the application based on parameters that have been filled. The CLEAR key functions to delete entries in the parameters, wave, bathymetry and time sections, which aim to speed up work in repeating new test cases and animations.

5. Operating

Here the example by running the software. There are 2 conditions to use this software : Running Animation and Save Test Case & Animation

5.1. Running Animation

5.1.1. Filled Data

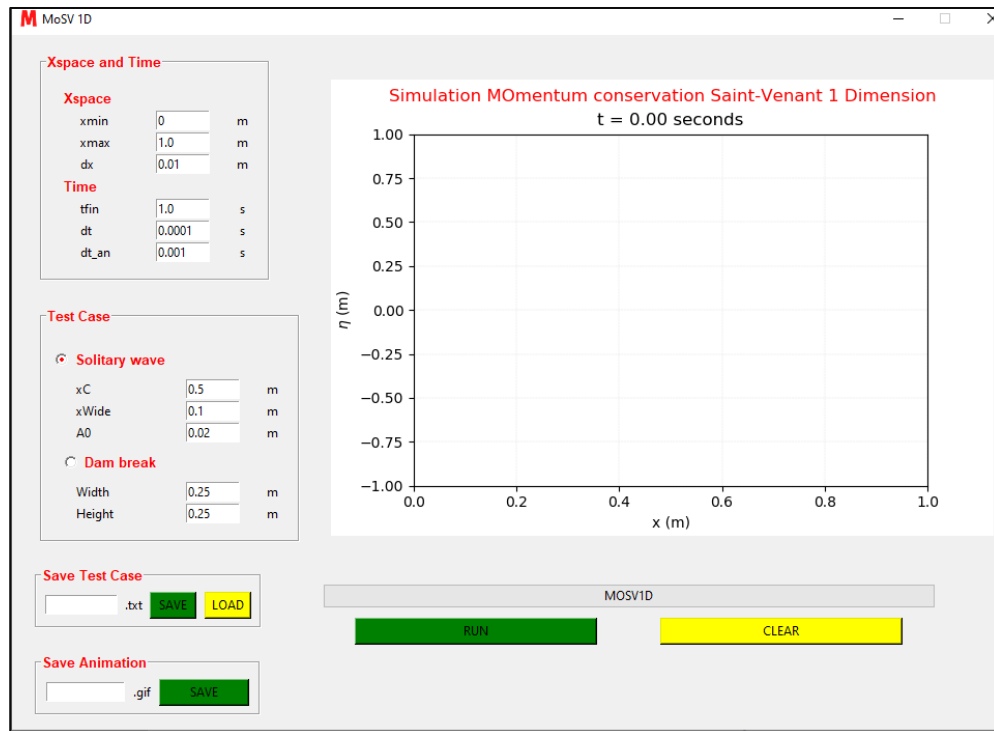


Illustration 12 Filled Data

First we fill all the data entries in the domain, wave, bathymetry, time and dam break sections. Then when all the data has been filled, press the green RUN button. Then wait for the animated image to appear on the blank canvas. The results of the animation of each parameter, will display the animation form as illustrated 16 (Result).

5.1.2. Result

The following is the result of each parameter, will display the results of the animation as below :

5.1.2.1 Result Solitary Wave

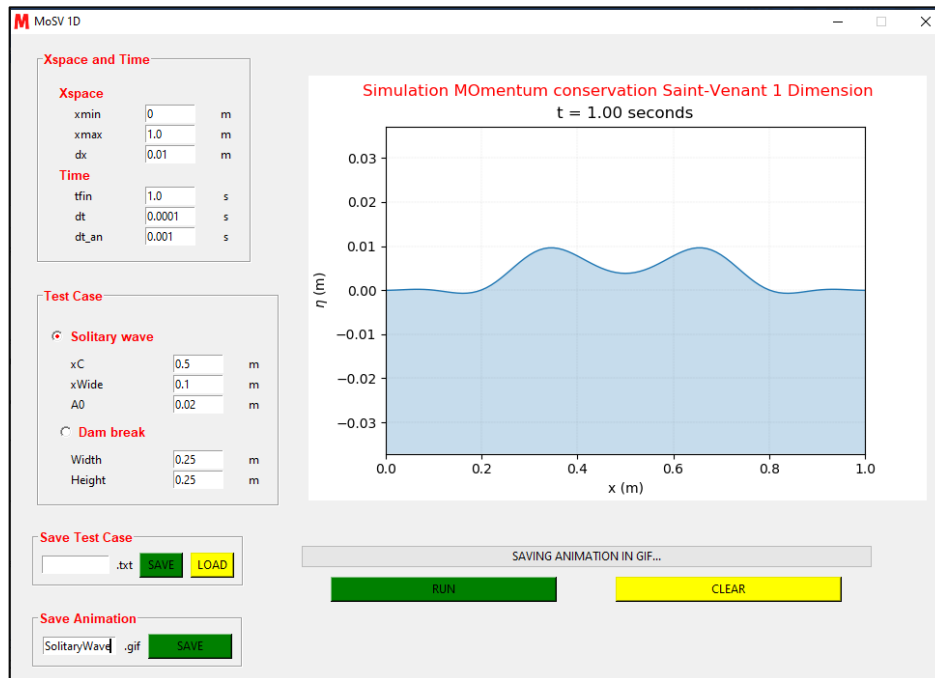


Illustration 13 Result Solitary Wave

5.1.2.2 Result Dam Break

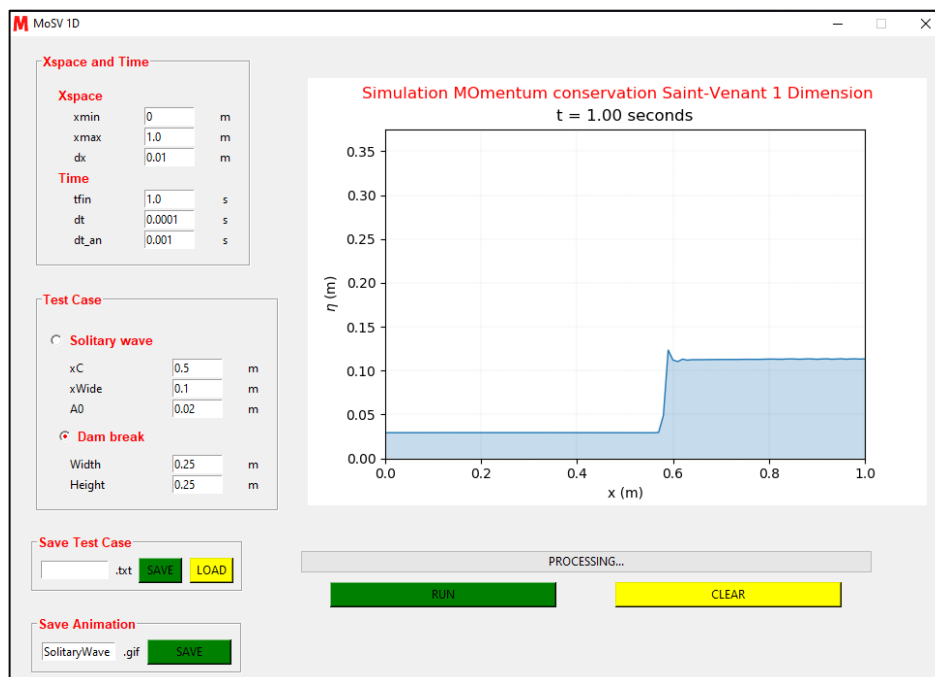


Illustration 14 Result Dam Break

5.2. Additional Features

5.2.1. Save Test Case

Save all 1D MoSV parameters in the form of a text (.txt) file by giving the file name first. The following is an example of a test case file with the name TestCase_1 that has been saved.

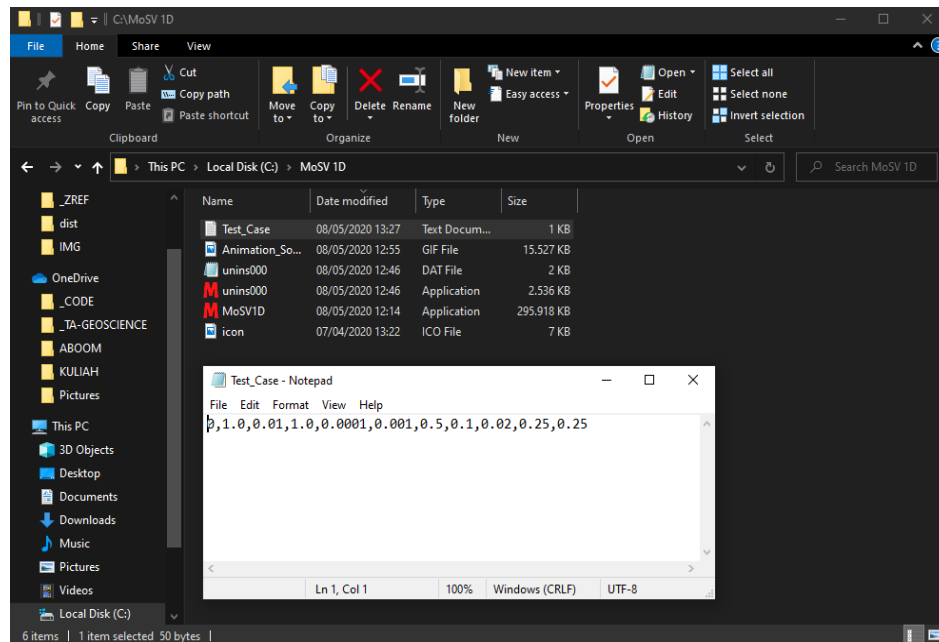


Illustration 15 Save & View Test Case

5.2.2. Load Test Case

Load the test case file that has been previously stored and then retrieve all the data contained in the file to be filled in to the GUI parameter entry and then it will be a requirement to run the animation.

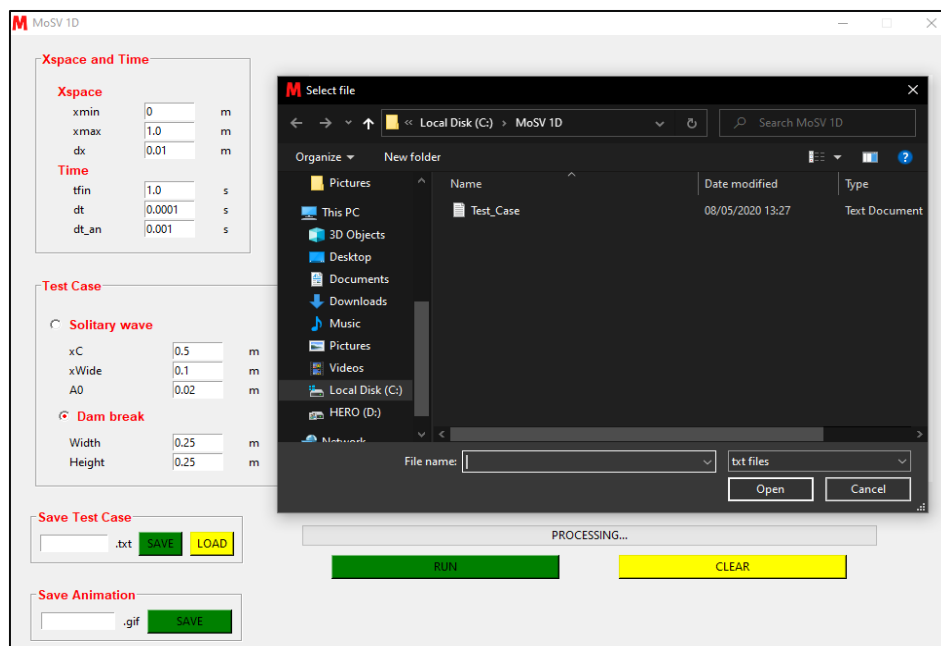


Illustration 16 Load Test Case

5.2.3. Save Animation

Save the results of the MoSV 1D animation in the form of a gif (.gif) file by giving the file name first. When pressing the save button before giving a name a pop-up will appear as follows :

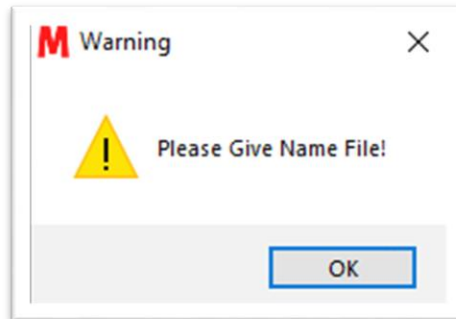


Illustration 17 Pop Up Warning

The following is an example of an animation file with the name Animation_1 that has been saved.

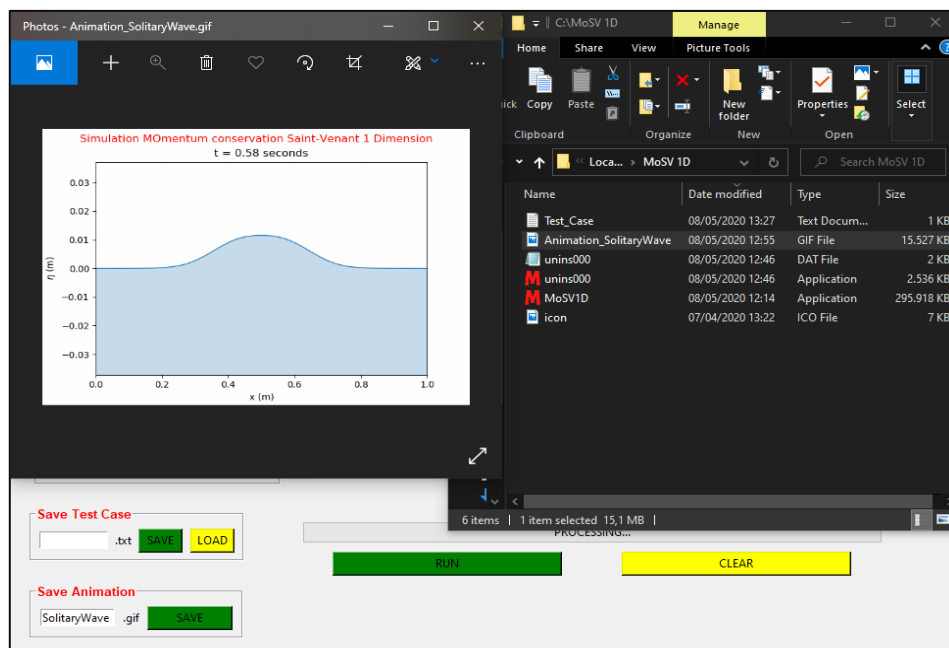


Illustration 18 Save & View Animation

5.2.4. Run Animation

Running animation with a state where all parameters have been filled and pressing the RUN button so that the animation will appear in the form of canvas in the GUI.

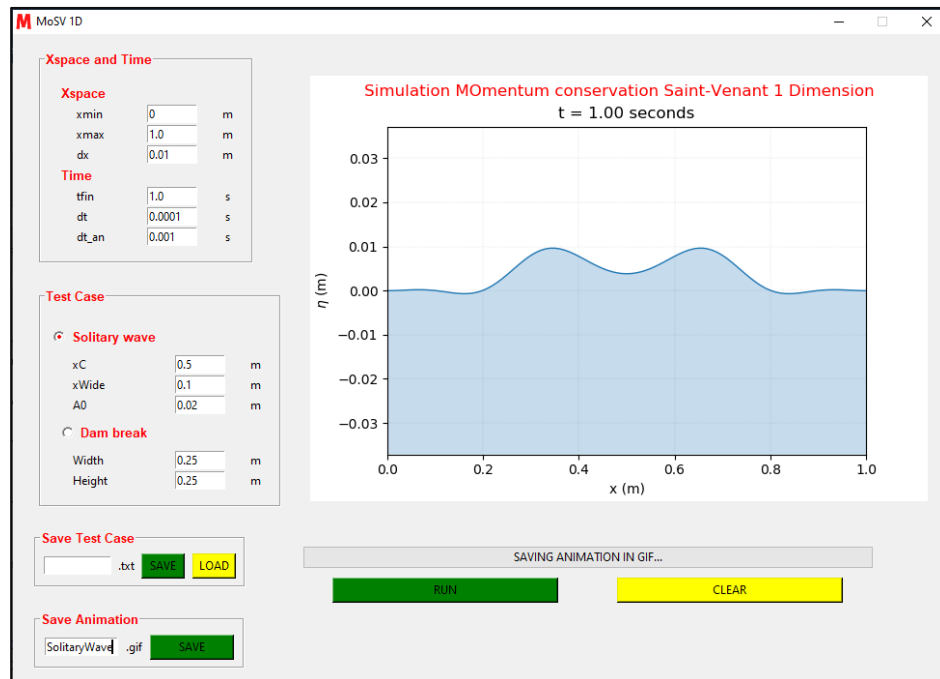


Illustration 19 Run Animation

5.2.5. Clear Input Parameter

Remove the contents of all entry parameters in the Xspace, Time, Solitary Wave and dam break except. This section aims to make it easier for us to replace all parameters at once. Here is the result of clear animation:

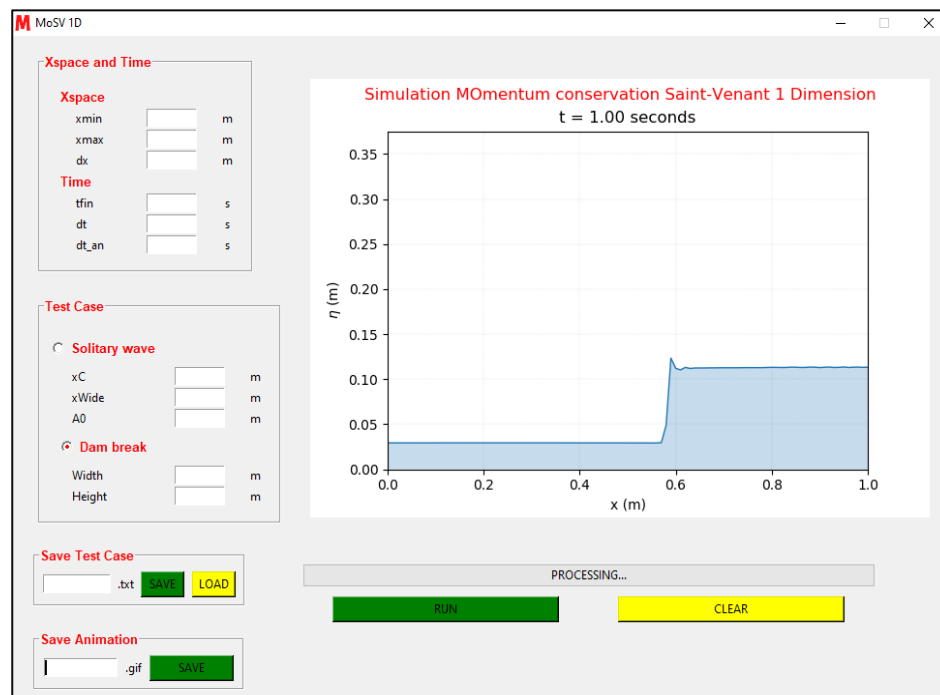


Illustration 20 Clear Input Parameter

5.2.6. Close GUI

When pressing the close button on the top right, a Quit pop-up will appear. If the user asks OK then the application will exit, while pressing cancel returns the application. Here is a pop-up when pressing the close button on the application.

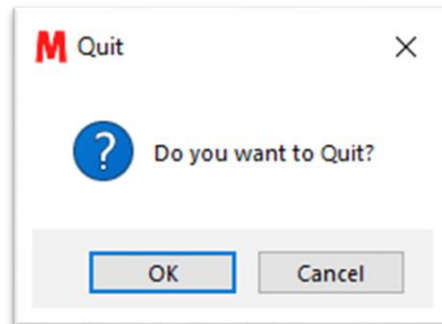


Illustration 21 Pop Up Quit

6. Test Result

6.1. Solitary Wave

The following is the result of Solitary Wave based on input parameters as shown below :

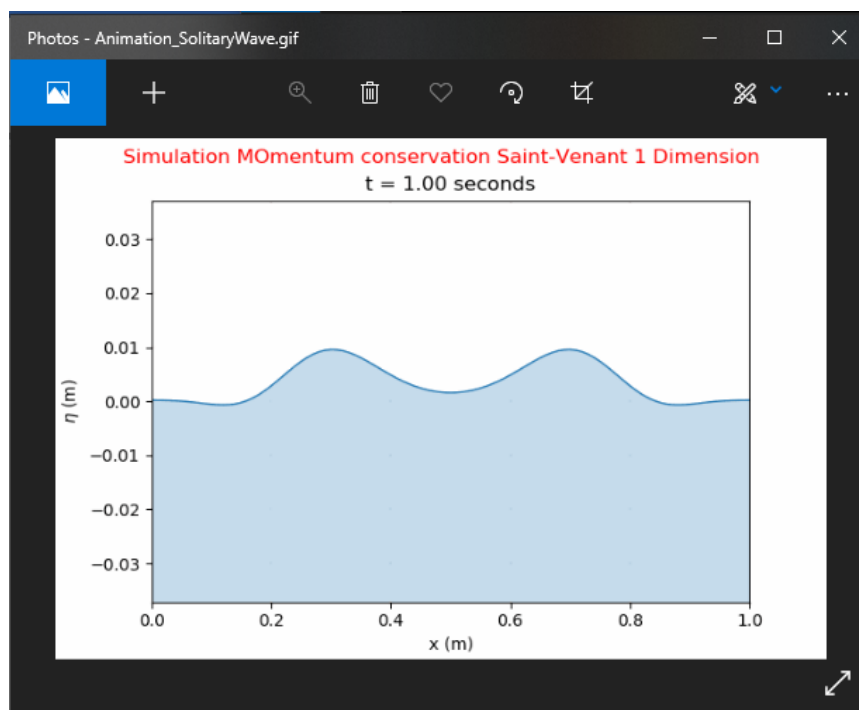


Illustration 22 Solitary Wave

6.2. Dam Break

The following is the result of Dam Break based on input parameters as shown below :

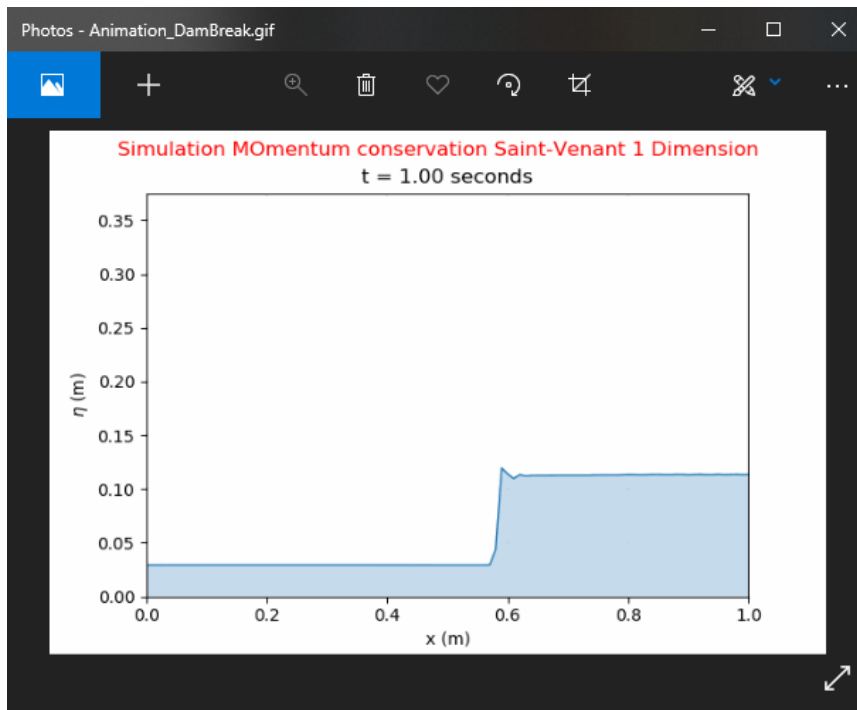


Illustration 23 Dam Break