Installation of GmSAFIR, the free graphic pre-processor of SAFIR

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1. Introduction

"GmSAFIR" stands for "GMSH for SAFIR". This is the open source graphic and parametric pre-processor that allows you to generate input files for SAFIR®. It has been developed by Efectis (Bruno Guillaume) in cooperation with Liege University (Jean-Marc FRANSSEN) This document details the procedure to install and run this software on your computer.

Four different components are needed to run GmSAFIR.

1) An operating system that is running your computer
2) The Python software
3) The python library of the GMSH software
4) The GmSAFIR software

Each of the next subsection describes how these different codes can be installed on your computer and how they must be tuned in the required and/or convenient manner.

2. Operating system

Your computer most likely came with an operating system (O.S.) already installed. We will assume from here that a Windows 64 bits O.S. is running your computer.

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It is possible to run GmSAFIR under Linux with slightly modified commands and slightly different operations during the installation.

3. Python

Python is a modern language for coding. GmSAFIR is coded in Python. You thus need to install this software on your computer. Good news are:

1) It is free.
2) You will not have to learn this language to use GmSAFIR if you limit yourself to the most common features (although, of course, having a good command of this code will allow you to tailor the open source code GmSAFIR to your own needs).

3.1 Dowloading Python

The version 3 of python must be installed.

Just type "Python install" in Google or directly type https://www.python.org/downloads/ in your favourite browser and you should see the window below (version number of Python may have increased since this screenshot was taken).
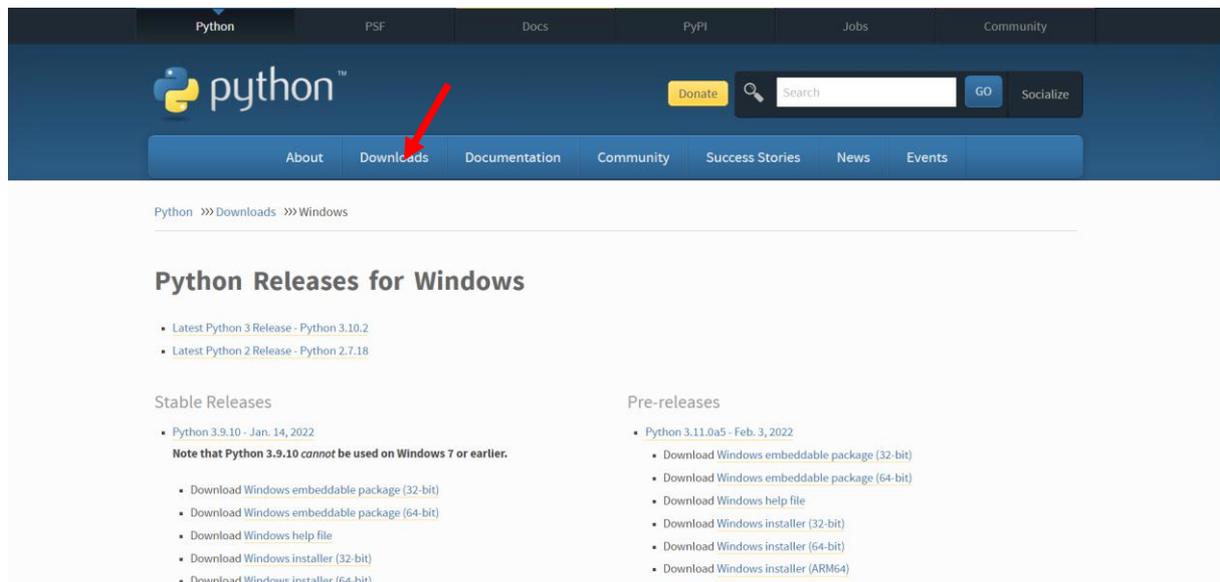
Click on "Downloads" in the blue ribbon and, in the window that appears, you can click on "Python 3.9.6[1]". Doing so will download the file "python-3.9.6-amd64.md" on your computer.

This file is not Python yet. It is the file that will install Python on your computer. Double click on this executable in the Windows explorer and installation should proceed in a quite automatic way; accept all recommended options.

TAKE CARE to carefully note the folder in which Python has been installed in the disk of your computer. If not, you will have great difficulties to find it and use it.

In our case, it was in the folder: "C:\Users\Jean-Marc\AppData\Local\Programs\Python\Python39"

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[1] Or any more recent version number

If you click on the Window on the bottom left of your screen, type "PYT", and select the command "python 3.9 (64 bits) application" that should appear as the best result, a DOS command window should open.
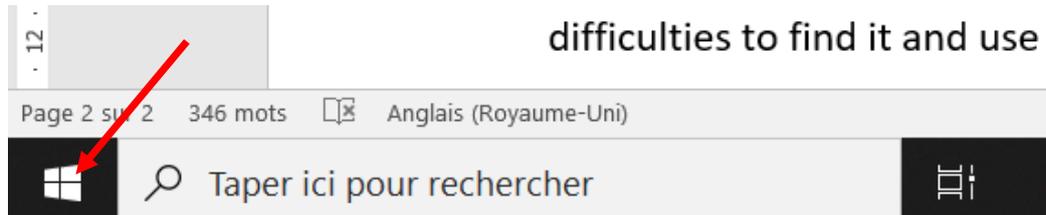
If the window looks like this (note the sign ">>>"), everything went fine.
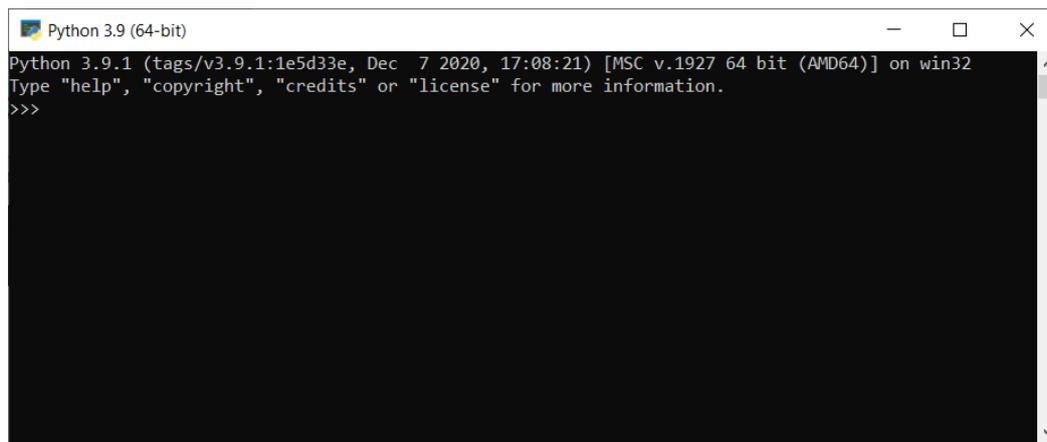
You can close this window by typing "exit()".

3.2 Setting an environmental variable

We don't want to type the complete address

"C:\Users\Jean-Marc\AppData\Local\Programs\Python\Python39\python.exe" every time we will need to use Python. To make the call to Python simpler, we are going to create an environmental variable.

In the recent versions of the Python Installer, you simply thick a box that will automatically install the Python path.

To test whether the modification has been effective, type "COM" on the bottom left window, then "Invite de commandes – Applications" and a DOS command window is opened.

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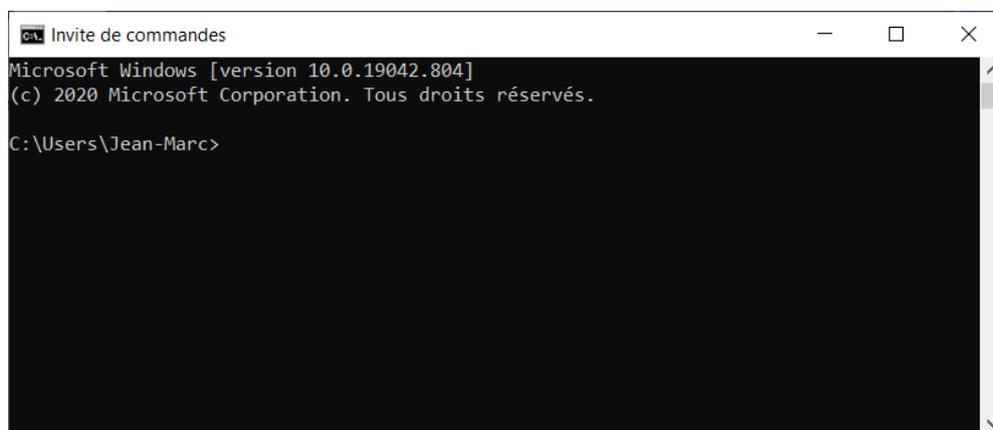
You can see that we are in a folder (here "c:\Users\Jean-Marc") that is very different from the one that contains the Python executable. Nevertheless, typing simply "python.exe" here should open the Python window that we have seen previously in Section 3.1. That makes us happy.

3.3 Installing some additional stuff

We have the core of Python, but not yet everything we need of it.

In a DOS command window, we will just type our first commands that will install the required stuff that, trust Bruno, is very much needed.

Yet, a difficulty may arise from the fact that different applications installed on your computer came with previous versions of Python, even if you are not aware of that. We want the requested stuff to be installed by the latest version of Python, for example Python 3.9. To know where this version of Python is located, in the DOS window, type "WHERE PYTHON.EXE". This should indicate to you the folder in which Python 3.9 is located. Go to this folder before you type the next three commands.

- First type: "*python.exe -m pip install fortranformat*"
- Then type "*python.exe -m pip install numpy*"
- Then type "*python.exe -m pip install matplotlib*"

You can verify the good execution of these three installs by typing, in a Python windows:

- import fortranformat,
- import numpy,
- import matplotlib.

The good execution of the installs is confirmed by the fact that these commands send us back to the triple >>> of the Python window, without any warning or error message.

4. GMSH Python library

GMSH is a powerful and versatile mesh generator developed by Christophe Geuzaine and Jean-François Remacle. It is the core on which GmSAFIR will be based. In simple words, GmSAFIR will operate GMSH, via Python, to have it working in the way that suits SAFIR and its fantastic users (that is: you).

Good news: it is free (our eternal gratitude to Christophe and Jean-François).

In a DOS command window, type:

"*python.exe -m pip install -i https://gmsh.info/python-packages --force-reinstall --no-cache-dir gmsh*"

And then, in a Python Window, "import gmsh" to confirm the good execution of the install.

Note: GMSH can be found here: https://gmsh.info/#Download. It is not necessary to download the full version of GMSH to run GmSAFIR. Only the Python library mentioned above is necessary. Nevertheless, installing GMSH will give you access to the documentation and the tutorials that may be very helpful, for example to control the level of refinement of the meshes created.

From here, you can select the O.S. of your computer, click on it which will download the installer file on your computer. Double click on this file and this will install GMSH on your computer.

If you start GMSH.EXE and get a message that reads like this:

Windows protected your PC

Microsoft Defender SmartScreen prevented an unrecognised app from starting. Running this app might put your PC at risk.

More info
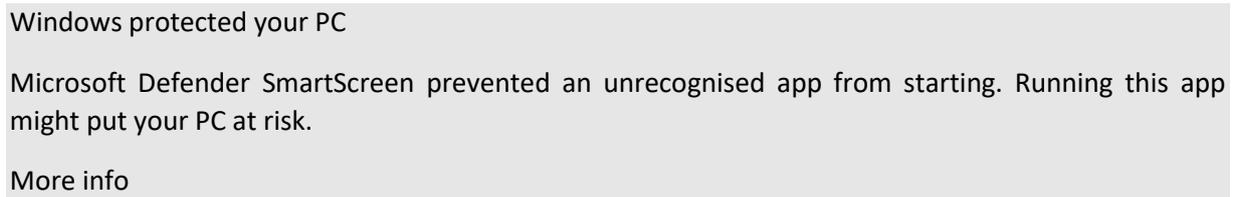
You should open the "Properties " of GMSH.EXE and type "Unblock".

5. GmSAFIR

5.1 Installing GmSAFIR

Installing GmSAFIR is as simple as getting the file "gmsafir.py" (click on "Code/Download ZIP" from https://github.com/gmsafir/gmsafir, then unpack the ZIP file), and copying it in the folder of your choice in your computer.

We chose "C:\Users\Jean-Marc\Documents\G4S\20022021"

Good news: GmSAFIR is also free of charge
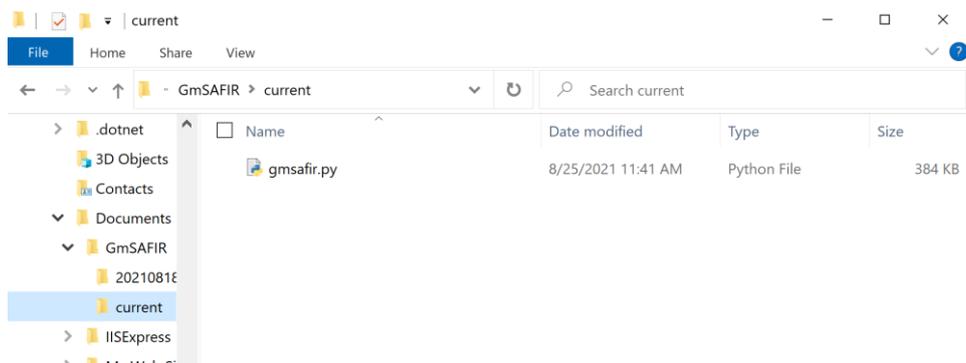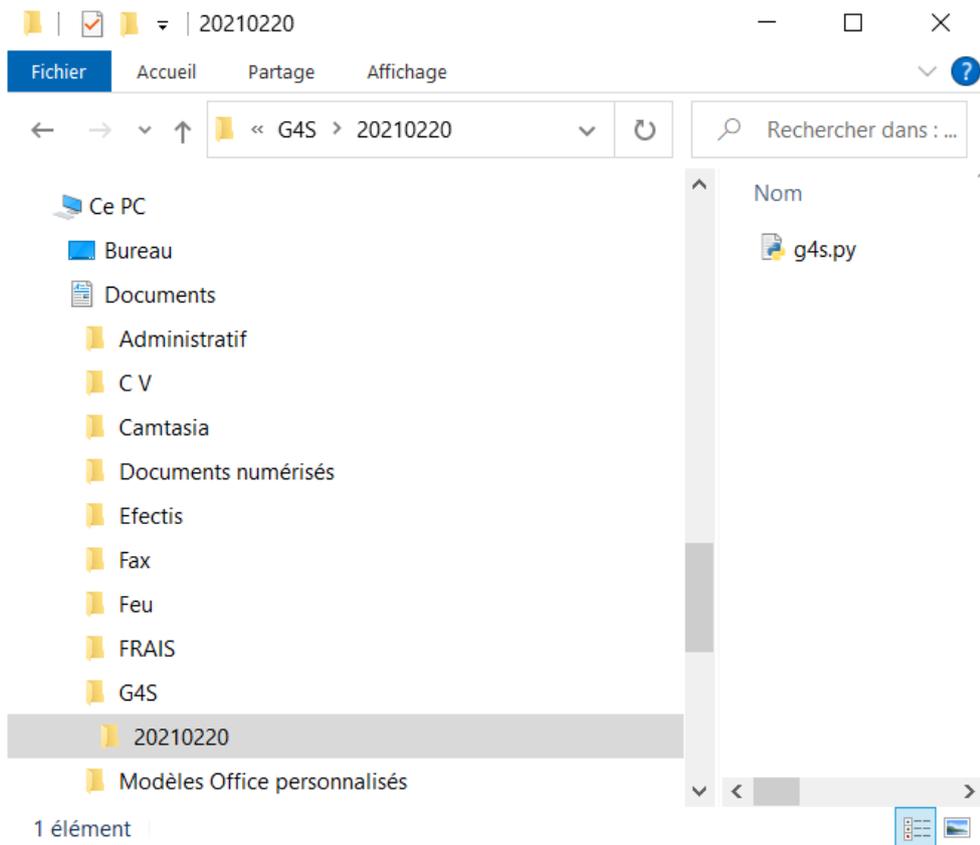
5.2 Setting an environmental variable to run GmSAFIR from a Command Window

If we want to call GmSAFIR from a Command window and from many different folders, most likely the folders in which we will run our different projects, we will create a GmSAFIREXE environment variable for that.

Note that the environment variable is not needed if we start GmSAFIR from the Windows Explorer, see Section 6.

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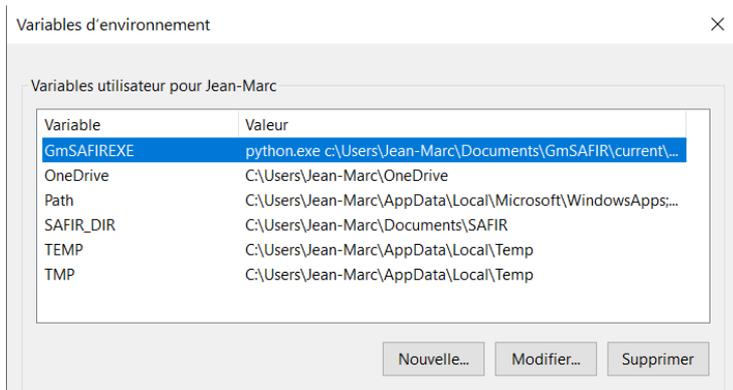
5.3 Setting another environmental variable to run SAFIR from inside GmSAFIR

If we want to use GmSAFIR not only to prepare a .IN file, but also to launch a SAFIR execution, we need to create a SAFIREXE environment variable for that.
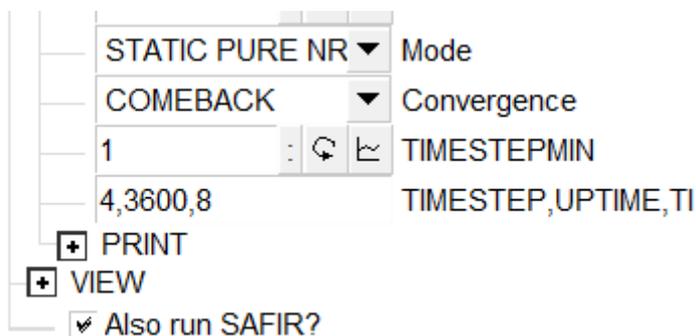
Note that the environment variable needs to be created no matter how GmSAFIR is started, from the Command Window or from the Windows Explorer.
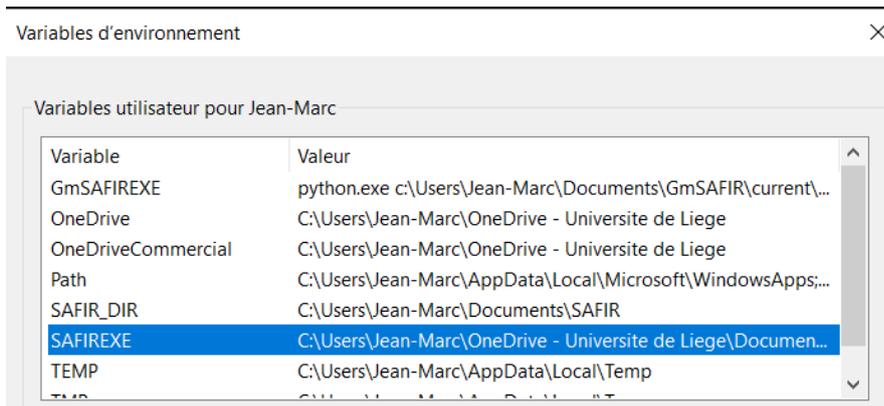
6. Running GmSAFIR

There are different ways to launch GmSAFIR.

In the Windows environment:

✓ you can double click on "GmSAFIR.py" in the Windows Explorer.

✓ You can also create a shortcut, for example on your desktop, and double click on this short cut.

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From a DOS command window. Type one of the following command:

- ✓ '%GmSAFIREXE%' or "python.exe C:\Users\Jean-Marc\Documents\G4S\20210220\gmsafir.py" if you did not set the environment variable as described in section 5.2.
  This will be used for creating a completely new project and will open the window underneath.
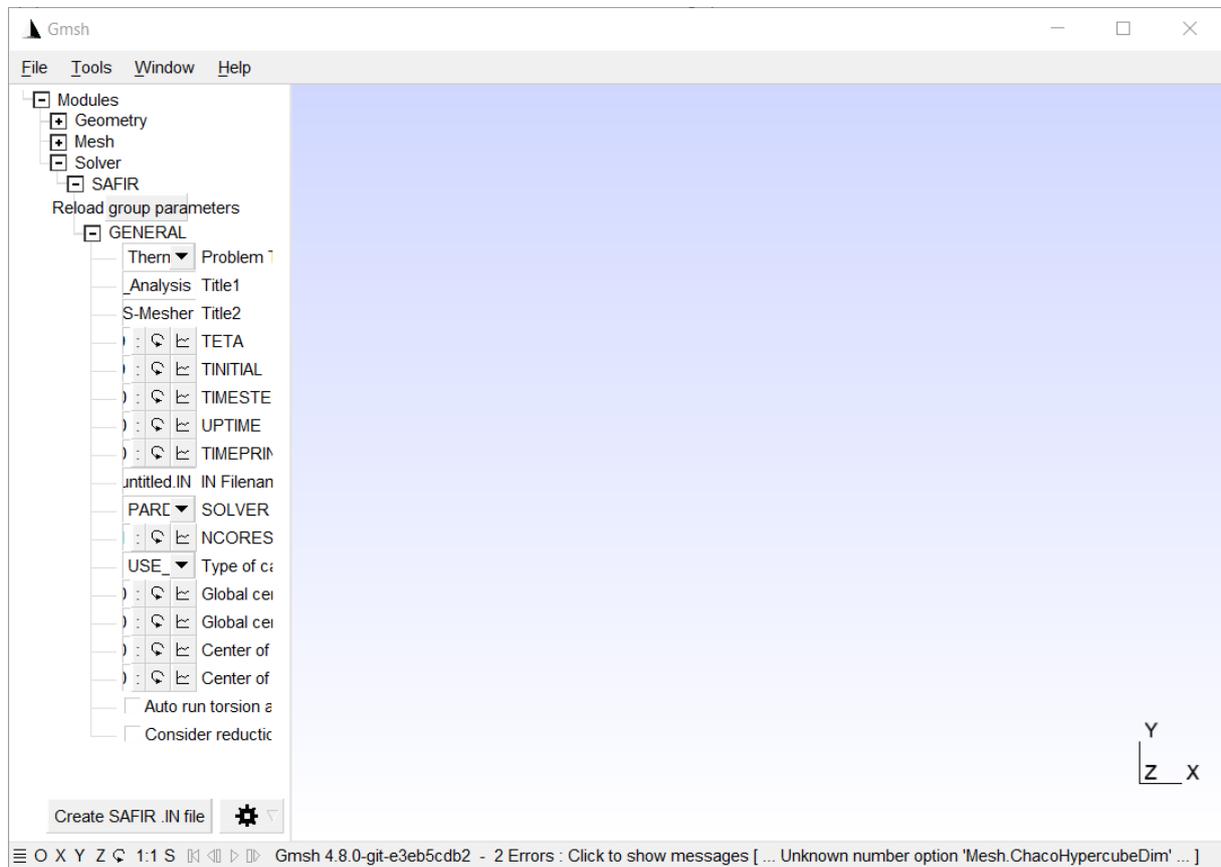
- ✓ "*%G4SEXE%* filename.geo" where "filename.geo" is the name of a file previously created by G4S that you want to modify or complete.

- ✓ "*%G4SEXE%* foldername" where "foldername" is the name of a folder that contains 0 or 1 file of the type "*filename.geo*"

- ✓ "*%G4SEXE%* foldername -nopopup" where "foldername" is the name of a folder that contains 1 or several files of the type "*filename.geo*" and one G4S file. This will run al geo files in a batch mode.

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