University of Cincinnati

GEOL 6024: GroundWater Modeling

Installing MODFLOW for Flopy

Project Report

Submitted By

Gaurav Atreya

M14001485

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1. How to install modflow for flopy

Flopy is a python program which only handles the input and output from modflow, so it doesn't have the capacity to do the simulation itself. Hence you need to tell it where to find the modflow program so it can send the files to that program.

1.1 Download as zip

You can download the zip files for modflow From here: `https://www.usgs.gov/software/modflow-6-usgs-modular-hydrologic-model`

The current version of MODFLOW 6 is version 6.2.2, released July 30, 2021.

The downloaded zip has following files when you unzip it.

command: shell
```
unzip -l ~/Downloads/mf6.2.2.zip
```

output
```
  mf6.2.2/
|-- bin                # contains mf6.exe executable
|-- doc                # contains pdfs
|-- examples        # contains a lot of examples
|-- make       # contains make files
|-- msvs       # contains Visual Studio solution/project
|-- src                # conaints the fortran source codes
|-- srcbmi       # same as prev
`-- utils         # contains utility programs/codes
```

You only need the file `mf6.exe` in the `/bin` directory to connect to the flopy.

1.2 Compile it from source code

You can compile the modflow code with fortran compiler to build the executables.

Using pymake from modflowpy makes it a bit easier. You can read the instructions here:

`https://github.com/modflowpy/pymake`

Run this in your terminal to install pymake.

```shell
command: shell
1  pip install mfpymake
```

Then use this code in python to build all the modflow apps.

```python
code: python
1  import pymake
2
3  pymake.build_apps()
```

You can choose to build only modflow 6.

Read the instructions in github for more information on that. Or read the documentation at `https://mfpymake.readthedocs.io/en/latest/`

2. Flopy installation

To install flopy you can use pip.

```shell
command: shell
1  pip install flopy
```

You can also install it through conda or similar package managers for python.

For models using zonebudget, there is a bug in flopy version 3.3.5. I brought it to the attention of the developers and they've fixed it. But it's not yet available to the pip version 3.3.5. If the next version isn't yet released when you're running this code, then you can install the git's latest version with the following command.

```shell
command: shell
1  pip install --upgrade git+https://github.com/modflowpy/flopy.git
```

3. Other Python libraries

To install all other libraries at once you can use the list in `requirements.txt` file.

Running this command in project root will install all requirements.

```shell
command: shell
1  pip install -r requirements.txt
```

The contents of the file has following libraries:

- numpy: For numerical analysis, used mostly for cell/layer properties

- pandas: For reading/writing csv files

- flopy: main flopy library

- shapely: used for defining geometries and using GIS tools

- matplotlib: used for plotting

- scipy: for interpolation algorithm

The geopandas is optional, it's only used in data-gen for generating shapefiles (I think).

- geopandas: for reading writing shapefiles