

Modflow User Tools (MUT) Version 1.22: User's Guide

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Chapter 1

Introduction

This document describes a Modflow interface called Modflow User Tools (MUT), which uses a text-based approach to build a modflow project. It currently relies on Tecplot©, a third-party visualization software package, to provide a 3D graphical interface for viewing the project mesh and properties during construction and then later for visualizing model results. In future, other visualization packages, including the open source program Paraview, could be supported and used instead.

The targeted version of Modflow is Modflow-USG (UnStructured Grid), which includes a new package that adds fully-coupled 2D surface water flow in a manner similar to the Connected Linear Network (CLN) package.

MUT can also post-process a Modflow-USG simulation to provide a Tecplot visualization. If applied to older projects, which were constructed using earlier versions of Modflow, results may be mixed. It is not our intent here to support all existing Modflow packages, many of which have been superceded by more modern ones.

1.1 Installation and Setup

1. Obtain the MUT source files from:

```
https://github.com/Grdbldr/MUT\_Source.git  
https://github.com/Grdbldr/MUT\_Examples.git
```

2. Define a windows environment variable USERBIN eg:

```
set USERBIN=c:\program_files\bin
```

This can be done through Windows settings or at the command prompt.

3. Build the source in Microsoft Visual Studio. We provide a Visual Studio 2019 solution file for this purpose. Currently, Microsoft is providing a free community version of Visual Studio 2022 but we haven't yet tested this version. Please let us know how this works if you try it.

Chapter 2

Model Characteristics

A discussion of the use of GWF, CLN and SWF Modflow submodels to simulate fully-integrated

Chapter 3

Physical Properties

3.1 Groundwater Flow(GWF) Domain

3.1.1 Mesh

3.2 Connected Linear Networks(CLN) Domain

3.3 Surface Water Flow(SWF) Domain

Chapter 4

Boundary Conditions

4.1 Constrained Head

4.1.1 Constant Head(CHD)

Pre-requisites:

Activate one of GWF, SWF or CLN domains

Choose cells

Instructions:

gwf constant head

Inputs:

Head L

All chosen cells will be assigned a constant head equal to the specified total head value.

4.1.2 Drains(DRN)

Pre-requisites:

Activate one of GWF, SWF or CLN domains

Choose cells

Instructions:

gwf drain

Inputs:

Drain conductance L/T

All chosen cells will be assigned a drain elevation equal to the top elevation of the cell with the specified drain conductance.

4.2 Constrained Flow

4.2.1 Recharge(RCH)

4.2.2 Pumping

4.2.3 Critical Depth

4.2.4 Zero-Gradient Depth

Chapter 5

Examples

5.1 1D Column

5.2 2D Hillslope

5.2.1 Groundwater Flow with Drains

5.2.2 Surface water - Groundwater Flow with Critical Depth Boundary

5.3 3D Abdul's Experiment

5.3.1 Triangles

5.3.2 Rectangles

5.3.3 Node-centred Approach for Modflow Cell Definition

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