CMG Geomechanics tutorial for Advanced Geomechanics course HW3

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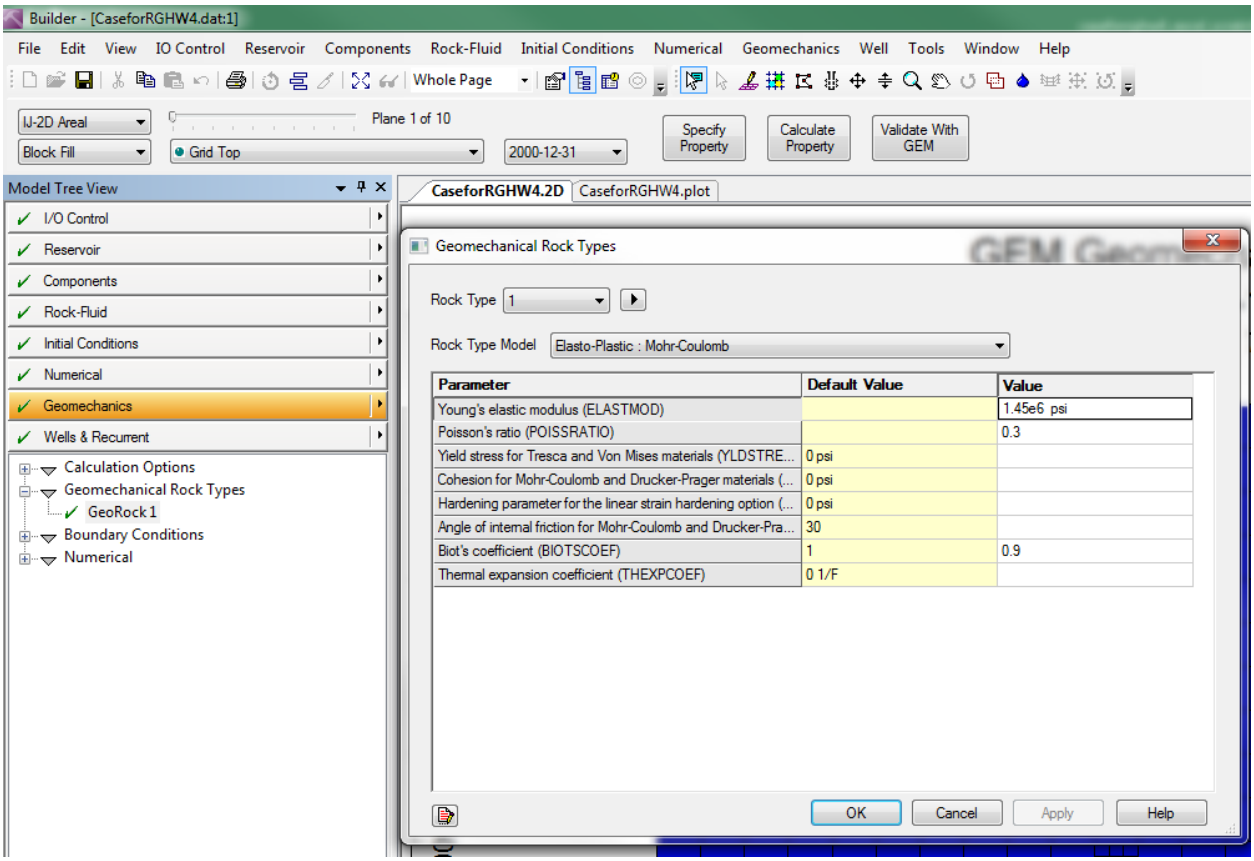
1. Changing elastic properties

1)Open the “XXX.dat”file through Builder (drag the input file to “Builder” 

)

2) Under 

Click “Geomechanical Rock Types” -> double click “GeoRock1” -> You can change elastic properties here. Change “Biot’s coefficient”



2. Changing stress setting

- I constrained the reservoir with zero displacement at the boundary except for upper surface boundary.

```
** constrain the host grid in full (*ALL) or part (*IJK)
*RCONBT *ALL ** On the bottom
*RCONLF *ALL ** On the left
*RCONRT *ALL ** On the right
*RCONBK *ALL ** On the back
*RCONFT *ALL ** On the front
```

And gave constant vertical stress, which is similar to what you calculated from HW1 condition.

This boundary condition will allow the simulation have zero lateral strain and constant vertical stress.

1) Open input file “XXX.dat” through note pad or other text file reader

2) Go to “GEOMECHANIC MODEL” section

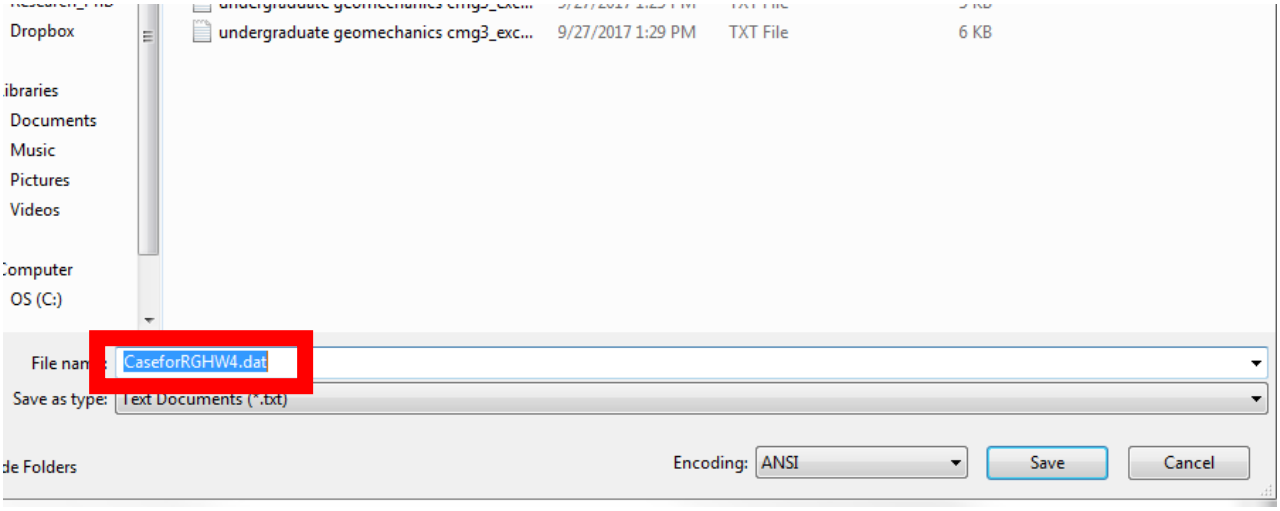
```
**  ==============  GEOMECHANIC MODEL  ======================
*GEOMECH
*GEOM3D
*GCOUPLING 2
*GPTOLMUL 0.5
*GEOGRID *GCART  21 21 10
*GDI  *GIVAR   21*50  **geomech domain
*GDJ  *GJVAR   21*50
*GDK  *GKVAR   10*10

*GOUTSRF *GGRID *PRES *STRAINVOL *SAFACTOR
** GTRANSLI -1000.0        ** no need to move the geomech domain Translation along the I direction
**GTRANSLJ -1000.0        ** Translation along the J direction
**GTRANSLK -1000.0
*GEODEPTH  *GTOP 1 1 1   1000
** constrain the host grid in full (*ALL) or part (*IJK)
*RCONBT *ALL ** On the bottom
*RCONLF *ALL ** On the left
*RCONRT *ALL ** On the right
*RCONBK *ALL ** On the back
*RCONFT *ALL ** On the front

** Note: The yielding stress has a high value to avoid plastics occuring.
** Young modulus   Poisson's ratio   Yielding stress
```

3) Change load here, the unit is tonf/m2, the conversion factor psi/[tonf/m2] is 13.88.

The load here is 70 tonf/m2, which is 971.6 psi. However, the actual total vertical stress will be adjusted because of the boundary conditions. If you adjust the value “70”, the vertical stress will be proportional to that value.

```
**real stress distribution
*DLOADBC3D
*IJK 1:21 1:21 1 **top
** node1 node2 node3 node4 load
   1     2     3     4     70 **1 tonf/m2 = 13.88 psi **Constant vertical stress 70*13.88 = 971.6 psi
```

4) Save the file in “.dat” format. Never save it as “.txt” format.


Dropbox
undergraduate geomechanics cmg3_exc...
9/27/2017 1:29 PM
TXT File
6 KB
Documents
Music
Pictures
Videos
OS (C:)
CaseforRGHW4.dat
Text Documents (*.txt)
Encoding:
ANSI
Save
Cancel

3. Changing well schedule or well type

```
** ==================RECURRENT DATA ================
*RUN

*DATE 2000 12 31

   *DTWELL 0.005
**


WELL   'PRO4'
**wdepth wlength rel_rough wellboretemp restemp wradius
**PRCOMP  WATER
**INCOMP  WATER
PRODUCER 'PRO4'
OPERATE  MAX  STW  100.0  CONT REPEAT
OPERATE  MIN  BHP  200.0  CONT REPEAT
**          rad  geofac  wfrac  skin
GEOMETRY  K  0.25  0.249  1.0  0.0
     PERF       GEO  'PRO4'
** UBA                      ff          Status  Connection
    11 11 6 / 2 2 1         1.0  OPEN    FLOW-TO  'SURFACE'  REFLAYER
    11 11 7 / 2 2 1         1.0  OPEN    FLOW-TO
    11 11 8 / 2 2 1         1.0  OPEN    FLOW-TO

   *WELLINIT *ITER
*TIME 1
*TIME 2
*TIME 3
*TIME 4
*TIME 5
*TIME 6
*TIME 7
*TIME 8
*TIME 9
*TIME   10
*TIME   20
*TIME   30
*TIME   40
*TIME   50
*TIME   60
*TIME   70
*TIME   80
*TIME   90
*TIME   100

*STOP
```

Simulation start date

Well name

You need to choose either “PRODUCER” or “INJECTOR”

Water production rate here is 100 bbl/day with minimum BHP 200psi

“11, 11, 6 / 2, 2, 1” This is where you perforate your well “PRO4”

This is the time that you will run the simulation.

You will run the simulation until 100 days including output of Times equal on this list.