PGE 392K In Class Problem

Dec 3, 2020

1. It is extremely important that you get the 3x3 example problem to work before moving on to the final project. It is easier to debug and there is no reason to expect the full reservoir will work if the smaller example does not. When you have completed the assignment from Dec 1, copy all of your files from Dec 1 into a new folder for Dec 3 (Final Project).
2. Change the input file to all the properties in the final project including the new text files for permeability, porosity, and depth. Many will be the same as the 3x3 example, but many will not be. I recommend only including vertical wells at this time for simplicity. Horizontal wells will be similar to the procedure in the single phase project
   1. L= 6000; W=7500; h=50
   2. , , and .
   3. t = 1 day; t\_final = 1000 days (but start with 100 days)
   4. PJ1-Depth, PJ1-Permeability, PJ1-Porosity
   5. NX=80; NY=75
   6. Ky=0.15\*kx; kz=1\*kx
   7. Cf=1E-6; cw =2.87E-6; co = 3E-6
   8. w = 0.383; o =2.47097
   9. Bo,bp = 1.04567; Bw= 1.012298811
   10. reservoir.Dref=7474.45; reservoir.Pref=4500
   11. Update wells (similar to project #1; you may want to copy and paste). Note: wells 3-6 start out as constant BHP wells.
3. Initialize the reservoir (pressure and saturation) and create a contour or surface plot of the pressures and saturations. You may not need to make any changes to your code, but recall you did this initialization on HW #1 so you can copy/paste parts of the code if necessary and use it for verification. When making the plots, be sure to change your pressures to NaN where permeability is zero (i.e outside the boundaries)
4. Run your code for the first 100 days. Make sure that the code runs in a reasonable time (< 2 minutes) and make plots of
   1. Pressure and saturation in a contour type plot
   2. Rates, BHP, and water cut for all wells.

Hint: I got an error during upwinding because some of the pressures/potentials were NaN (out of boundaries). The actual value for rel perm, viscosity, and FVF don’t matter outside the boundary so you can just make something up to avoid the error

1. Adapt your code to include the changing of the well constraints (you did this in project #1) and run for 1000 days
2. Include the horizontal wells as you did in project #1. Make all the required plots for the project.
3. Optional: there is a written tutorial on how to do this problem in CMG. If you are ambitious and/or you want to check your results against the solution, follow the tutorial and compare your answers (they may not be exact buts should be close).