PGE 392K In Class Problem

Dec 1, 2020

1. When you have completed the assignment from Nov 24 and verified the solution against the first timestep, copy all of your files from Nov 24 into a new folder for Dec 1
2. Adapt your capillary pressure function file to compute capillary pressure using the scanning curve and also calculate the derivative of capillary pressure using the scanning curve. You will need to keep track of the saturation in each grid block where saturation switches from drainage to imbibition (Sw\_hyst)





Sw(hyst) = Sw when reversal occurred (Sw ↓ to Sw ↑)

Sw(max) = maximum attainable water saturation = 1-Soirw

epspc: dimensionless real number which determines the transition between the imbibition and drainage curves for oil-water capillary pressure (take epspc=1e-5)

1. Make sure your “Q vectors” are correct. Important:
   1. Qw and Qo should only include constant rate wells and not BHP wells
   2. The Sw equation should include production/injection of water from BHP wells by adding a term, Jw\*(Pwf-Pi)
   3. The Q vector should be defined as:



1. Run your simulation and check the solution for pressure and saturation against early and late times. If your early solution matches well but at later times is very wrong – and even nonsensical – the problem may be in your relative permeability calculation or wells (or both).
2. Optimize your code for speed (you don’t want your main project to take too long). My code for this 9 block example took about 30 seconds for 50000 time steps (500 days at 0.01 days). Originally it took 3 minutes and I found that trying to save the pressure and saturation at every time step was slowing it down. Now the main bottleneck is having to call “Thalf” thousands of times. I am sure I could increase the speed further, maybe by vectorizing it.
3. Once you have successfully matched the 3x3 example problem, copy and paste your folder to a new folder “Final Project”. Change the input file to all the properties in the final project including the new text files for permeability, porosity, and depth. Prior to class on Dec 3, at least have your reservoir initialized (pressure and saturation) and create a contour or surface plot of the pressures and saturations. Hint: you did this on HW #1 so you can copy/paste code.