Midterm Project

Part 2 (50 points)

Description:

The problem requires you to run a 2-D water flooding case in a 2-phase oil and water reservoir using Eclipse and CMG. The reservoir can be considered as a 100*100*3-grid system. The size of each grid block is 30ft*30ft with a constant thickness of 30 ft in in all three layers. There are one injector (I1) and four producers (P1 to P4) deployed a five-spot pattern in the reservoir.

The depth of the top layer is 7000 ft. Porosity is 0.17 for all grid blocks. Permeability are 150 md, 100 md and 50 md for both x and y direction in the upper, middle and lower layer. Assume permeability in z direction is very small. The initial pressure of the reservoir is 4000 psi. Suppose your wells are operated by BHP, 7000 psi for injector and 3300 psi for producers.

Initial water saturation is 0.2, irreducible water saturation is 0.2 for all grid blocks. Corey correlation of relative permeability is applied with the following properties:

$$k_{rw} = 0.8 * S^4;\ k_{ro} = (1 - S)^2$$

Wells	Locations
I1	(50,51)
P1	(17,13)
P2	(90,10)
P3	(80,65)
P4	(20,77)

1. Eclipse part (50 pts)

1) Build your data file using the given properties. You can assume reasonable numbers if some properties you think are necessary but not given. Your data file must be error free.
2) Plot Cumulative oil production vs time, oil and water production rate vs time for producers
3) Determine water breakthrough time in days, and cumulative oil production in bbls for each producer.
4) Suppose you want to control the injector and producers by flow rate instead of BHP. Set injection rate to 4400 stb/day and well production liquid rate target to 1100 stb/day. Waterflood time duration is 20 years. Determine water breakthrough time by layer, and cumulative oil production in bbls for each producer. Plot Cumulative oil production vs time, oil and water production rate vs time for producers.

Requirements:

1. (5 points) Eclipse files must be error free.
2. (40 points) Write a report including your results (10 points), graphs (20 points), discussion (10 points). No more than 10 pages. Either in **Word** or **PDF**.
3. (5 points) Your graphs must be clear and readable, for example, you must have necessary chart elements including axis name, units, chart title, reasonable axis range.

4. You need to submit all your files in an organized **ZIP** file.
5. If you do bonus questions you will get extra points.

(20 pts) Bonus questions:

Use CMG to repeat 1)-4).

Due data:

11/22/2019 by 5:00 PM