

Simulation of Black Oil Model using CMG(BUILDER)

We modelled a black oil type model reservoir with the help of using CMG (compute Modelling Group Ltd) Software.

Black oil model is basically a type of model in which oil is treated as a single component with no interaction with the gas or water phases.

I used cartesian grid blocks for modeling the reservoir in such a way that the desired well must be placed in the center of the total grids selected in cartesian grid system. Grid selected as 55,55 ,1 in i,j,k grid blocks respectively. Width of grids used is 57*15 of each. Permeability is 100md and porosity used is 0.2cp and the thickness of grid top is 7250 ft.

Basic data is entered to correlate PVT data as 130 F reservoir temperature, maximum pressure as 4200psi, bubble point pressure is 1600 and stock tank oil density used 56.129lb./ft³ gas gravity as 0.8. rock compressibility 3e6 1/psi.

First graph that appear is between the solution gas oil ratio RS (ft³/bbl) vs pressure of oil and gas and bo (oil formation volume factor) vs. pressure graph between solution gas oil ratio vs.

pressure and oil formation factor shows the direct relation between Rsvs. p & BO VS p AS shown in fig 1. minimum pressure is 15 and the maximum pressure is 4200psi. While maximum bo at 4500psi is 1.56 and minimum is 1.03. Maximum solution gas oil ratio at 4200 is 1082 and minmum is 4.

Second graph appears as a result of PVT is Eg vs. Pressure as shown in Flg 2. Trend line shows the direct relation between Eg vp. Maximum Eg at pressure 4500psi is 1648.

Also the graph between viscosity of oil and gas v pressure appears fig 3. Viscosity of oil is increasing as the pressure of the reservoir depletes. At minimum pressure 15psi viscosity of oil is greater up to 10.2cp while at maximum pressure viscosity of oil is lesser 0.9cp. viscosity of gas increase as the pressure increases maximum viscosity of gas at 4500psi is 0.0345.

Also three phase diagram of saturation of fluids appears as Fig 4. where saturation of fluids lies between 0.1 to 0.7 of three fluids oil, gas and water.

Graph between relative permeability of water of saturation of water indicates as the relative permeability krw increases with the increase of water saturation relative permeability of water is approx. 0.3 hen water saturation is 0.08 while relative permeability of oil decreases

as the water saturation increases graph shows the k_{ro} almost 0 when water saturation reaches up to 0.80.

Maximum number of simulation time is about 731 day almost two year's simulation starts from 1901/1/1 to 1903/1/1.

The result parameter of this black oil type simulation is attached at last: