HW#8

Assigned: Thursday, October 22, 2009

Due: Thursday, October 29, 2009

This problem involves calculating the P/z vs G_P performance for a naturally fractured gas reservoir. The required properties are listed at the end. Please use a correlation to calculate $\frac{1}{z}\frac{\partial z}{\partial P}$. Use $\Delta t = 100 days$; run until $P/z = 1atm$.

Computational steps:

1) Calculate the properties which do not change with time (r_e, r_o, WI, etc)
2) Calculate $q_g B_g = -WI(\bar{P} - P_w)$
3) Calculate $\tau_g = \frac{q_g B_g}{\pi r_e^2 \Delta z}$
4) Calculate $\frac{\partial P_m}{\partial t}$ from $C_g = \phi_m C_{Tm} \frac{\partial P_m}{\partial t}$
5) Calculate $P_f - P_m$ from $\sigma k_m \lambda_{gm}(P_f - P_m) = \tau_g$
6) Update G_P.
7) Go back to step 2 for a new $\bar{P}$

Submit:

a) Plot of P/z vs G_P
b) Table of values of P/z vs G_P

Data:

- $P_i = 5000 psi$
- $T = 180F$
- $P_{wf} = 1000 psi$
- $k_f = 1000 md$
- $\phi_f = 10^{-4}$
- $k_m = 3\cdot 10^{-3} md$
- $\phi_m = 0.1$
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- Well spacing: 40 acre
- $r_w = 0.25 ft$
- $\Delta z = 30 ft$
- $\gamma_g = 0.6$ to air
- $s = 2$
- $L_x = L_y = 20 feet$
- $L_z = 30 feet$
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- $\mu_g = 0.02$
- $k_{rgf}^* = 1$
- $k_{rgm}^* = 0.6$
- $S_{wm} = 0.30$
- $S_{wf} = 0.05$
- $C_{\phi,m} = 3\cdot 10^{-6} psi^{-1}$
- $C_{\phi,f} = 5\cdot 10^{-6} psi^{-1}$
- $C_w = 3\cdot 10^{-6}$