1.Determine the pressure at the distance 50 m from the well if the coefficient of well performance 125 t/day·MPa, flow rate 12 t/day, radius of the well 0,1 m, depth of the well 2,1 km, liquid density at the bottomhole 900 kg/m^3, formation conductivity $2\cdot10^{-9}$ m^3/Pa·s, distance between the wellhead and dynamic level of the well 140 m, reservoir pressure 28 MPa.

$$P_{bh} = \rho g(H - h_d) = 17{,}305 MPa$$

$$K_0 = \frac{Q}{\Delta p} = \frac{2\pi kh}{\mu \ln\frac{R}{r_w}} = \frac{2\pi\varepsilon}{\ln\frac{R}{r_w}}$$

$$Q = \frac{2\pi kh\Delta p}{\mu \ln\frac{R}{r_w}}$$

$$\varepsilon = \frac{kh}{\mu}$$

$$\ln\frac{R}{r_w} = \frac{2\pi\varepsilon}{K_0}$$

$$P_r = P_{res} - \frac{P_{res} - P_{bh}}{\ln\frac{R}{r_w}} \ln\frac{r}{r_w} = P_{res} - \frac{K_0(P_{res} - P_{bh})}{2\pi\varepsilon} \ln\frac{r}{r_w} = 19{,}49 MPa.$$

2.Determine the pressure at the distance 50 m from the well if the coefficient of well performance 125 t/day·MPa, flow rate 12 t/day, radius of the well 0,1 m, depth of the well 2,1 km, liquid density at the bottomhole 900 kg/m^3, formation conductivity $2\cdot10^{-9}$ m^3/Pa·s, distance between the wellhead and dynamic level of the well 140 m, reservoir pressure 28 MPa.

Data:

r=50 m

K_o=125 t/day·MPa

Q=12 t/day

r_w=0,1m

H=2,1km

ρ=900 kg/m^3

ε=$2\cdot10^{-9}$ m^3/Pa·s

h_d=140 m

P_{res}=28 MPa

$$P_r = P_{res} - \frac{P_{res} - P_{bh}}{\ln\frac{R}{r_w}} \ln\frac{r}{r_w}$$

$$P_{bh} = \rho g(H - h_d) = 17{,}305 MPa$$

$$K_0 = \frac{Q}{\Delta p} = \frac{2\pi kh}{\mu \ln \frac{R}{r_w}} = \frac{2\pi\varepsilon}{\ln \frac{R}{r_w}}$$

$$Q = \frac{2\pi kh\Delta p}{\mu \ln \frac{R}{r_w}}$$

$$\varepsilon = \frac{kh}{\mu}$$

$$\ln \frac{R}{r_w} = \frac{2\pi\varepsilon}{K_0}$$

$$P_r = P_{res} - \frac{P_{res} - P_{bh}}{\ln \frac{R}{r_w}} \ln \frac{r}{r_w} = P_{res} - \frac{K_0 \left(P_{res} - P_{bh}\right)}{2\pi\varepsilon} \ln \frac{r}{r_w} = 19{,}49 MPa.$$

K_o=125 t/day·MPa

$$K_o = \frac{125 \cdot 1000}{86400 \cdot 10^6 \cdot 900} \frac{m^3}{s \cdot Pa}$$

$$P_r = P_{res} - \frac{K_0 \left(P_{res} - P_{bh}\right)}{2\pi\varepsilon} \ln \frac{r}{r_w} = 19{,}49 MPa.$$