


HOMEWORK #4

PETE-324

I. Lee, Eq. 1.21

$$J = \frac{q}{P - P_{wf}} = \frac{0.00708 kh}{B\mu \left[\frac{1}{2} \ln \left(\frac{10.06 A}{C_A r_w^2} \right) - \frac{3}{4} + S \right]}$$

for  from Lee, Table 1.2 :

$$C_A = 4.5132$$

$$J = \frac{0.00708 * (5.7 \text{ md}) * (130 \text{ ft})}{1.05 \text{ RB/stB} * 1.5 \text{ cp} * \left[\frac{1}{2} \ln \left(\frac{10.06 * 3.49 * 10^6 \text{ ft}^2}{4.5132 * (0.25)^2} \right) - \frac{3}{4} + 5.1 \right]}$$

$$J = 0.2437 \frac{\text{stb/day}}{\text{psi}}$$

II. • Maximum time for infinite acting

Lee, Table 1.2 : $t_{0A} < 0.025$

$$t < \frac{\phi \mu C_t A t_{0A}}{0.000264 k}$$

$$t < \frac{(0.19)(1.5 \text{ cp})(19 \times 10^{-6} \text{ psi}^{-1})(3.49 \times 10^6 \text{ ft}^2)(0.025)}{0.000264 (5.7 \text{ md})}$$

$$t < 313.97 \text{ hours} \Rightarrow 314 \text{ hours} = 13.08 \text{ days}$$

• Time required for PSS, (accuracy within 1%)

$$t_{0A} > 0.30$$

$$t > \frac{\phi \mu C_t A t_{0A}}{0.000264 k}$$

$$t > 12558.712(t_{0A})$$

$$t > 3767.61 \text{ hours} = 156.98 \text{ days}$$

•> Time required for pss (exact)

$$t_{DA} > 0.6$$

$$t > \frac{\phi \mu C_t A}{0.000264 k} t_{DA}$$

$$t > 12558.712 (t_{DA})$$

$$t > 7535.23 \text{ hours} = 313.97 \text{ days}$$

III. Equations for transient (SLSL) and pss curves

a. Transient (SLSL) :

$$P_i - P_{wf}(t) = -70.6 \frac{qB\mu}{kh} \left[\ln \left(\frac{1688 \phi \mu C_t r_w^2}{k t} \right) - 2s \right]$$

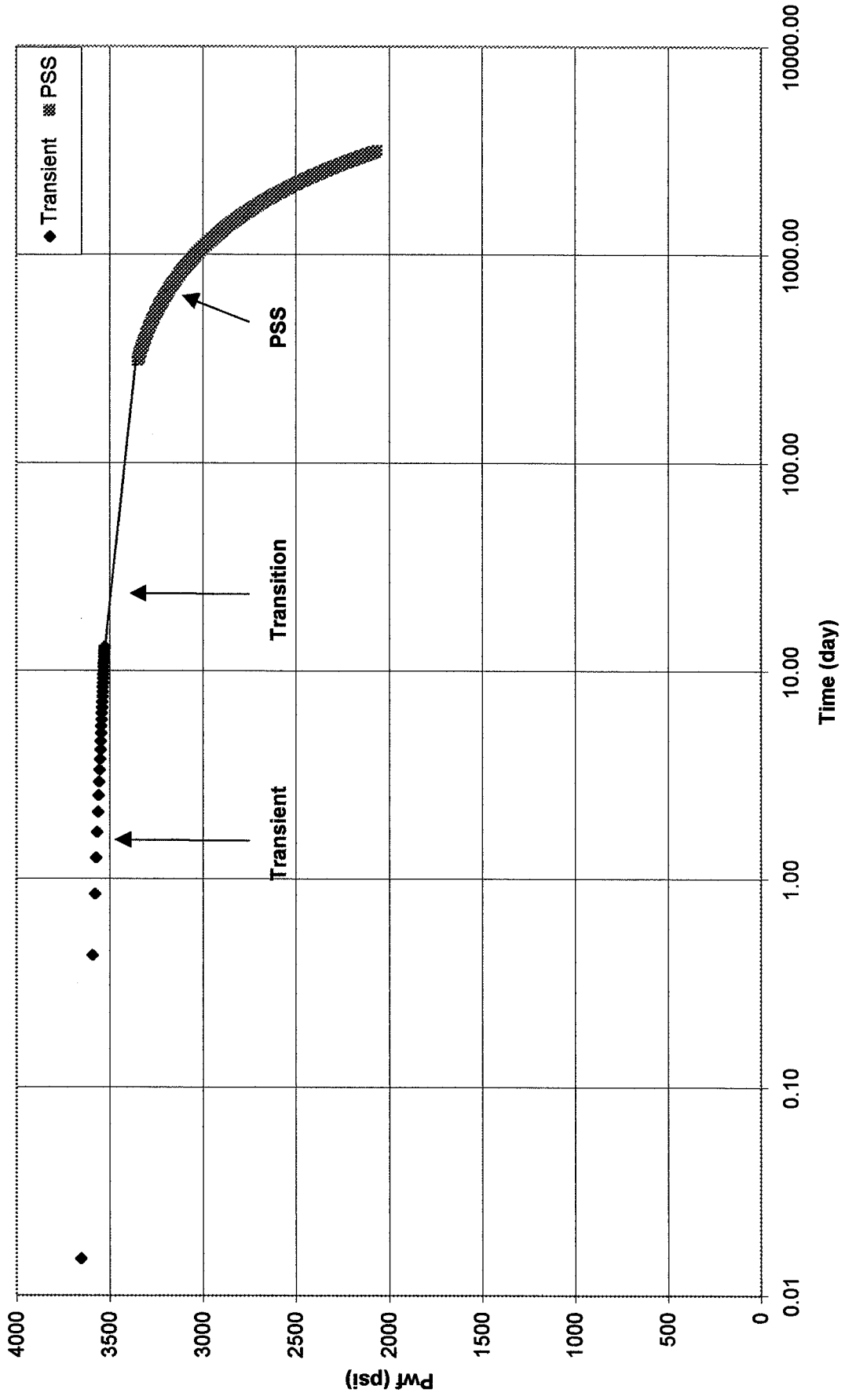
b. pss

$$\bar{P} - P_{wf} = 141.2 \frac{qB\mu}{kh} \left[\frac{11}{2} \ln \left(\frac{10.06 A}{C_A r_w^2} \right) - \frac{3}{4} + s \right]$$

$$\bar{P} = P_i - 5.615 \frac{qB}{V_p C_t} t$$

$$P_{wf} = \left(P_i - 5.615 \frac{qB}{V_p C_t} t(\text{days}) \right) - \left(141.2 \frac{qB\mu}{kh} \left[\frac{11}{2} \ln \left(\frac{10.06 A}{C_A r_w^2} \right) - \frac{3}{4} + s \right] \right)$$

Transient and PSS solutions (Semi log Plot)



Transient and PSS Solutions, (Cartesian Plot)

