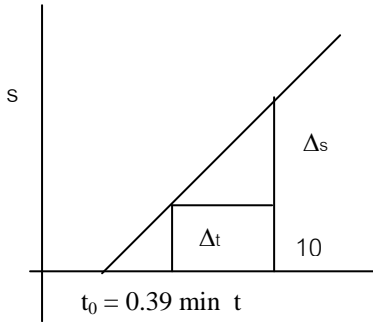


### 4.4.3 Copper – Jacob Method of Solution

when r: small  
 t: large  
 u: small  
 $< 0.01$



$$r = \frac{Q}{4\pi T} \left( -0.57 + 2 - \ln \frac{r^2 S}{4Tt} \right)$$

$$r = \frac{2.30Q}{4\pi T} \log \frac{2.25Tt}{r^2 S}$$

$$r = 0, t = t_0 \quad 0 = \frac{2.30Q}{4\pi T} \log \frac{2.25Tt_0}{r^2 S}$$

$$\frac{2.25Tt_0}{r^2 S} = 1$$

$$S = \frac{2.25Tt_0}{r^2} \dots\dots\dots *$$

$$\log \frac{t}{t_0} = \log(t_0) = 1$$

$$s - s_0 = \frac{2.30Q}{4\pi T} \left[ \log \frac{2.25Tt}{r^2 s} / \frac{2.25Tt_0}{r^2 s_0} \right]$$

$$rs = \frac{2.30Q}{4\pi T}$$

$$T = \frac{2.30Q}{4\pi \Delta s} \dots\dots\dots *$$

Sample 4.4.3