معادلات مادة هيدروليكا الآبار والمضخات (٤٣٧ هزر)

صفر ١٤٢٨ هـ

$Q = \frac{\pi k \left(h_e^{\,2} - h_w^{\,2}\right)}{\ln \frac{r_e}{r_w}}$	$Q_R = \frac{\pi k}{\ln \frac{r_e}{r_w}} \left[\left(h_e^{\,2} - h_w^{\,2}\right) + \frac{R}{2k} (r_e^{\,2} - r_w^{\,2}) \right]$
$Q = \frac{2 \pi k D \left(h_e - h_w\right)}{\ln \frac{r_e}{r_w}}$ $T = K D$	$Q_p = \left[\frac{\pi k \left(h_s^{\,2} - h_w^{\,2}\right)}{\ln \frac{r_e}{r_w}} \right] \times \left[1 + 7 \sqrt{\frac{r_w}{2h_s}} . \cos \frac{\pi h_s}{2h_e} \right]$
$Q_s = 2 \pi k r_w \left(h_e - h_w\right)$ $Q_{max} \rightarrow h_w = 0 \qquad \Delta Q\% = \frac{Q_{Basic} - Q}{Q_{Basic}} \times 100$ $Q_{max} \rightarrow h_w = D$	$Q_p = \left[\frac{2 \pi k h_s \left(h_e - h_w\right)}{\ln \frac{r_e}{r_w}} \right] \times \left[1 + 7 \sqrt{\frac{r_w}{2h_s}} . \cos \frac{\pi h_s}{2D} \right]$
$h_{2he} - h_w = \frac{Q_p}{4 \pi k} \times \left[\frac{2}{h_s} . \ln \frac{\pi h_s}{2r_w} + \frac{0.2}{h_e} \right]$	$h_{2he} - h_w = \frac{Q_p}{2 \pi k} \times \left[\frac{1}{h_s} . \ln \frac{\pi h_s}{2r_w} + \frac{0.1}{D} + \frac{1}{D} . \ln \frac{r_e}{2D} \right]$
$h_e^{\,2} - h^2_i = \frac{Q_i}{\pi k} \ln \frac{r_{ei}}{r_i} = C_i$	$h_i = \sqrt{h_e^{\,2} - C_i} \qquad Z_i = h_e - h_i$
$Q_1 = Q_2 = \frac{2 \pi k D \left(h_e - h_w\right)}{\ln \left(\frac{r_e^{\,2}}{r_w . B} \right)}$	$Q_1 = Q_2 = Q_3 = \frac{2 \pi k D \left(h_e - h_w\right)}{\ln \left(\frac{r_e^{\,3}}{r_w . B^2} \right)}$
$Q_1 = Q_2 = \frac{\pi k \left(h_e^{\,2} - h_w^{\,2}\right)}{\ln \left(\frac{r_e^{\,2}}{r_w . B} \right)}$	$Q_1 = Q_2 = Q_3 = \frac{\pi k \left(h_e^{\,2} - h_w^{\,2}\right)}{\ln \left(\frac{r_e^{\,3}}{r_w . B^2} \right)}$
$Z_t = z_1 + z_2 + z_3 + ... Z_n$ $Z_t = \sum z_i = \sum_i^n (h_e - \sqrt{h_e^{\,2} - C_i})$ $z_i = h_e - \sqrt{h_e^{\,2} - C_i}$	$Q_1 = Q_3 = \left[\frac{2 \pi k D \left(h_e - h_w\right) \ln \left(\frac{B}{r_w} \right)}{2 \ln \left(\frac{r_e}{B} \right) \ln \left(\frac{B}{r_w} \right) + \ln \left(\frac{B}{2r_w} \right) \ln \left(\frac{r_e}{r_w} \right)} \right]$
$C_i = \frac{Q_i}{\pi k} \ln \frac{r_{ei}}{r_i}$ $Z_t = \sum z_i = \frac{1}{2 \pi k D} \sum_i^n Q_i . \ln \frac{r_{ei}}{r_i}$	$Q_2 = \left[\frac{2 \pi k D \left(h_e - h_w\right) \ln \left(\frac{B}{2r_w} \right)}{2 \ln \left(\frac{r_e}{B} \right) \ln \left(\frac{B}{r_w} \right) + \ln \left(\frac{B}{2r_w} \right) \ln \left(\frac{r_e}{r_w} \right)} \right]$
$Q_2 = \left[\frac{\pi k \left(h_e^{\,2} - h_w^{\,2}\right) \ln \left(\frac{B}{2r_w} \right)}{2 \ln \left(\frac{r_e}{B} \right) \ln \left(\frac{B}{r_w} \right) + \ln \left(\frac{B}{2r_w} \right) \ln \left(\frac{r_e}{r_w} \right)} \right]$	$Q_1 = Q_3 = \left[\frac{\pi k \left(h_e^{\,2} - h_w^{\,2}\right) \ln \left(\frac{B}{r_w} \right)}{2 \ln \left(\frac{r_e}{B} \right) \ln \left(\frac{B}{r_w} \right) + \ln \left(\frac{B}{2r_w} \right) \ln \left(\frac{r_e}{r_w} \right)} \right]$
$(No) at 1 cm^2 = \frac{1 \times P}{\frac{\pi}{4} d_{one}^{\,2}}$	$Q_s = \pi d_s L_s P (1 - C) \cdot V_s$