$$\rho_s = \frac{M_s}{V_s}; \qquad \rho_b = \frac{M_s}{V_t}; \qquad n = 1 - \frac{\rho_b}{\rho_s}; \qquad \theta = S_w \cdot n$$

$$\Delta p = \frac{2\sigma}{R}$$

$$h = \frac{2\sigma\, cos\vartheta}{\rho_w\, g\, r}$$

$$H = \frac{\phi_{p,v}}{g\rho_w} + z = h + z$$

$$\psi = |h|$$

$$Q = \frac{\pi \Delta P R^4}{8\eta L}$$

$$q = \frac{Q}{A} = K\frac{\Delta H}{L}$$

$$\boldsymbol{q} = -K\nabla H$$

$$\frac{\partial \theta}{\partial t} = -\nabla \cdot \boldsymbol{q} + \sum_i r_i$$

$$C(h)\frac{\partial h}{\partial t} = \nabla \cdot [K(h)\nabla(h+z)] + r_w$$

$$\frac{\partial \theta}{\partial t} = \nabla \cdot [D(\theta)\nabla\theta] + \frac{\partial K(\theta)}{\partial z} + r_w$$

$$\theta(\psi) = \theta_r + (\theta_s - \theta_r)[1 + (\alpha\psi)^n]^{-m}$$

$$S_e(\theta) = \frac{\theta - \theta_r}{\theta_s - \theta_r}$$

$$K(\theta) = K_s \cdot k_r(S_e) = K_s S_e^l \left[1 - (1 - S_e^{1/m})^m\right]^2$$

$$I(t) = i_f t + \frac{i_0 - i_f}{\delta}\left[1 - e^{-\delta t}\right]$$

$$i(t) = \frac{dI(t)}{dt} = i_f + \left(i_0 - i_f\right)e^{-\delta t}$$

$$I(t) = S \cdot t^{\frac{1}{2}} + A_1 \cdot t^{\frac{2}{2}} + \cdots$$

$$i(t) = \frac{1}{2} S \cdot t^{-\frac{1}{2}} + A_1$$

$$t_p = \frac{S^2}{4(P - A_1)^2}$$

$$\frac{\partial S}{\partial t} = P\ - R - D - ET$$

$$R_n = H + \lambda ET + G$$

$$\lambda ET_p = \frac{\Delta(R_n - G) + \rho_a c_p \dfrac{(e_a^* - e_a)}{r_a}}{\Delta + \gamma\left(1 + \dfrac{r_s}{r_a}\right)}$$

$$ET_{c,\ adj} = K_S \cdot K_C \cdot ET_0$$

$E = E_p$ (stage I); $E = \frac{\alpha}{2} t^{-1/2}$ (stage II)

$$\frac{\partial \theta}{\partial t} = \frac{\partial}{\partial z}\left[K_z\left(\frac{\partial h}{\partial z} + 1\right)\right] - \alpha_{rw}(h) \cdot \frac{L_r(z)}{\int_{-z_r}^{0} L_r(z) \cdot dz} \cdot T_r(t)$$