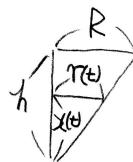


時刻  $t$  における水量を  $Q(t)$  とすると.

右図より  $\frac{h}{R} = \frac{x(t)}{r(t)}$ ,  $r(t) = \frac{R}{h} x(t) \neq 0$ .

$$Q(t) = \pi \frac{R^2}{h^2} x(t)^2 \cdot x(t) \cdot \frac{1}{3} = \frac{\pi R^2}{3h^2} x(t)^3$$



$$Q(t) - Q(t+\Delta t) = \int V(t) dt = S k x(t) dt \quad \text{--- (1)}$$

$$\frac{dQ(t)}{dt} = -S k x(t), \quad \frac{\pi R^2}{3h^2} x(t)^2 \frac{dx(t)}{dt} = -S k x(t), \quad x(t) \neq 0 \neq 0. \quad 2x(t) \frac{dx(t)}{dt} = -\frac{2S h^2 k}{\pi R^2} \quad \text{--- (1)}$$

$$\frac{dx(t)^2}{dt} = 2x(t) \frac{dx(t)}{dt} \quad \text{--- (2)}$$

$$\text{(1)(2)より} \frac{dx(t)^2}{dt} = -\frac{2S h^2 k}{\pi R^2}, \quad x(t)^2 = -\frac{2S h^2 k}{\pi R^2} t + C, \quad x(0) = h \neq 0 \quad C = h^2, \quad x(t)^2 = h^2 \left(1 - \frac{2S k}{\pi R^2} t\right)$$

$$x(t) = h \sqrt{1 - \frac{2S k}{\pi R^2} t}$$