

④ The equations will be similar to that of previous question except that flow rate will be proportional to  $\sqrt{h}$ .

$$\therefore \frac{dh_1}{dt} = \frac{F_i}{A_1} - \frac{C_{v1} \sqrt{h_1}}{A_1} + w_1 \quad \text{--- (1)}$$

$$\frac{dh_2}{dt} = \frac{C_{v1} \sqrt{h_1}}{A_1} - \frac{C_{v2} \sqrt{h_2}}{A_2} + w_2 \quad \text{--- (2)}$$

There will also be a noise term  $w_1$  and  $w_2$

& Eqs ① & ② will be supplied to the DDE block in Simulink.

also  $y = C_{v2} \sqrt{h_2}$  (flow rate)

Also, steady state values:  $h_{1,ss} = \left( \frac{F_i}{C_{v1}} \right)^2$

$$h_{2,ss} = \left( \frac{C_{v1} A_2}{C_{v2} A_1} \right)^2 h_{1,ss}$$