LIQUID LEVEL SYSTEM

$$q_0(h) = Ch^{\frac{1}{2}}$$

$$q(h) - q_0(t) = A\frac{dh}{dt}$$

$$q(h) - Ch^{\frac{1}{2}} = A\frac{dh}{dt}$$

nonlinear difference equation

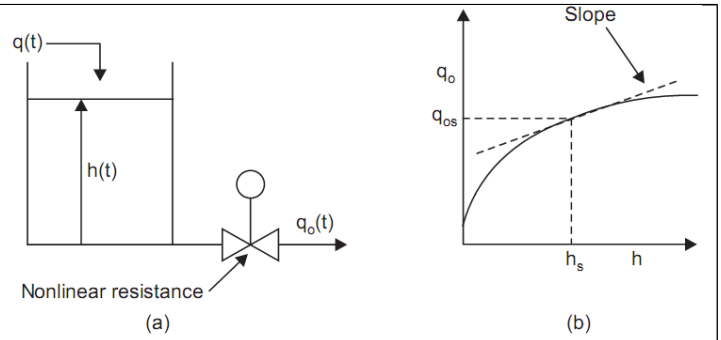

Fig A.5 Liquid-level system with non-linear resistance

$$f(x(t)) = f(a) + \left(\frac{\left.\frac{dx(t)}{dt}\right|_{t=a}}{1!}\right)(x-a)$$

$$q_o(h) = q_o(h_s) + \left(\frac{\left.\frac{d[q_o(h)]}{dt}\right|_{h=h_s}}{1!}\right)(h-h_s)$$

$$q_0(h) = q_o(h_s) + \left.\frac{d\left[Ch^{\frac{1}{2}}\right]}{dt}\right|_{h=h_s} \quad (h-h_s) = q_o(h_s) + \left(\frac{1}{2}\frac{C}{\sqrt{h_s}}\right)(h-h_s)$$

$$\boxed{q_0(h) = q_o(h_s) + \left(\frac{1}{2}\frac{C}{\sqrt{h_s}}\right)(h-h_s)}$$

$$q(h) - \left[q_o(h_s) + \left(\frac{1}{2}\frac{C}{\sqrt{h_s}}\right)(h-h_s)\right] = A\frac{dh}{dt}$$

Figure 3.1: Block diagram for the tank in Section 2.3.

Figure 3.2: Block diagram describing how the level in the tank depends on the inflow and the outflow.

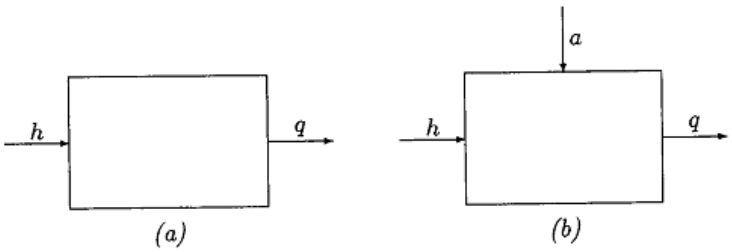

Figure 3.3: (a) Outflow as a function of the level, and (b) as a function of the level and the outflow area.

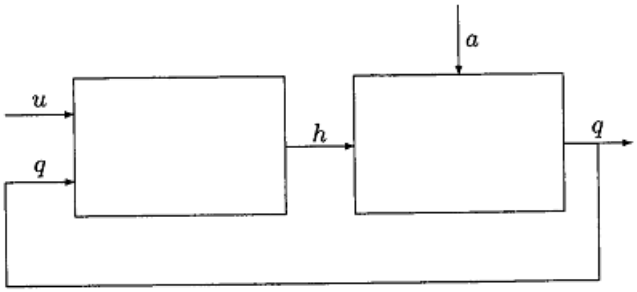

Figure 3.4: Block diagram for the tank system.