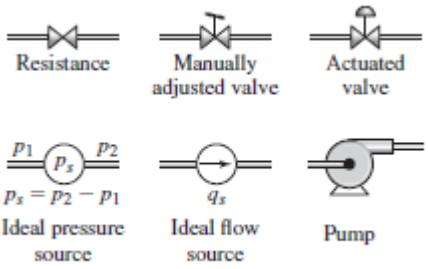
Control y Sistemas

Trabajo práctico: Modelado de sistemas hidráulicos

Referencias de símbolos



Realice los siguientes ejercicios en Simscape.

1)

EXAMPLE 7.4.3 Liquid-Level System with a Flow Source

■ **Problem**

The cylindrical tank shown in Figure 7.4.3 has a bottom area A. The total mass inflow rate from the flow source is $\hat{q}_{mi}(t)$, a given function of time. The total mass outflow rate $\hat{q}_{mo}$ is not given and must be determined. The outlet resistance R is the linearized resistance about the reference condition (h_r, q_{mir}). Develop a model of h, the deviation of the liquid height from the constant reference height h_r, where $\hat{h} = h_r + h$.

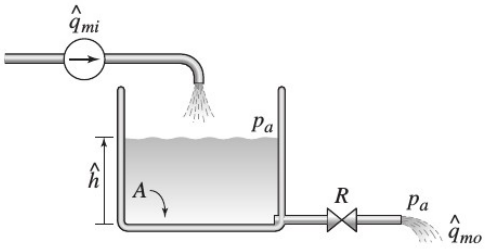
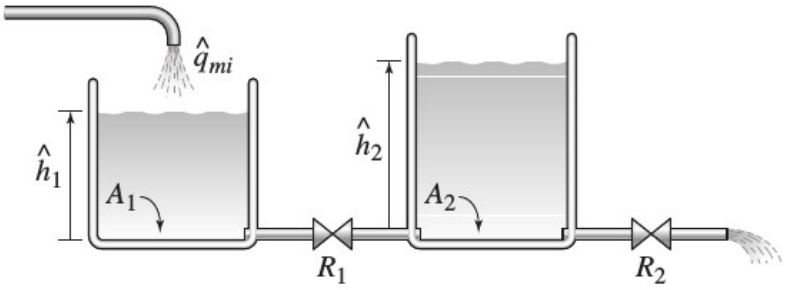


Figure 7.4.3 A liquid-level system with a flow source.

2)

7.23 (a) Develop a model of the two liquid heights in the system shown in Figure P7.23. The inflow rate $q_{mi}(t)$ is a mass flow rate. (b) Using the values $R_1 = R$, $R_2 = 3R$, $A_1 = A$, and $A_2 = 4A$, find the transfer function $H_2(s)/Q_{mi}(s)$.



3)

EXAMPLE 7.4.10 A Liquid-Level System with a Pump

■ **Problem**

Figure 7.4.12 shows a liquid-level system with a pump input and a drain whose linear resistance is R_2. The inlet from the pump to the tank has a linear resistance R_1. The resistances were linearized about the reference height $h = hr$. Obtain a linearized model of the liquid height h.

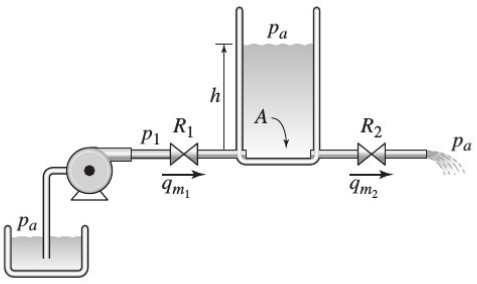


Figure 7.4.12 A liquid-level system with a pump.

4)

EXAMPLE 7.4.7 | Hydraulic Piston and Load

■ **Problem**

Figure 7.4.8 shows a double-acting piston and cylinder. The device moves the load mass m in response to the pressure sources p_1 and p_2. Assume the fluid is incompressible, the resistances are linear, and the piston mass is included in m. Derive the equation of motion for m.

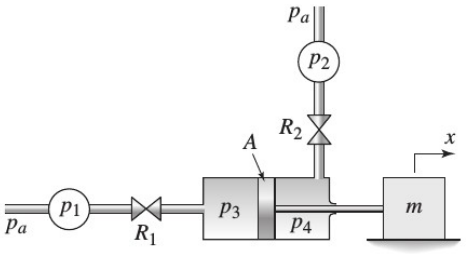


Figure 7.4.8 A double-acting piston and cylinder.