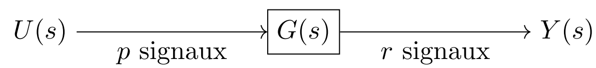
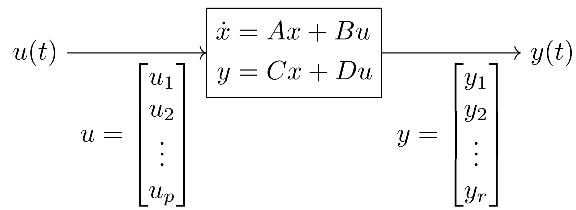
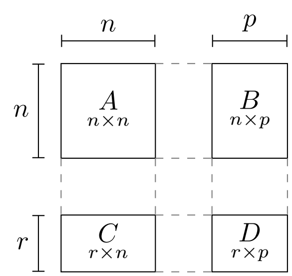
1 Espaces d'états







1.1 $A, B, C, D \longrightarrow G$

$$G(s) = C(sI - A)^{-1}B + D$$

$$G(z) = C_n(zI - A_n)^{-1}B_n + D_n$$

1.1.1 Gain haute fréquence

$$\lim_{s\to\infty} G(s) = D$$

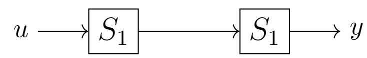
1.1.2 Gain basse fréquence

$$G(0) = -CA^{-1}B + D$$

1.2 $G(s) \longrightarrow A, B, C, D$

1.3 $G(z) \longrightarrow A, B, C, D$

1.4 Mise en cascade

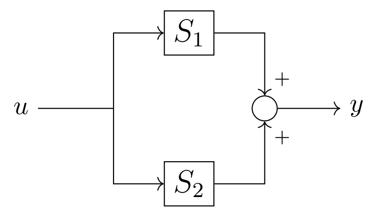


$$S_{tot} = S_2(s) \cdot S_1(s) \qquad \text{ordre important}$$

$$A_{tot} = \begin{bmatrix} A_1 & 0 \\ B_2C_1 & A_2 \end{bmatrix} \qquad B_{tot} = \begin{bmatrix} B_1 \\ B_2D_1 \end{bmatrix}$$

$$C_{tot} = \begin{bmatrix} D_2C_1 & C_2 \end{bmatrix} \qquad D_{tot} = D_2D_1$$

1.5 Mise en parallèle

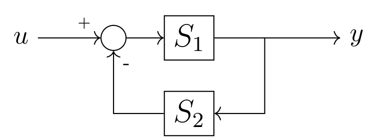


$$S_{tot}(s) = S_1(s) + S_2(s)$$

$$A_{tot} = \begin{bmatrix} A_1 & 0 \\ 0 & A_2 \end{bmatrix} \qquad B_{tot} = \begin{bmatrix} B_1 \\ B_2 \end{bmatrix}$$

$$C_{tot} = \begin{bmatrix} C_1 & C_2 \end{bmatrix} \qquad D_{tot} = D_1 + D_2$$

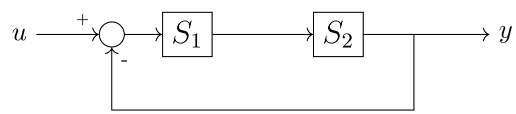
1.5.1 Mise en contre-réaction 1



$$A_{tot} = \begin{bmatrix} A_1 - B_1D_2(I - D_1D_2)^{-1}C_1 & -B_1(C_2 - D_2D_1C_2) \\ B_2(I - D_1D_2)^{-1}C_1 & A_2 - B_2(I - D_1D_2)^{-1}D_1C_2 \end{bmatrix} \qquad B_{tot} = \begin{bmatrix} B_1 - B_1D_2ND_1 \\ B_2ND_1 \end{bmatrix}$$

$$C_{tot} = \begin{bmatrix} (I - D_1D_2)^{-1}C_1 & -(I - D_1D_2)^{-1}D_1C_2 \end{bmatrix} \qquad D_{tot} = (I - D_1D_2)^{-1}D_1$$

1.5.2 Mise en contre-réaction 2



$$S_{tot}(s) = \left(I + S_1(s)S_2(s)\right)^{-1} S_1(s)$$

$$A_{tot} = \begin{bmatrix} A_1 & 0 \\ B_2C_1 & A_2 \end{bmatrix} \qquad B_{tot} = \begin{bmatrix} B_1 \\ B_2D_1 \end{bmatrix}$$

$$C_{tot} = \begin{bmatrix} D_2C_1 & C_2 \end{bmatrix} \qquad D_{tot} = D_1D_2$$