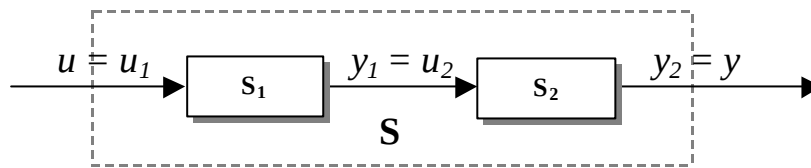


Sistemi collegati in serie (o cascata).



$$S_1: \begin{cases} \dot{x}_1 = f_1(t, x_1, u_1) \\ y_1 = h_1(t, x_1, u_1) \end{cases} \quad S_2: \begin{cases} \dot{x}_2 = f_2(t, x_2, u_2) \\ y_2 = h_2(t, x_2, u_2) \end{cases}$$

$$S: \begin{cases} \dot{x} = f(t, x, u) = (f_1(t, x_1, u), f_2(t, x_2, h_1(t, x_1, u))) \\ y = h(t, x, u) = h_2(t, x_2, h_1(t, x_1, u)) \end{cases}$$

Per i sistemi lineari si può scrivere:

$$S_1: \begin{cases} \dot{x}_1 = A_1 x_1 + B_1 u_1 \\ y_1 = C_1 x_1 + D_1 u_1 \end{cases} \quad S_2: \begin{cases} \dot{x}_2 = A_2 x_2 + B_2 u_2 \\ y_2 = C_2 x_2 + D_2 u_2 \end{cases}$$

$$S: \begin{cases} \dot{x}_1 = A_1 x_1 + B_1 u \\ \dot{x}_2 = A_2 x_2 + B_2 C_1 x_1 + B_2 D_1 u \\ y = C_2 x_2 + D_2 C_1 x_1 + D_2 D_1 u \end{cases}$$

$$\begin{cases} \dot{x} = \begin{pmatrix} \dot{x}_1 \\ \dot{x}_2 \end{pmatrix} = \begin{pmatrix} A_1 & 0 \\ B_2 C_1 & A_2 \end{pmatrix} x + \begin{pmatrix} B_1 \\ B_2 D_1 \end{pmatrix} u \\ y = (D_2 C_1 \quad C_2) x + D_2 D_1 u \end{cases}$$