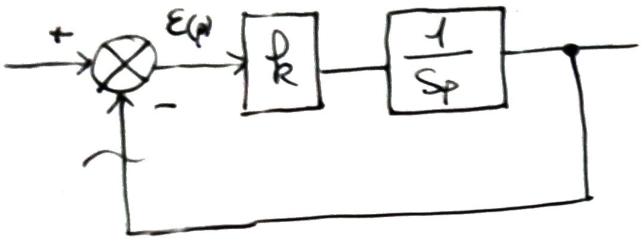
1



$$FTBO(p) = \frac{k}{S \cdot p}$$

$$FTBF(p) = \frac{Y(p)}{X(p)} = \frac{\frac{k}{S \cdot p}}{1 + \frac{k}{S \cdot p}} = \frac{k}{k + S \cdot p}$$

Si la forme canonique

$$FTBF(p) = \frac{1}{1 + \frac{S}{k} p} \Rightarrow \begin{cases} \text{Gain statique: } K = 1 \\ \text{Const de temps: } \tau = \frac{S}{k} \end{cases}$$

Réponse à une rampe

$$x(t) = a \cdot t \cdot u(t)$$

$$\downarrow \mathcal{L}$$

$$X(p) = \frac{a}{p^2}$$

d'où $Y(p) = \dfrac{a k}{p^2 (k + S \cdot p)}$

$$y(0) = \lim_{p \to \infty} p \cdot Y(p) = 0$$

$$y'(0) = \lim_{p \to \infty} p^2 \cdot Y(p) = 0$$

$$y(\infty) = \lim_{p \to 0} p \cdot Y(p) = \infty$$

th. de l'à peu près des Ingénieurs

écart { de vitesse : $\varepsilon_v = \lim_{t \to \infty} \varepsilon(t) = \lim_{p \to 0} p\,\varepsilon(p)$

{ de traînage

avec $\varepsilon(p) = X(p) - Y(p)$

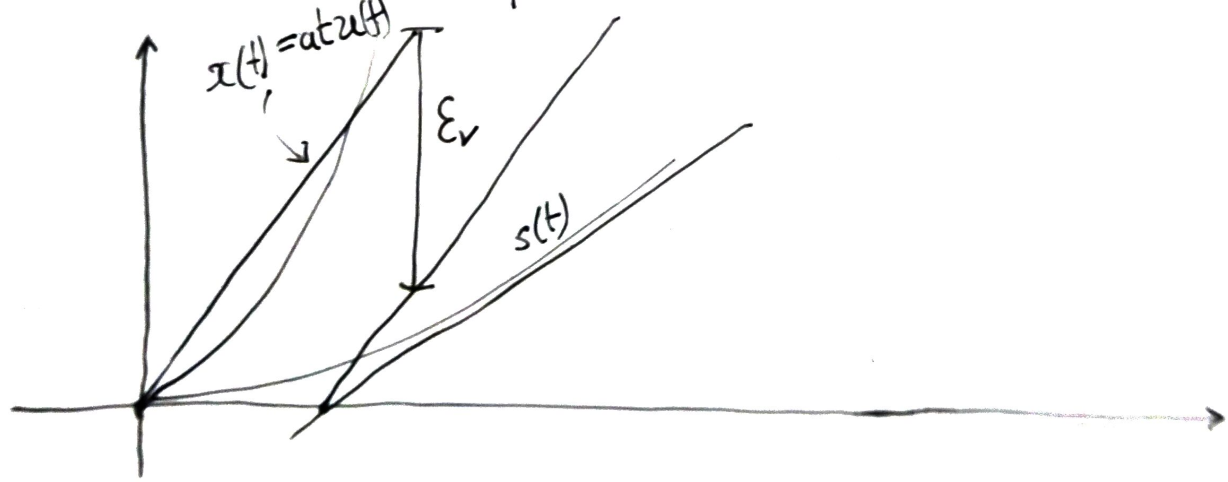
$= X(p) - FTBO(p)\,\varepsilon(p)$

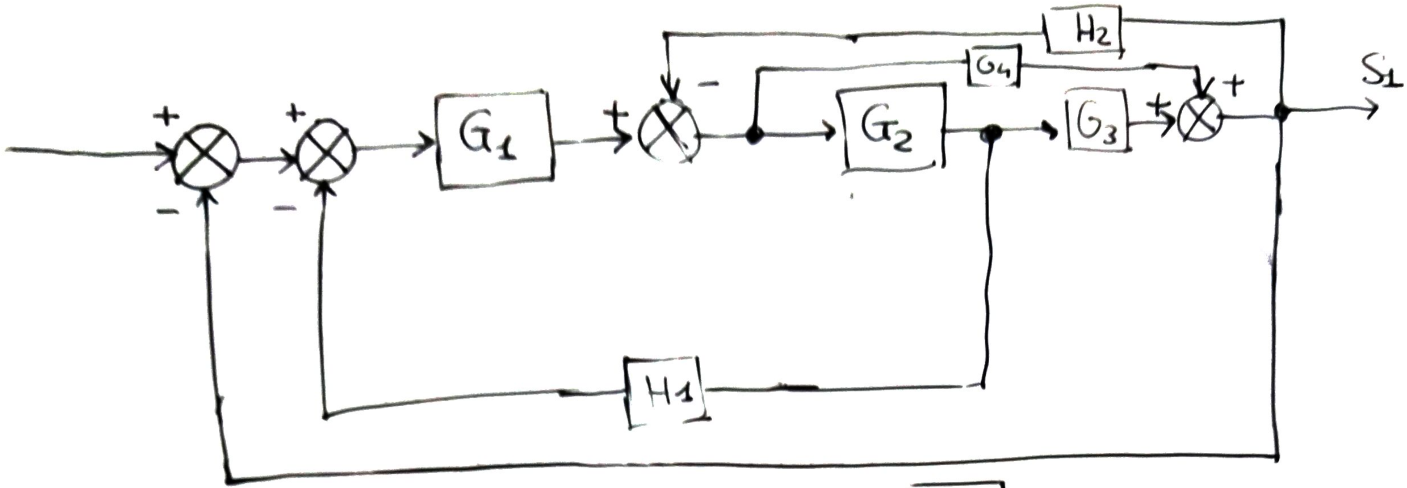
$$\Rightarrow \varepsilon(p) = \frac{X(p)}{1 + FTBO(p)}$$

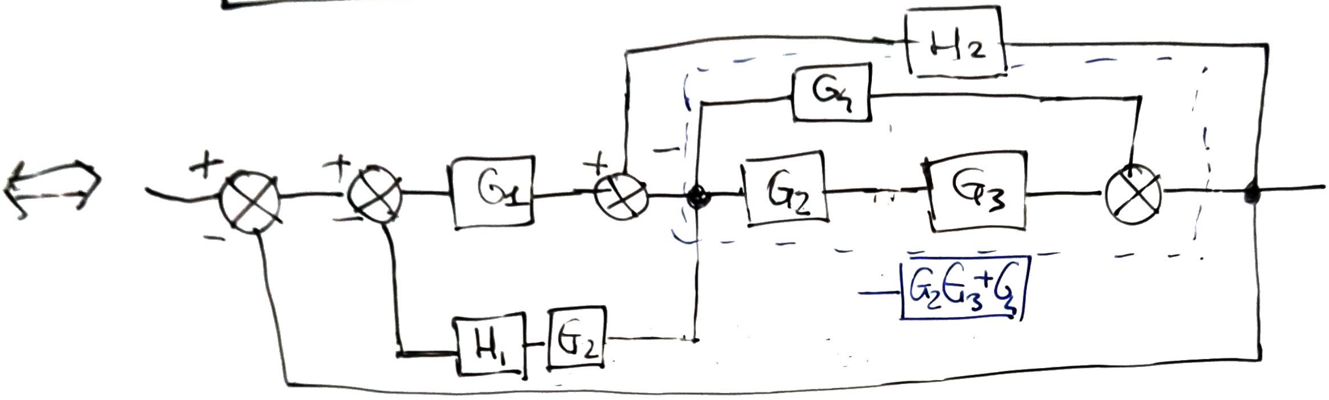
$$= \frac{a}{p^2\left(1 + \frac{k}{S \cdot p}\right)}$$

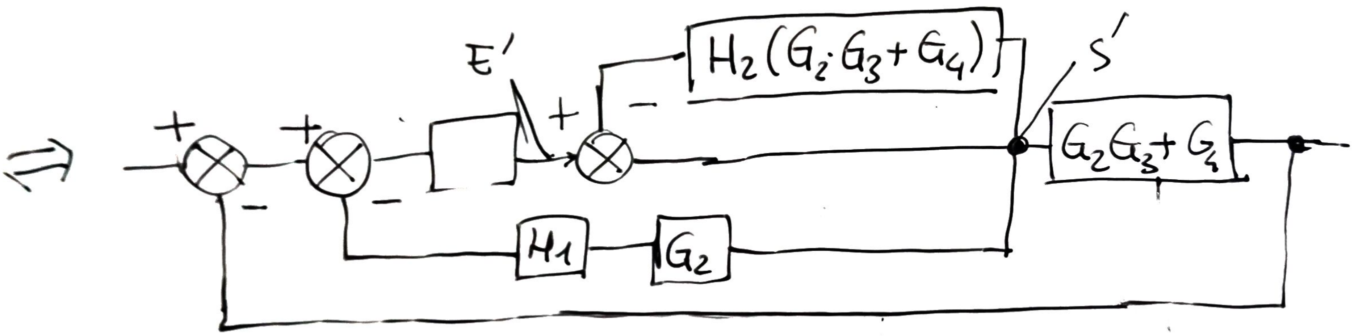
ε_v

$$\varepsilon_v = \lim_{p \to 0} \frac{a}{p\left(1 + \frac{k}{S \cdot p}\right)} = \infty$$

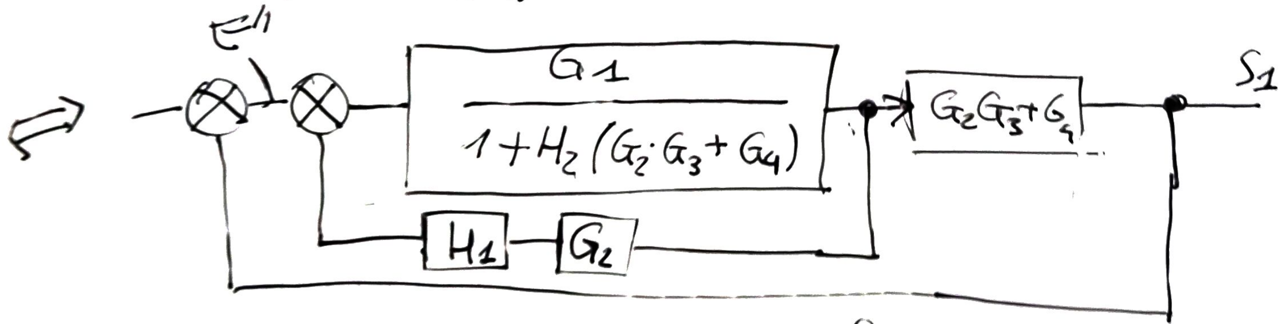






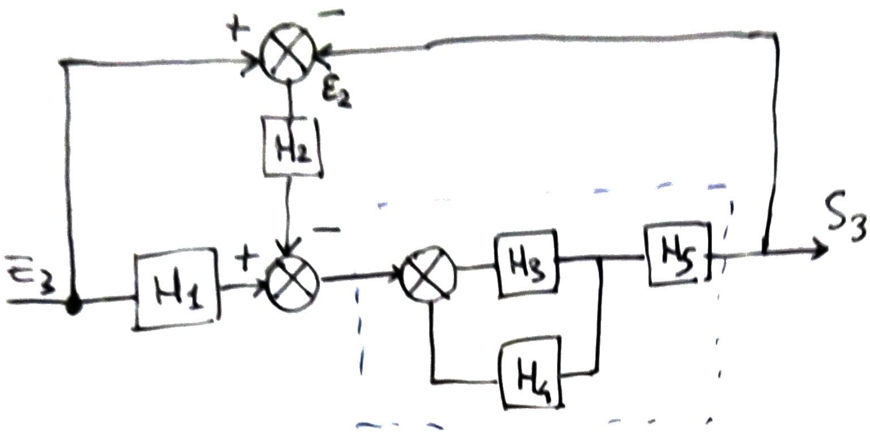


$$\frac{S'}{E'} = \frac{1}{1+H_2(G_2\cdot G_3+G_4)}$$



$$\frac{S_1}{E''} = (G_1\cdot G_2+G_3)\,\frac{G_1}{G_1\cdot H_1\cdot G_2+1+H_2(G_2G_3+G_4)}$$

$$\frac{S_1}{E_1} = \frac{G_1(G_2 \cdot G_3 + G_4)}{(G_2 \cdot G_3 + G_4)(H_2 + G_2) + 1 + H_1 G_1 G_2}$$



$$\frac{H_3 \cdot H_5}{1 + H_3 \cdot H_5}$$

$$S_3 = \frac{H_3 \cdot H_5}{1 + H_3 \cdot H_4}\left[\overbrace{H_1 \cdot E_3 - H_2\underbrace{(E_3 - S_3)}_{\varepsilon_2}}^{\varepsilon_1}\right]$$

$$\frac{S_3}{E_3} = \frac{\frac{H_3 \cdot H_5}{1 + H_3 \cdot H_4}(H_1 - H_2)}{1 - \frac{H_2 H_3 H_5}{1 + H_3 \cdot H_4}}$$

d'où $$\frac{S_3}{E_3} = \frac{H_3 \cdot H_5 (H_1 - H_2)}{1 + H_3(H_4 - H_2 \cdot H_5)}$$