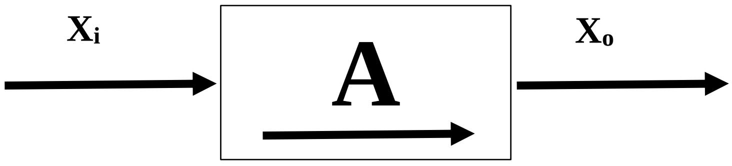
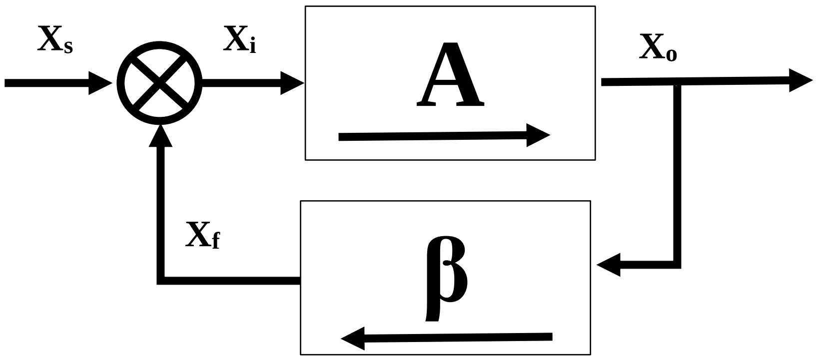
Realimentación

- Lazo abierto



$$A = \frac{X_o}{X_i}$$

- Lazo cerrado



$$X_o = AX_i$$

$$X_f = \beta X_o$$

$$X_i = X_s \pm X_f$$

Realimentación Positiva

$$X_o = AX_i$$

$$X_f = \beta X_o$$

$$X_i = X_s + X_f$$

$$\wedge X_o \uparrow \ X_f \uparrow \therefore \ X_i \uparrow$$

Entonces $X_o \uparrow\uparrow$

Realimentación Negativa

$$X_o = AX_i$$

$$X_f = \beta X_o$$

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$X_i = X_s - X_f$

$\wedge X_o \uparrow X_f \uparrow$ pero $X_i \downarrow$

Expresión fundamental de un sistema con realimentación negativa

$X_o = AX_i$

$X_O = A\,(X_s - X_f)$

$X_O = A\,(X_s - \beta X_o)$

$X_O = AX_s - \beta AX_o$

$X_o + \beta AX_o = AX_s$

$X_o\,(1 + \beta A) = AX_s$

$$\frac{X_o}{X_s} = \frac{A}{1 + A\,\beta}$$

$$A_f = \frac{X_o}{X_s}$$

$$A_f = \frac{A}{1+\beta A}$$

$D = 1 + \beta \mathrm{A}$ …………………………………………………. Diferencia de retorno

$G_l = \beta \mathrm{A}$ ……………………………………………….. Ganancia de lazo

Amplificador Altamente Realimentado

$\beta A \gg 1$

$\therefore \wedge A_f = \frac{A}{1+\beta A}$ y $\beta A \gg 1$

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$$A_f = \frac{1}{\beta}$$

<u>Desensibilización del sistema</u>

Si varía A:

$$\frac{\partial A_f}{\partial A} = \frac{1 + \beta A - \beta A}{(1 + \beta A)^2} = \frac{1}{(1 + \beta A)^2}$$

$$\partial A_f = \partial \frac{A}{A} \underbrace{\frac{A}{(1+\beta A)}}_{\boxed{A_f}} \frac{1}{(1+\beta A)}$$

$$\therefore \frac{\partial A_f}{A_f} = \frac{1}{D} \frac{\partial A}{A}$$

Si varía β :

$$\frac{\partial A_f}{\partial \beta} = \frac{-A^2}{(1 + \beta A)^2} = \underbrace{\frac{-A}{(1+\beta A)}}_{\boxed{A_f}} \frac{A}{(1+\beta A)}$$

$$\frac{\partial A_f}{A_f} = \frac{-\partial \beta \; A}{(1+\beta A)}$$

$$\wedge \, \beta A \gg 1$$

$$\frac{\partial A_f}{A_f} = \frac{-\partial \beta}{\beta}$$

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