Saturday, April 24, 2021 9:36 PM

$$\int_{-\infty}^{+\infty} x(t) e^{-j\omega t}\,dt \qquad \int_{-\infty}^{+\infty} x(t) e^{-st}\,dt \qquad s = \sigma + j\omega$$

$$\mathcal{L}\{x(t)\} = \int_{0^-}^{+\infty} x(t) e^{-st}\,dt = X(s)$$

(1) LINEARNA

(2) $\mathcal{L}\{x(t)\} = X(s)$

$\mathcal{L}\left\{\frac{d}{dt}x(t)\right\} = sX(s) - x(0^-)$ | ~~STAMPANA ZBIRKA~~ DODATAK E ~~F(0F)~~ |

$\mathcal{L}\left\{\frac{d^n}{dt^n}x(t)\right\} = s^n X(s) - \sum_{k=0}^{n-1} s^{n-k-1} x^{(k)}(0^-)$

$n=2 \quad \mathcal{L}\left\{\frac{d^2}{dt^2}x(t)\right\} = s^2X(s) - sx(0^-) - x'(0^-)$

(3) INTEGRACIJA

$$\mathcal{L}\left\{\int_{0^-}^{t} x(\alpha)\,d\alpha\right\} = \frac{1}{s}X(s)$$

(4) $\mathcal{L}\{x(t-t_0)\,u(t-t_0)\} = X(s)e^{-st_0}$

(5) KAŠNJENJE u S DOMENU

$$\mathcal{L}\{x(t)e^{-s_0 t}\} = X(s-s_0)$$

(6) $\mathcal{L}\{t^n x(t)\} = (-1)^n X^{(n)}(s)$

(7) $\mathcal{L}\left\{\frac{1}{t}x(t)\right\} = \int_s^{\infty} X(u)\,du$

(8) $\mathcal{L}\{x(at),\ a \geq 0\} = \frac{1}{a}X\left(\frac{s}{a}\right)$

(8) $\mathcal{L}\{x(at), a\geq 0\} = \frac{1}{a} X\left(\frac{s}{a}\right)$

(9) $\mathcal{L}\{x(t) * h(t)\} = X(s) \cdot Y(s)$

(10) $\mathcal{L}\{x(t) \cdot h(t)\} = \frac{1}{2\pi j} X(j\omega) * H(j\omega)$

$\mathcal{L}\{u(t)\} = \frac{1}{s}$

$\mathcal{L}\{\delta(t)\} = 1$

$\mathcal{L}\left\{\frac{t^n}{n!}u(t)\right\} = \frac{1}{s^{n+1}}$

$n \geq 1$

$\mathcal{L}\{e^{-at}u(t)\} = \frac{1}{s+a}$

$\mathcal{L}\left\{\frac{t^{n-1}}{(n-1)!}e^{-at}u(t)\right\} = \frac{1}{(s+a)^n}$

$\mathcal{L}\{\sin\omega_0 t \cdot u(t)\} = \frac{\omega_0}{s^2+\omega_0^2}$

$\mathcal{L}\{\cos\omega_0 t\, u(t)\} = \frac{s}{s^2+\omega_0^2}$

TEOREMA POČETNOG I KRAJNJEG VREDNOSTI

$x(0^+) = \lim_{s\to\infty} sX(s)$

$\lim_{t\to\infty} x(t) = \lim_{s\to 0} sX(s)$

↑ LAPLASOVA!

$x(t) = C$

$X(j\omega) = C \cdot 2\pi \cdot \delta(\omega)$

$Y(j\omega) = H(j\omega) \cdot X(j\omega) =$

$H(j\omega) \cdot C \cdot 2\pi \cdot \delta(\omega) =$

$H(0) \cdot C \cdot 2\pi\delta(\omega)$

$y(t) = H(0) \cdot C$

SVE VREME JE USTALJENI REŽIM

$h(t), H(s)$ $\quad \lim_{t\to\infty} y(t)$

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

$X(s) = C \cdot \frac{1}{s}$

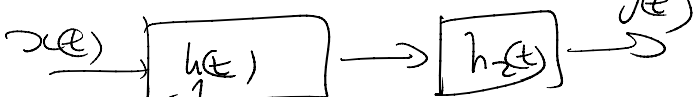
$Y(s) = C \cdot \frac{1}{s} H(s)$

$y(\infty) = \lim_{s\to 0} C \cdot \frac{s}{s} H(s) = C \cdot H(0)$

$x(t) = \sin\omega_0 t \cdot u(t)$

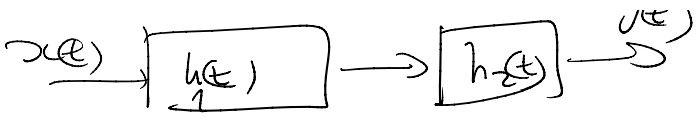
$x(t) = \sin\omega_0 t$

POVEZIVANJE SISTEMA



$s = j\omega$

$s = \sigma + j\omega$

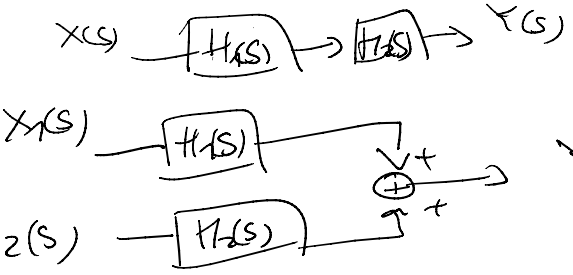


$s = j\omega$

$s = \sigma + j\omega$

$y(t) = x(t) * h_1(t) * h_2(t)$

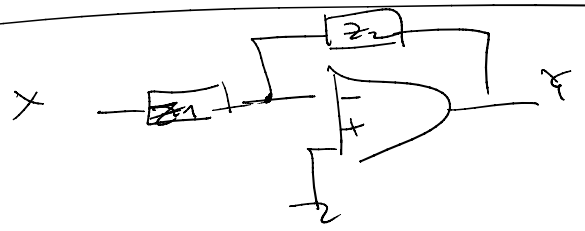
$Y(s) = X(s) \cdot H_1(s) \cdot H_2(s)$



$X_1(s) \cdot H_1(s)$

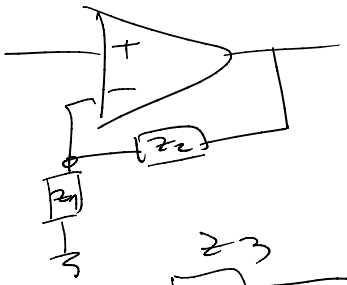
$Y(s) = X_1 H_1(s) + X_2 H_2(s)$

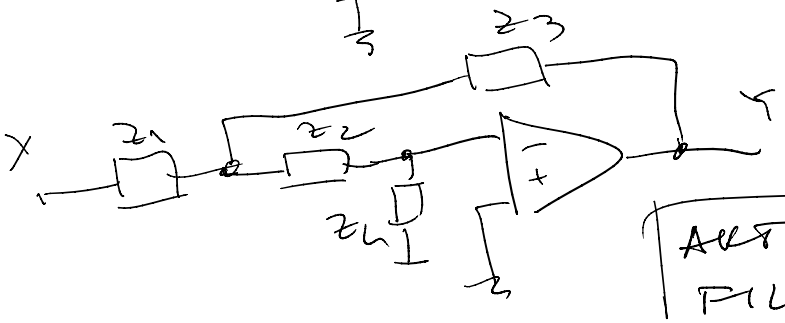
SISTEMI SA POVRATNOM SPREGOM



$$Y(s) = -\frac{Z_2(s)}{Z_1(s)} \cdot X(s)$$

$$Y = \left(1 + \frac{Z_2}{Z_1}\right) X$$



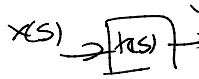


$Y(s) = H(s) \cdot X(s)$

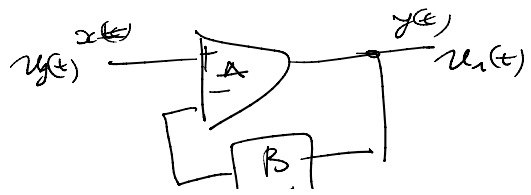
$s = j\omega$

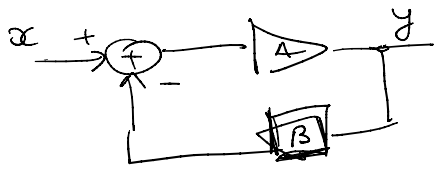
AKTIVNI FILTERI

- MEJSONOVO PRAVILO (OSNOVI AUTOMATSKOG UPRAVLJANJA)

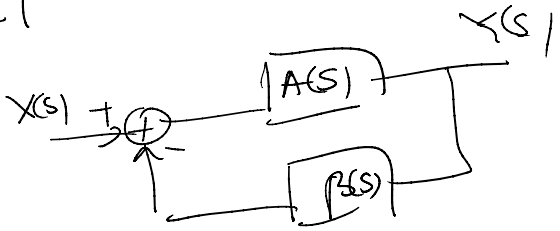


$Y(s) = H(s) \cdot X(s)$

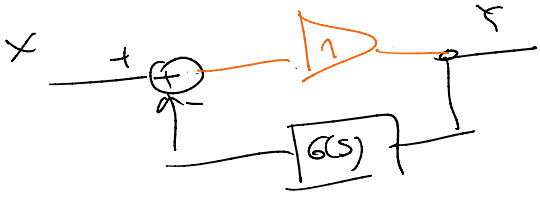




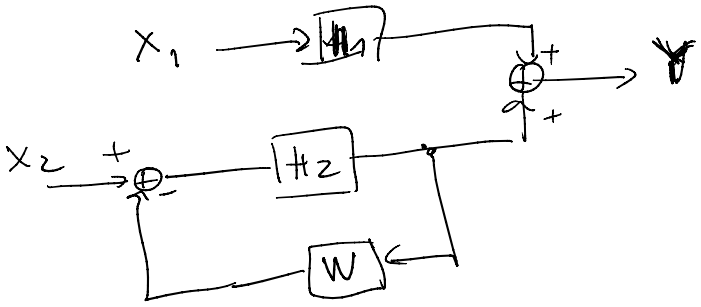
$$y = \frac{A}{1+BA}\,x$$



$$Y(s) = \frac{A(s)}{1+\beta(s)A(s)}\,X(s)$$



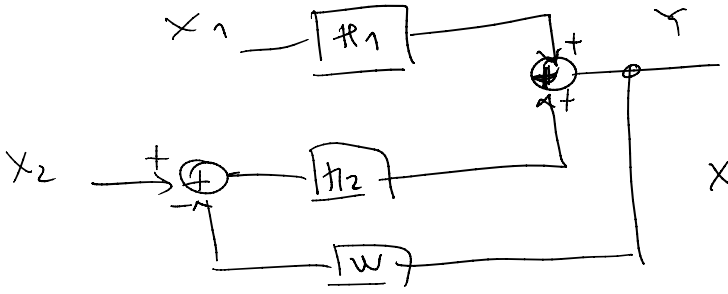
$$Y = \frac{1}{1+G(s)\cdot 1}\,X = \frac{1}{1+G(s)}\,X$$



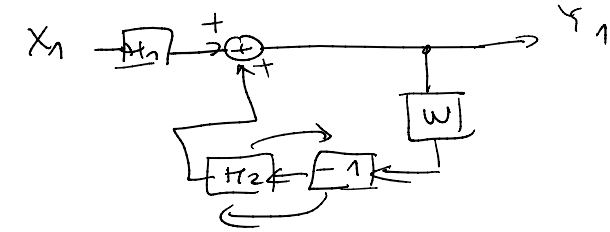
$$Y = H_1 X_1 + \frac{H_2}{1+H_2 W}\cdot X_2$$

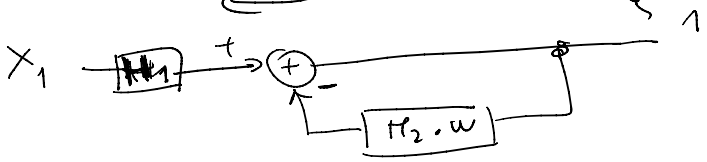
$X_1 = 0 \Rightarrow Y_2 \quad Y = Y_1 + Y_2$

$X_2 = 0 \Rightarrow Y_1$



$$Y_2 = \frac{H_2}{1+W H_2}\cdot X_2$$





$$Y = \frac{H_2 X_2}{1+W H_2} + \frac{H_1 X_1}{1+H_2 W}$$

$$Y_1 = \frac{1}{1+H_2 W}\cdot H_1 X_1$$

$$= \frac{H_1 X_1 + H_2 X_2}{1+W H_2}$$

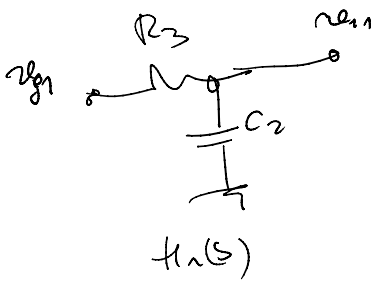
SAU

LINEARNA ELEKTRONIKA

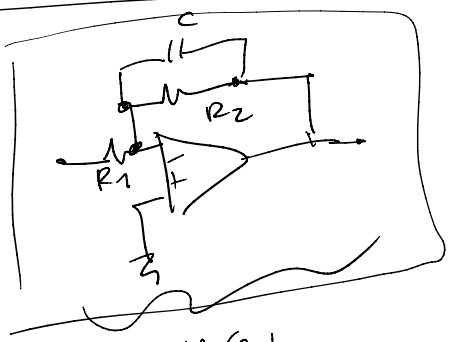
$= \frac{H_1 X_1 + H_2 \cdot L}{1 + W H_2}$

POLINOM: POLOVI SISTEMA

LINEARNA ELEKTRONIKA

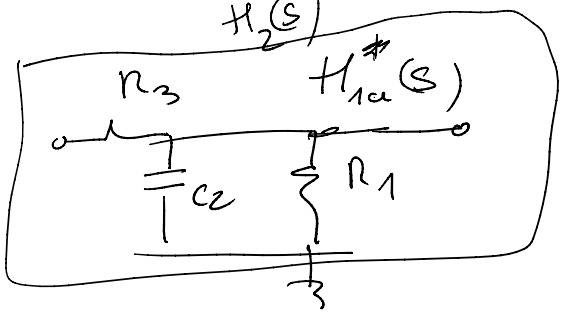


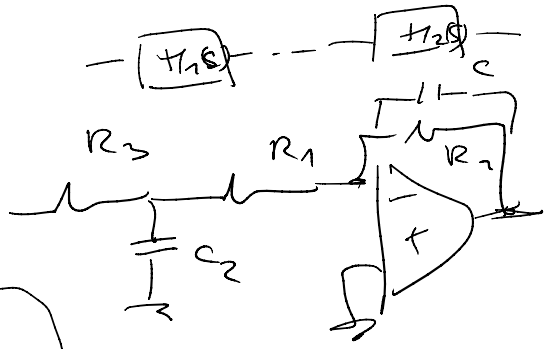
$H_1(S)$

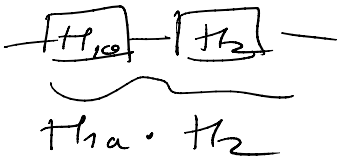


$H_2(S)$

$H_1(S) = \frac{V_{G1}(S)}{V_{I1}(S)} =$







$H_{1a} \cdot H_2$