Curso

SISTEMAS Y CONTROL

Clase 19

Fotogramas de los pizarrones de clases filmadas

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Clase 19 –

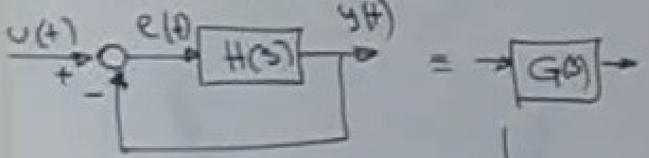
- Comportamiento asintótico, (diseño de servomecanismos) Kp, Kv, Ka

- Estabilidad (1)

Esta clase hace uso de las transparencias, “estabilidad.pdf”

ERRORES en RÉGIMEN, COMPORTAMIENTO ASINTÓTICO, DISEÑO de SERVOMECANISMOS

- Si $G(s)$ es cociente de polinomios
- $G(s)$ estable
- $u(t) = t^k$, ¿ $y(t)$? $t \to \infty$



$$G(s) = \frac{H(s)}{1+H(s)} \quad \text{si} \quad U(s) = \frac{1}{s^r} \Rightarrow E(s) = \frac{s^N}{s^N + \alpha \frac{\prod_{i=1}^{m}(s-z_i)}{\prod_{j=1}^{n-N}(s-p_j)}} \frac{1}{s^r}$$

ej:

$u(t)$	$U(s)$
Y_t	$\frac{1}{s}$
$t\,Y_t$	$\frac{1}{s^2}$
$\frac{t^2}{2!}\,Y_t$	$\frac{1}{s^3}$

si $H(s) = \alpha \frac{\prod_{i=1}^{m}(s-z_i)}{s^N \prod_{j=1}^{n-N}(s-p_j)}$

$$\boxed{E(s) = \frac{1}{1+H(s)} U(s)}$$

$sE(s)$

teo. valor final.

Si $\exists \lim_{t\to\infty} f(t) \Rightarrow \lim_{t\to\infty} f(t) = \lim_{s\to 0} sF(s)$

$$u(t) = \frac{t^{r-1}}{(r-1)!}$$

1) $\lim_{t\to\infty} e(t) \; \exists \iff N+1 \geq r$

$e_\infty = \lim_{t\to\infty} e(t)$

$$sE(s) = \frac{s}{1+H(s)} U(s) = \frac{s^{N+1}}{s^N + \alpha \frac{\prod_{i=1}^{m}(s-z_i)}{\prod_{j=1}^{n-N}(s-p_j)}} \cdot \frac{1}{s^r}$$

$U(s) \to \frac{1}{s^r}$

$$\lim_{t\to\infty} e(t) = \lim_{s\to 0} sE(s) = \lim_{s\to 0} \frac{s^{N+1}}{s^N + \alpha \frac{\prod_{i=1}^{m}(s-z_i)}{\prod_{j=1}^{n-N}(s-p_j)}} \frac{1}{s^r}$$

si $N+1<r$ $\quad e(t)\to\infty$

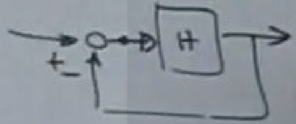
si $N+1\geq r \to \begin{cases} N+1=r \;—\; e(t)\to c_e = \dfrac{1}{\lim\limits_{s\to0} H(s)s^N} \;\; (N\neq 0) \qquad \dfrac{1}{1+H(0)} \;\; (N=0) \\ N+1>r \;—\; e(t)\to 0 \end{cases}$

$e(t)=T$

$N=r-1$

$N>r-1$

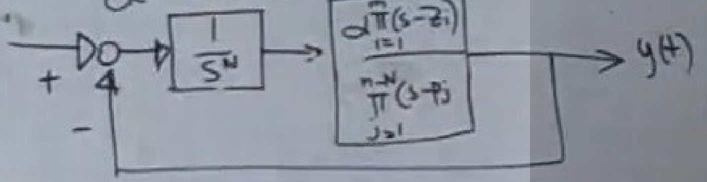
$\frac{E}{U}=\frac{1}{1+H}$



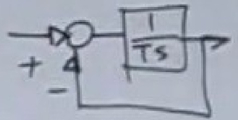
si $N=0$ $\quad k_p=\lim\limits_{s\to0} H(s)$

si $N=1$ $\quad K_v=\lim\limits_{s\to0} sH(s)$

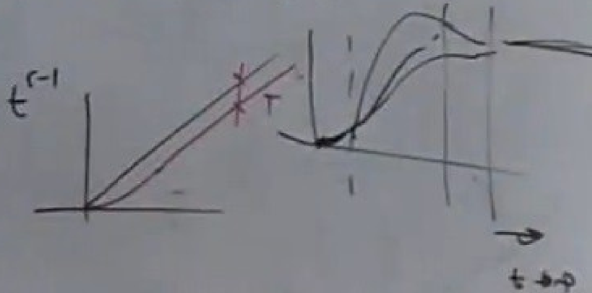
si $N=2$ $\quad K_a=\lim\limits_{s\to0} s^2H(s)$



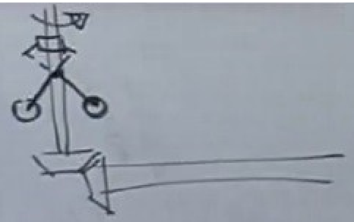
$G(s)=\frac{1}{Ts+1}=$

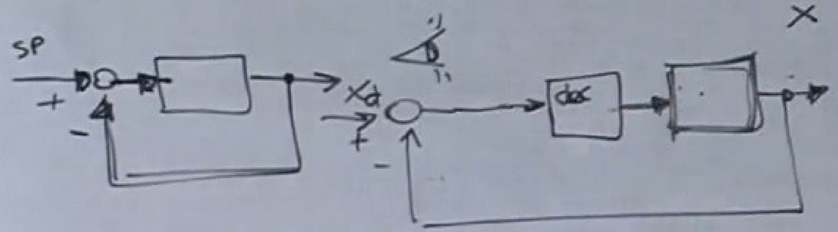


$K_v=\frac{1}{T}$

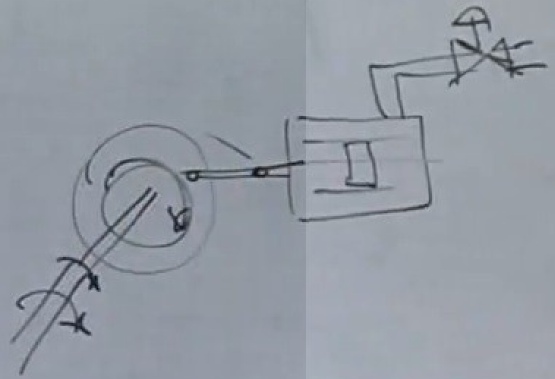


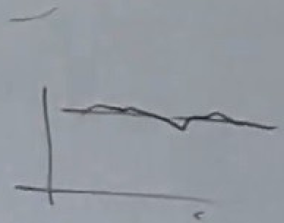
Tipo N \ $u(t)$	$\frac{1}{s}$ $r=1$ Y_t	$\frac{1}{s^2}$ $r=2$ tY_t	$\frac{1}{s^3}$ $r=3$ $\frac{t^2}{2!}Y_t$	$\frac{1}{s^4}$ $r=4$ $\frac{t^3}{3!}Y_t$	
0	$\boxed{\frac{1}{1+K_p}}$	∞	∞	∞	∞
1	0	$\boxed{\frac{1}{K_v}=T}$	∞	∞	∞
2	0	0	$\boxed{\frac{1}{K_a}}$	∞	∞
3	0	0	0	$\boxed{\ddots}$	∞

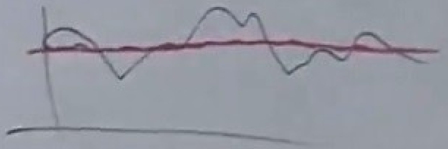




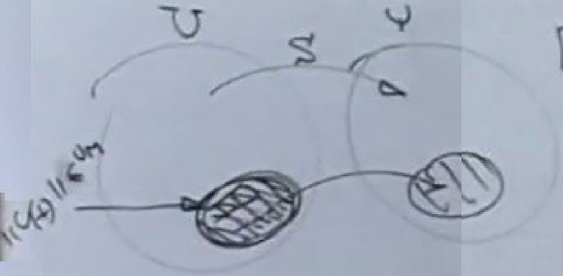
SP
+
-
Xd
-
dsc
X







sea S : U, Y, S



$u_{[t_c,\infty)}: [t_c,\infty) \to \mathcal{C}_u$ con $\mathcal{C}_u, \mathcal{C}_y$ esp vect. normados def. sobre el c.e. $\mathbb{R}$

$[t_c,\infty) \subset T$

$y_{[t_c,\infty)}: [t_c,\infty) \to \mathcal{C}_y$

$y(t) = sg(u(t))$

PROPOSICIÓN: Si S es lineal (1) $\Rightarrow$ (2)