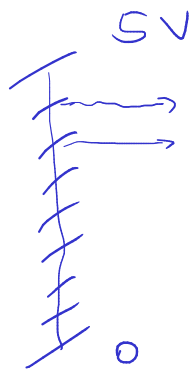


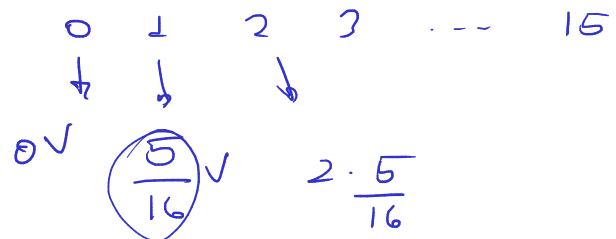
tempo continuo. { analógico
eq. dif. ord.
func. transf. Laplace
amplitude continua

$$U(s) = C(s) E(s) \quad C(s) = K_p + \frac{K_i}{s} + K_D s$$

Digital:



4 bits $\rightarrow 2^4$ níveis.



No programa:

input = Analog Read(A0)

Arduino $\rightarrow 10$ bits $\rightarrow 2^{10} = 1024$ níveis.



1024

0 ~ 1023

\rightarrow

0 \rightarrow 0V

1023 \rightarrow 5V

1 $\rightarrow \frac{5}{1024} \approx 5\text{mV}$

clock! discretização do tempo.

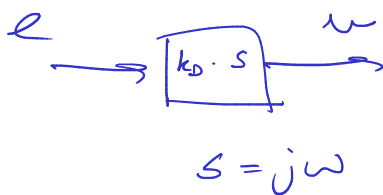
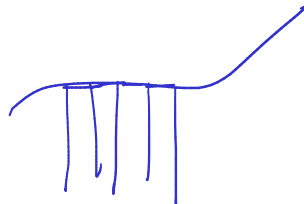


1ms. = período de amostragem.

$$e_c \leftarrow + = e \cdot \Delta t$$

$$e_c = e_c + \overset{0,5}{e \cdot \Delta t}$$

e_c	0	0,5	1	1,5	---
n	1	2	3	4	5 6 ---



$$u(\omega) = E(\omega) \cdot j\omega$$

$$|u(\omega)| = |E(\omega)| \cdot \omega \uparrow$$



$$\rightarrow \frac{k_D j\omega}{j\omega T + 1}$$

