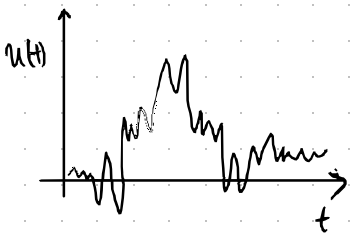
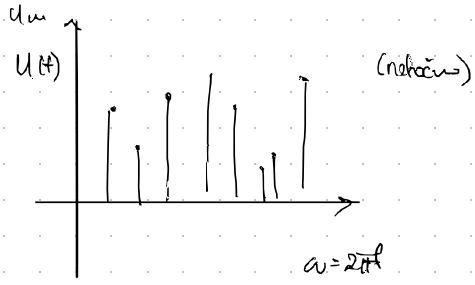
Uvod u elektroniku

Prikaz el. signala:

Vremenska domena:

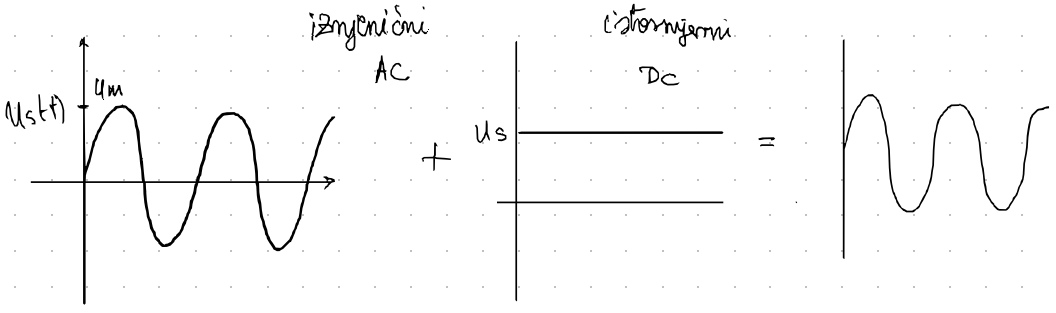


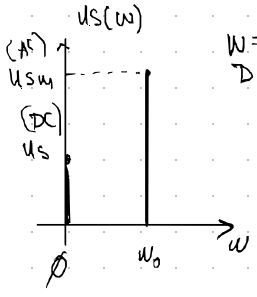
Furierova transf.



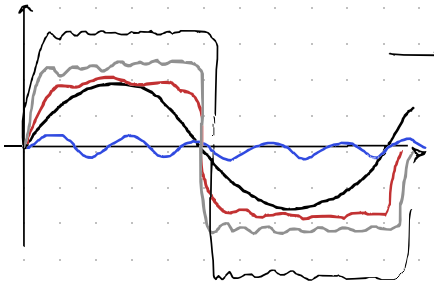
$$\sum_k A_k \sin(\omega_k t \pm \varphi_k)$$

Sinusni signal





Kako dobiti pravokutni signal? → beskonačna suma signala:

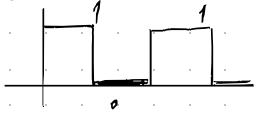


→ zbrajanjem sve viših harmonika dobivamo sve približniji pravokutni signal

Abrahamni zapis analognog signala

↳ niska razina = 0

visoka razina = 1

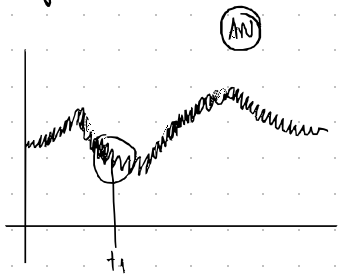


Čime se bavi el.?

Što je signal?

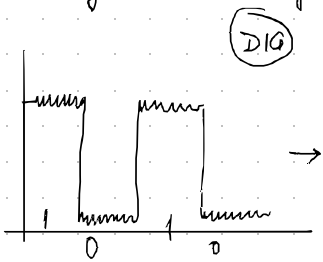
→ digitalni sustavi su otporniji na šum => 0 ili 1, nema između

Primjer:



tranz – pojačalo

Signal male amplitude



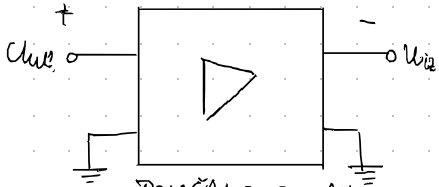
→ lakše ignoriramo šum

tranz – sklopka

Frekvencijska karakteristika pojačalo pojačava ulazni signal

naponsko (U) pojačanje

$U_{iz} = A_V \cdot U_{ul}$



U_{ul}, U_{iz} = sinusni signali

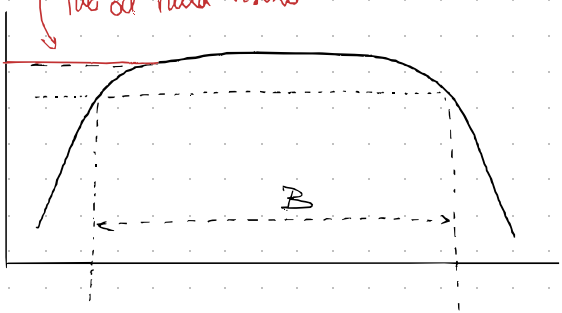
- VALNI OBLIK FREKV. } LINEARNI REŽIM
→ ISTE!

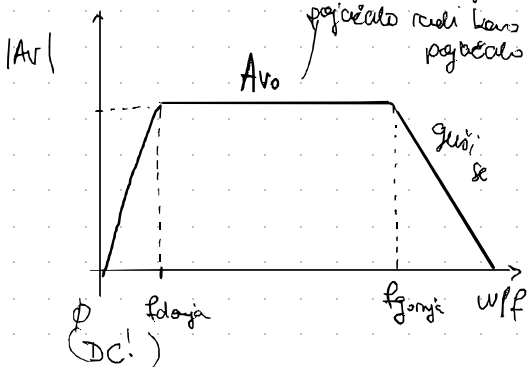
sačuvam je valni oblik

$$A_V = \frac{U_{iz} \cdot \cancel{sin(\omega t)}}{U_{ulaz} \cdot \cancel{sin(\omega t)}}$$

DC pojačala pojačavaju OBA signala (i AC, i DC)

ide od nula visoko

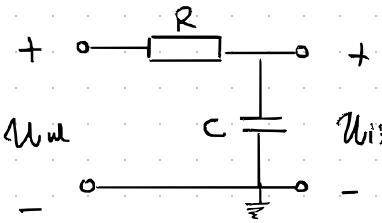




Frekvencijska karakteristika RC mreža

RC mreže

$Z_C = \frac{1}{j\omega C}$ $\quad C \to 0 \Rightarrow$ uzemljenje

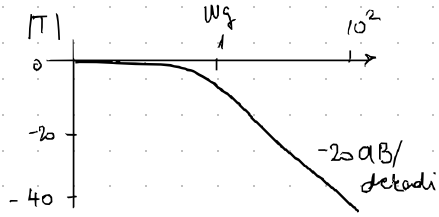


– niskopropusni filtar – guši signal

$T = \frac{U_{iz}}{U_{ul}} = \frac{\frac{1}{j\omega C}}{R + \frac{1}{j\omega C}} = \frac{1}{1 + j\omega RC}$

Želimo da krug što manje (nula) da bi granični f bila što veća

$T = \frac{1}{1 + \omega/\omega_1}$

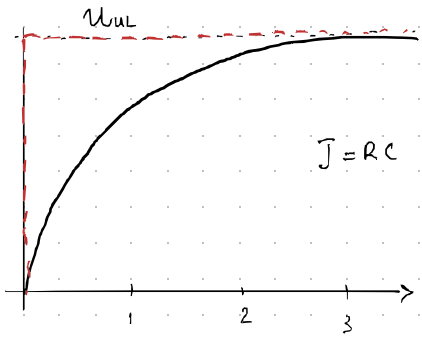


Amplituda

$|T| = \frac{1}{\sqrt{1 + \left(\frac{\omega}{\omega_1}\right)^2}}$

$|T| = -20 \log \sqrt{1 + (\omega/\omega_1)^2}$

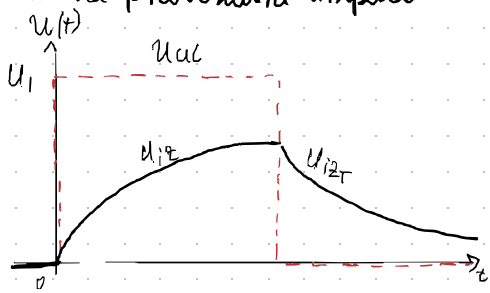
Odziv RC mreže na skokovitu pobudu

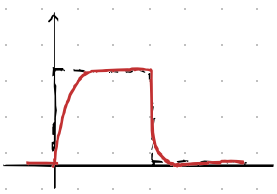


veliki otpor & veliki C → sporo kapa struja u kondenzator koji ima veliki kapacitet

Kondenzatoru treba vremena da se napuni

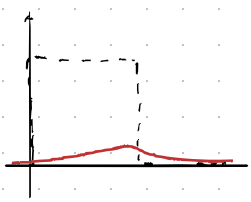
–II– na pravokutni impuls





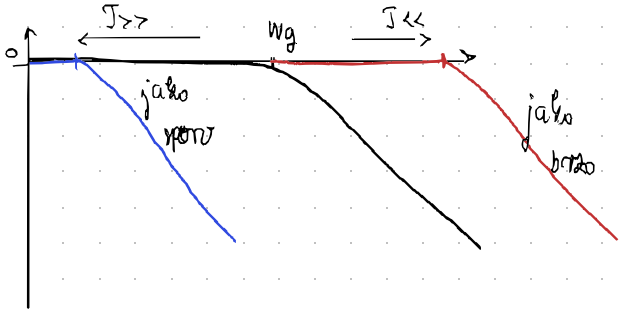
$T \ll T_P$

jako brzo



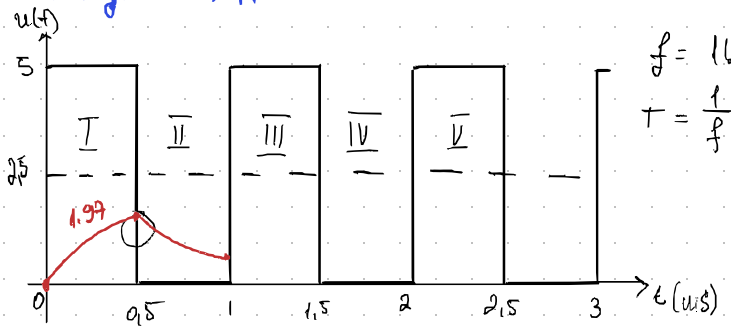
$T \gg T_P$

jako sporo



izotermijska (DC) komponenta je uvijek tu

Primjer 1.4) ppt



$f = 1\,kHz$ $\quad R = 1\,k\Omega$

$T = \frac{1}{f} = 1\,ms$ $\quad C = 1\,\mu F$

$T = 1\,ms$

$$u_{iz}(t) = u_c(t) = u_{cp} + (u_{ck} - u_{cp})\left[1 - \exp\left(-\frac{t - t_p}{T}\right)\right] S(t)$$

u_{cp} = početni napon na C

u_{ck} = napon na koji se C pokušava nabiti ili izbiti

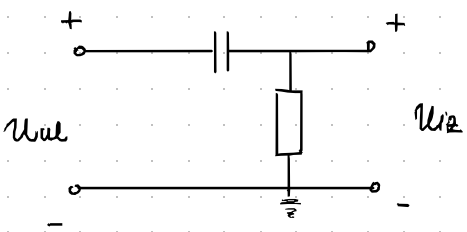
t_p = početno vrijeme

(I) $t_p = 0$ $\quad u_{cp} = 0$ $\quad u_{ck} = 5\,V$

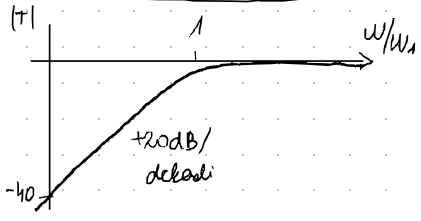
$$u_c(t = 0,5) = 0 + (5 - 0)\left[1 - \exp\left(-\frac{0,5 - 0}{1}\right)\right] = 1,97$$

(II) $$u_c(t = 1) = 1,97 + (0 - 1,97)\left(1 - \exp\left(-\frac{1 - 0,5}{1}\right)\right] = 1,19\,V$$

CR mreža najjače propušta, najviše guši DC komponentu



visoko propusni filtar



$$|T| = 20\log\left(\frac{\omega}{\omega_1}\right) - 20\log\sqrt{1 + \left(\frac{\omega}{\omega_1}\right)^2}\ dB$$

$u_{ul}(t) = u_c(t) + u_R(t)$