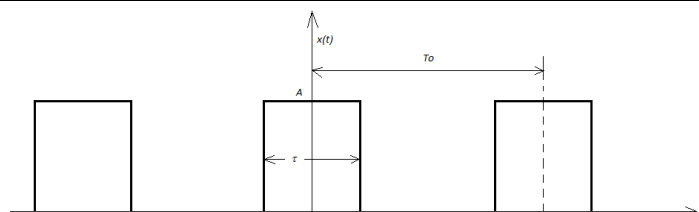


Srednja snaga i energija (Ako nije drugačije zadano, $R = 1\Omega$!)			
$E = \int_{-\infty}^{\infty} Ri^2(t)dt = \int_{-\infty}^{\infty} \frac{u^2(t)}{R}dt$		$P = \lim_{T \rightarrow \infty} \frac{1}{T} \int_{-\frac{T}{2}}^{\frac{T}{2}} Ri^2(t)dt$	
Periodični signali			
$\cos x = \frac{e^{jx} + e^{-jx}}{2} \quad \sin x = \frac{e^{jx} - e^{-jx}}{2j}$	$x(t) = \sum_{k=-\infty}^{\infty} c_k e^{jk\omega_0 t}$	$c_k = \frac{1}{T_0} \int_{-\infty}^{\infty} x(t) e^{-jk\omega_0 t} dt$	$c_k = c_k e^{-j\theta_k}$
$P = \sum_{k=-\infty}^{\infty} c_k ^2 = c_0 ^2 + 2 \sum_{k=1}^{\infty} c_k ^2$	Snaga istosmjerne komponente: $ c_0 ^2$.		$\omega_0 = \frac{2\pi}{T_0} \rightarrow T_0$ - osnovni period
Periodičan slijed pravokutnih impulsa			
$x(t) = \begin{cases} A, & 0 \leq t \leq \frac{\tau}{2} \\ 0, & \frac{\tau}{2} < t \leq \frac{T_0}{2} \end{cases}$ τ - trajanje signala T_0 - osnovni period A - amplituda			
$c_k = A \frac{\tau}{T_0} \frac{\sin\left(\frac{k\omega_0\tau}{2}\right)}{\frac{k\omega_0\tau}{2}} \leftrightarrow c_k = A \frac{\tau}{T_0} \left \frac{\sin\left(\frac{k\omega_0\tau}{2}\right)}{\frac{k\omega_0\tau}{2}} \right $		$P = A^2 \frac{\tau}{T_0}$ Snaga istosmjerne komponente: $P_0 = A^2 \left(\frac{\tau}{T_0}\right)^2$	Omjer impuls/pauza: $\frac{\tau}{T_0 - \tau}$
Kroz 0 prolazi u $\frac{k}{\tau}, k \in \mathbb{Z}$.	$c_0 = A \frac{\tau}{T_0}$		
Neperiodični signali			
$E = \int_{-\infty}^{\infty} [x(t)]^2 dt = \lim_{T \rightarrow \infty} \int_{-T}^T [x(t)]^2 dt$ $P = \lim_{T \rightarrow \infty} \frac{1}{2T} \int_{-T}^T [x(t)]^2 dt$	$X(f) = \int_{-\infty}^{\infty} x(t) e^{-j2\pi f t} dt$ $X(\omega) = \int_{-\infty}^{\infty} x(t) e^{-j\omega t} dt$	$x(t) = \int_{-\infty}^{\infty} X(f) e^{j2\pi f t} df$ $x(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} X(\omega) e^{j\omega t} d\omega$	Pravokutni impuls: $X(f) = A\tau \frac{\sin\left(\frac{2\pi f \tau}{2}\right)}{\frac{2\pi f \tau}{2}}$
Signal energije: $E < \infty \rightarrow P = 0$		Signal snage: $P > 0 \rightarrow E \rightarrow \infty$	Ni jedno ni drugo: $E \rightarrow \infty, P \rightarrow \infty$
Slučajni signali		Uzorkovanje	
$\mu_X(t) = \int_{-\infty}^{\infty} x f(x, t) dx$ $S_X(f) = \int_{-\infty}^{\infty} R_X(\tau) e^{-j2\pi f \tau} d\tau$ $R_X(\tau) = \int_{-\infty}^{\infty} S_X(f) e^{j2\pi f \tau} df$ $P = R_X(0) = \int_{-\infty}^{\infty} S_X(f) df$ $S_Y(f) = S_X(f) H(f) ^2$ $S_N(f) = \frac{N_0}{2}$ $y(t) = \int_{-\infty}^{\infty} x(\tau) h(t - \tau) d\tau$ $H(f) = \int_{-\infty}^{\infty} h(t) e^{-j2\pi f t} dt$ $h(t) = \int_{-\infty}^{\infty} H(f) e^{j2\pi f t} df$ NPK: $B = f_g$ PPK: $B = f_g - f_d$		μ_k - srednja vrijednost slučajnog procesa R - autokorelacijska funkcija $S_{X,Y}$ - spektralna gustoća snage S ili P_S - srednja snaga signala P ili P_N - srednja snaga šuma h - impulsni odziv H - prijenosna funkcija N_0 - spektralna gustoća AWGN N_q - srednja snaga kvantizacijskog šuma u - uzorkovanje m - multipleksiranje r - broj bitova L - broj razina B - širina pojasa A - pojačanje E_b - energija bita C - kapacitet kanala D - dinamika m_{\max} - maksimalna amplituda ulaznog signala Δ - korak kvantizacije σ_q^2 - srednja kvadratna greška $f(u)$ - funkcija gustoće vjerojatnosti razine signala $f(q)$ - funkcija gustoće vjerojatnosti razine kvantizacijskog šuma	
		$f_u = 2B$ $R = f_u r$ $R_m = 2R$ $L = 2^r$ $N = N_0 B$ $A = \frac{S_2}{S_1}$ $C = B \log_2 \left(1 + \frac{S}{N} \right)$ $\frac{E_b}{N_0} = \frac{\frac{C}{B} - 1}{\frac{C}{B}}$ $D = 0.5 \log \left(1 + \frac{S}{N} \right) = \frac{C}{2B}$	
		Kvantizacija	
		$\frac{S}{N} = \frac{3}{2} 2^{2r} = \left(\frac{3S}{m_{\max}^2} \right) 2^{2r}$ $\Delta = \frac{2m_{\max}}{L}$ $-\frac{\Delta}{2} \leq q \leq \frac{\Delta}{2}$ $\sigma_q^2 = \frac{1}{3} m_{\max}^2 2^{2r}$	$P_S = \int_{-\infty}^{\infty} u^2 f(u) du$ $P_N = \int_{-\infty}^{\infty} q^2 f(q) dq$ $\frac{S}{N} = \frac{P_S}{P_N}$ $\left(\frac{S}{N_q} \right)_{dB} = 1.76 + 6.02r$
		