FS | trigó $x(t)=\frac{a_0}{2}+\sum_{k=1}^{\infty}\left[a_k\cos(k\omega_0 t)+b_k\sin(k\omega_0 t)\right]$

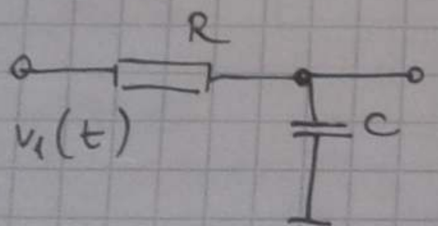
$$a_0=\frac{2}{T_0}\int_{T_0}x(t)\,dt$$

$$a_k=\frac{2}{T_0}\int_{T_0}x(t)\cos(k\omega_0 t)\,dt \qquad b_k=\frac{2}{T_0}\int_{T_0}x(t)\sin(k\omega_0 t)\,dt$$

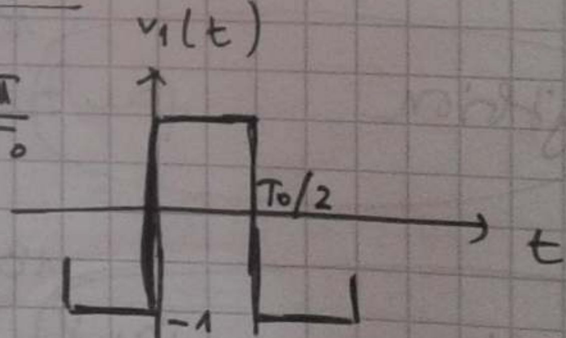
Mérnöki $x(t)=C_0+\sum_{k=1}^{\infty}C_k\cos(k\omega_0 t-\theta_k)$ $\qquad C_0=\frac{a_0}{2}$

$$C_k=\sqrt{a_k^2+b_k^2} \qquad \theta_k=\mathrm{arctg}\,\frac{b_k}{a_k}$$

$x(t)$ ps $\Rightarrow b_k=0$ $\qquad x(t)$ ptlan $\Rightarrow a_k=0$

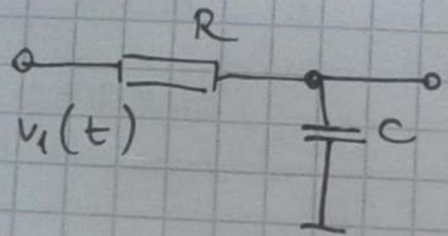


$v_2(t)=?$ $\qquad \frac{1}{RC}\ll\frac{2\pi}{T_0}$



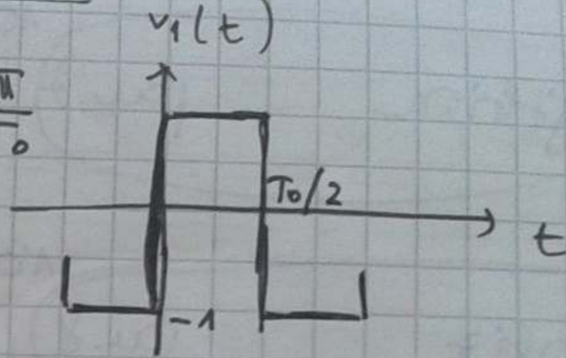
$$a_0=\frac{2}{T_0}\int_{T_0}v_1(t)\,dt=\frac{2}{T_0}\int_{0}^{T_0}v_1(t)\,dt=0$$

$$a_k=\frac{2}{T_0}\int_{T_0}v_1(t)\cos(k\omega_0 t)\,dt=\frac{2}{T_0}\int_{-T_0/2}^{T_0/2}v_1(t)\cos(k\omega_0 t)\,dt=$$



$v_2(t) = ?$

$$\frac{1}{RC} \ll \frac{2\pi}{T_0}$$



$$\underline{a_0} = \frac{2}{T_0}\int_{T_0} v_1(t)\,dt = \frac{2}{T_0}\int_0^{T_0} v_1(t)\,dt = \underline{0}$$

$$\underline{a_k} = \frac{2}{T_0}\int_{T_0} v_1(t)\cos(k\omega_0 t)\,dt = \frac{2}{T_0}\int_{-T_0/2}^{T_0/2} v_1(t)\cos(k\omega_0 t)\,dt =$$

$$= \frac{2}{T_0}\left[\int_{-T_0/2}^{0}(-1)\cos(k\omega_0 t)\,dt + \int_0^{T_0/2} 1\cdot\cos(k\omega_0 t)\,dt\right] =$$

$$= -\frac{2}{T_0}\left[\int_0^{-T_0/2}\cos(k\omega_0 t)\,dt + \int_0^{T_0/2}\cos(k\omega_0 t)\,dt\right] =$$

$$= \frac{2}{T_0}\left[\int_0^{-T_0/2}\cos(-k\omega_0 \tau)\,d\tau + \int^{T_0/2}\cos(k\omega_0 t)\,dt\right] = \underline{0}$$

$$b_k = \frac{2}{T_0}\left[\int_{-T_0/2}^{0} -1\cdot\sin(k\omega_0 t)\,dt + \int_0^{T_0/2} 1\cdot\sin(k\omega_0 t)\,dt\right] =$$

$$= \frac{2}{T_0}\left[\frac{\cos(k\omega_0 t)}{k\omega_0 t}\Bigg|_{-T_0/2}^{0} - \cancel{+}\ \frac{\cos(k\omega_0 t)}{k\omega_0 t}\Bigg|_0^{T_0/2}\right] =$$

$$= \frac{\cancel{2}}{\cancel{T_0}}\ \frac{\cos 0 - \cos\left(-\frac{k\cancel{2}\pi}{\cancel{T_0}}\cdot\frac{\cancel{T_0}}{\cancel{2}}\right) - \cos\left(k\cdot\frac{\cancel{2}\pi}{\cancel{T_0}}\cdot\frac{\cancel{T_0}}{\cancel{2}}\right) + \cos(0)}{k\cdot 2\pi} =$$

$$\frac{\;}{T_0}\Big[\int_{-T_0/2} \ldots \Big]$$

$$= \frac{2}{T_0}\left[\int_{0}^{-T_0/2}\cos(k\omega_0 t)\,dt + \int_0^{T_0/2}\cos(k\omega_0 t)\,dt\right] =$$

$$= \frac{2}{T_0}\left[\int_0^{-T_0/2}\cos(-k\omega_0\tau)\,d\tau + \int_0^{T_0/2}\cos(k\omega_0 t)\,dt\right] = \underline{0}$$

$$b_k = \frac{2}{T_0}\left[\int_{-T_0/2}^{0} -1\cdot\sin(k\omega_0 t)\,dt + \int_0^{T_0/2} 1\cdot\sin(k\omega_0 t)\,dt\right] =$$

$$= \frac{2}{T_0}\left[\frac{\cos(k\omega_0 t)}{k\omega_0 t}\Bigg|_{-T_0/2}^{0} - \frac{\cos(k\omega_0 t)}{k\omega_0 t}\Bigg|_{0}^{T_0/2}\right] =$$

$$= \frac{2}{\cancel{T_0}}\,\frac{\cos 0 - \cos\left(-\frac{k2\pi}{\cancel{T_0}}\cdot\frac{\cancel{T_0}}{\cancel{2}}\right) - \cos\left(k\cdot\frac{\cancel{2}\pi}{\cancel{T_0}}\cdot\frac{\cancel{T_0}}{\cancel{2}}\right) + \cos(0)}{k\cdot\frac{\cancel{2}\pi}{\cancel{T_0}}} =$$

$$= \frac{2\left[1-\cos(k\pi)\right]}{k\pi} = \begin{cases} 0 & k \text{ ps} \\ 4/k\pi & k \text{ ptlau} \end{cases}$$

$$v_1(t) = \frac{4}{\pi}\left[\sin(\omega_0 t) + \frac{\sin(3\omega_0 t)}{3} + \ldots + \frac{\sin(k\omega_0 t)}{k} + \ldots\right] V, \quad k = 1, 3, \ldots$$

harmonic form: $v_1(t) = \frac{4}{\pi}\left[\cos(\omega_0 t - \pi/2) + \frac{\cos(3\omega_0 t - \pi/2)}{3} + \ldots\right] V$