$U_m := 10$
$T := 10^{-3}$
$R := 100$
$L := 0.005$
$C_1 := 0.5 \cdot 10^{-6}$
$C_2 := 1 \cdot 10^{-6}$

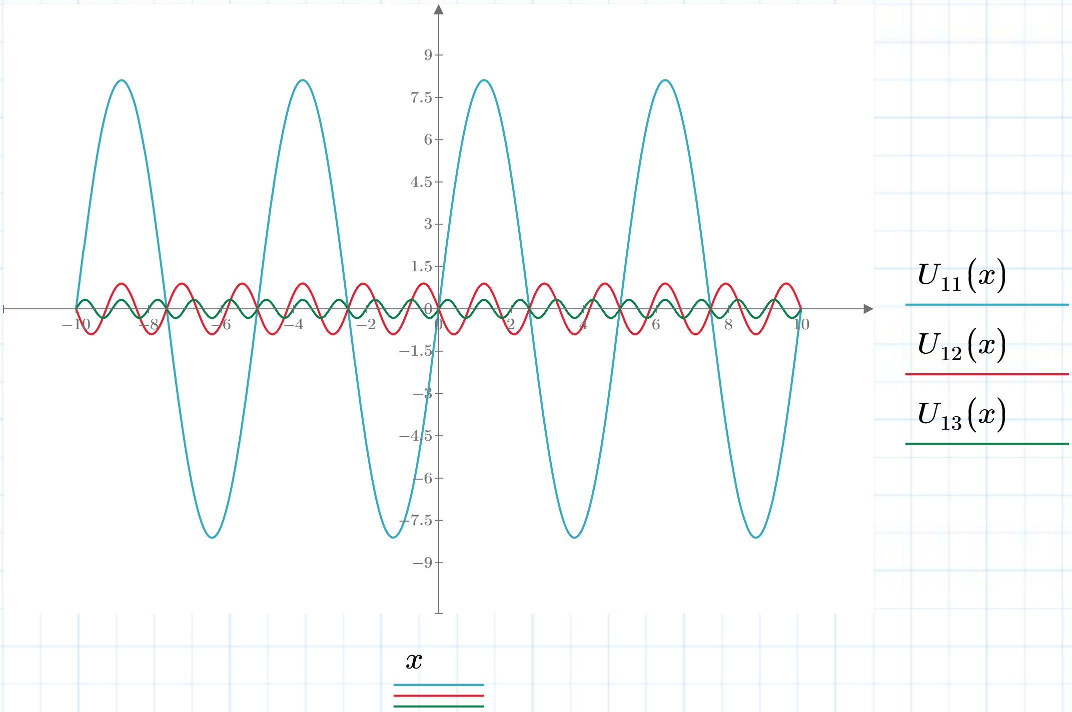
$j := \sqrt[2]{-1}$
$w := 100\,\pi$

Федосов Андрій $IO-64$
Задача №2

$$U_1(t) := \sum_{k=1}^{5} \frac{8 \cdot U_m \cdot (-1)^{\frac{k-1}{2}}}{\pi^2 \cdot k^2} \sin(k \cdot w \cdot t)$$

$$U_1(t) := 8.11 \cdot \sin(w \cdot t) - 0.901 \cdot \sin(3 \cdot w \cdot t) + 0.324 \cdot \sin(5 \cdot w \cdot t)$$

$U_{11}(t) := 8.11 \cdot \sin(w \cdot t)$ $U_{12}(t) := -0.901 \cdot \sin(3 \cdot w \cdot t)$ $U_{13}(t) := 0.324 \cdot \sin(5 \cdot w \cdot t)$



$w := 6280$

$X_L1 := w \cdot L = 31.4$ $X_{C1}1 := \frac{1}{w \cdot C_1} = 318.471$ $X_{C2}1 := \frac{1}{w \cdot C_2} = 159.236$

$Z_{12}1 := \frac{j \cdot X_L1 \cdot (-j \cdot X_{C2}1)}{j \cdot X_L1 - j \cdot X_{C2}1} = 39.113\angle 90°$ $I_{1m}1 := \frac{8.11}{R - j \cdot X_{C1}1 + Z_{12}1} = 0.027\angle 70.305°$

$U_{2m}1 := I_{1m}1 \cdot Z_{12}1 = 1.069\angle 160.305°$ $I_{2m}1 := \frac{U_{2m}1}{j \cdot X_L1} = 0.034\angle 70.305°$

$I_{3m}1 := \frac{U_{2m}1}{-j \cdot X_{C2}1} = 0.007\angle -109.695°$

$X_L3 := 3 \cdot w \cdot L = 94.2$ $\quad X_{C1}3 := \dfrac{1}{3 \cdot w \cdot C_1} = 106.157$ $\quad X_{C2}3 := \dfrac{1}{3 \cdot w \cdot C_2} = 53.079$

$Z_{12}3 := \dfrac{j \cdot X_L3 \cdot (-j \cdot X_{C2}3)}{j \cdot X_L3 - j \cdot X_{C2}3} = 121.591 \angle -90°$ $\quad I_{1m}3 := \dfrac{0.901}{R - j \cdot X_{C1}3 + Z_{12}3} = 0.004 \angle 66.295°$

$U_{2m}3 := I_{1m}3 \cdot Z_{12}3 = 0.44 \angle -23.705°$ $\quad I_{2m}3 := \dfrac{U_{2m}3}{j \cdot X_L3} = 0.005 \angle -113.705°$

$I_{3m}3 := \dfrac{U_{2m}3}{-j \cdot X_{C2}3} = 0.008 \angle 66.295°$

$X_L5 := 5 \cdot w \cdot L = 157$ $\quad X_{C1}5 := \dfrac{1}{5 \cdot w \cdot C_1} = 63.694$ $\quad X_{C2}5 := \dfrac{1}{5 \cdot w \cdot C_2} = 31.847$

$Z_{12}5 := \dfrac{j \cdot X_L5 \cdot (-j \cdot X_{C2}5)}{j \cdot X_L5 - j \cdot X_{C2}5} = 39.951 \angle -90°$ $\quad I_{1m}5 := \dfrac{0.324}{R - j \cdot X_{C1}5 + Z_{12}5} = 0.002 \angle 46.026°$

$U_{2m}5 := I_{1m}5 \cdot Z_{12}5 = 0.09 \angle -43.974°$ $\quad I_{2m}5 := \dfrac{U_{2m}5}{j \cdot X_L5} = 5.725 \cdot 10^{-4} \angle -133.974°$

$I_{3m}5 := \dfrac{U_{2m}5}{-j \cdot X_{C2}5} = 0.003 \angle 46.026°$

$i_1(t) := 0.027 \cdot \sin(w \cdot t + 70.305°) - 0.004 \cdot \sin(3 \cdot (w \cdot t + 66.295°)) + 0.002 \cdot \sin(3 \cdot (w \cdot t + 46.026°))$

$U_2(t) := 1.069 \cdot \sin(w \cdot t + 160.305°) - 0.44 \cdot \sin(3 \cdot (w \cdot t - (23.705)°)) + 0.09 \cdot \sin(3 \cdot (w \cdot t - 43.974°))$

$I_1 1 := \dfrac{|I_{1m}1|}{\sqrt{2}} = 0.019$ $\quad I_1 3 := \dfrac{|I_{1m}3|}{\sqrt{2}} = 0.003$ $\quad I_1 5 := \dfrac{|I_{1m}5|}{\sqrt{2}} = 0.002$

$I_1 := \sqrt{I_1 1^2 + I_1 3^2 + I_1 5^2} = 0.02$

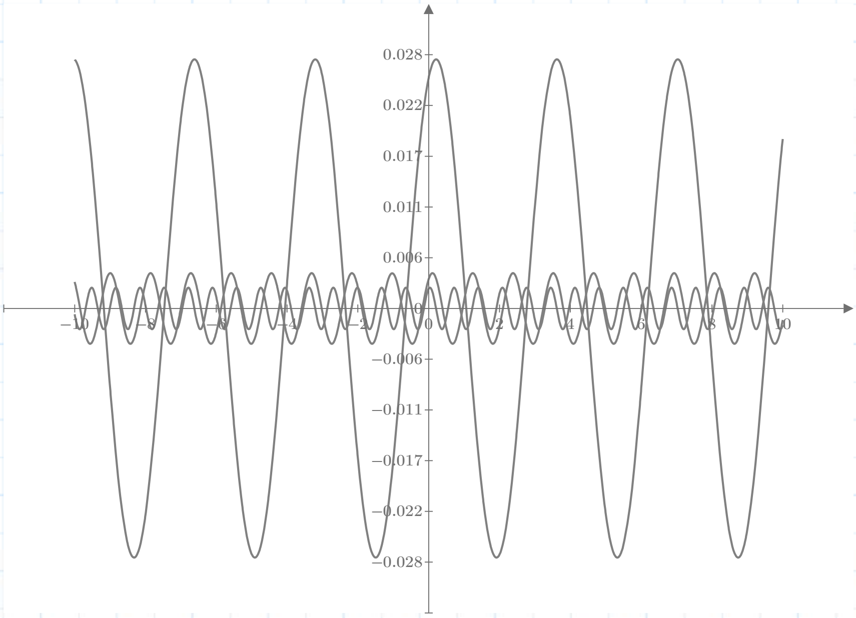
$U_2 1 := \dfrac{|U_{2m}1|}{\sqrt{2}} = 0.756$ $\quad U_2 3 := \dfrac{|U_{2m}3|}{\sqrt{2}} = 0.311$ $\quad U_2 5 := \dfrac{|U_{2m}5|}{\sqrt{2}} = 0.064$

$U_2 := \sqrt{U_2 1^2 + U_2 3^2 + U_2 5^2} = 0.82$

$U_{2\text{середнє}} := \dfrac{U_2 1 + U_2 3 + U_2 5}{1.11} = 1.019$

$K_{ф} := \dfrac{U_2}{U_{2\text{середнє}}} = 0.805$ $\quad K_{a} := \dfrac{1.07}{U_2} = 1.305$ $\quad K_{сп} := \dfrac{U_2 1}{U_2} = 0.922$ $\quad K_{г} := \dfrac{\sqrt{U_2 3^2 + U_2 5^2}}{U_2 1} = 0.42$

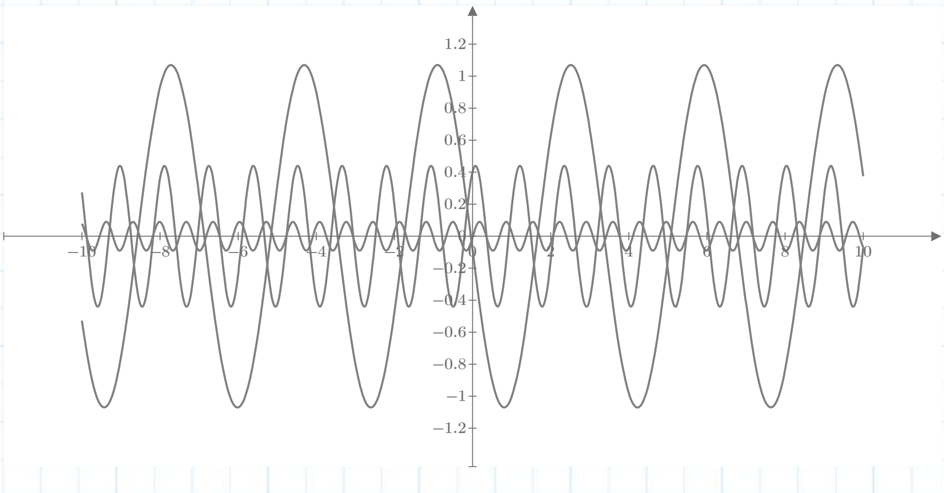
$i1(t) := 0.027 \cdot \sin(w \cdot t + 70.3)$
$i3(t) := -0.00383 \cdot \sin(3 \cdot (w \cdot t + 66.3))$
$i5(t) := 0.00225 \cdot \sin(5 \cdot (w \cdot t + 48))$



$i1(x)$
$i3(x)$
$i5(x)$

x

$u_2 1(t) := 1.07 \cdot \sin(w \cdot t + 160.3)$
$u_2 3(t) := -0.44 \cdot \sin(3 \cdot (w \cdot t - 23.7))$
$u_2 5(t) := 0.09 \cdot \sin(5 \cdot (w \cdot t - 44))$



$u_2 1(x)$
$u_2 3(x)$
$u_2 5(x)$

x