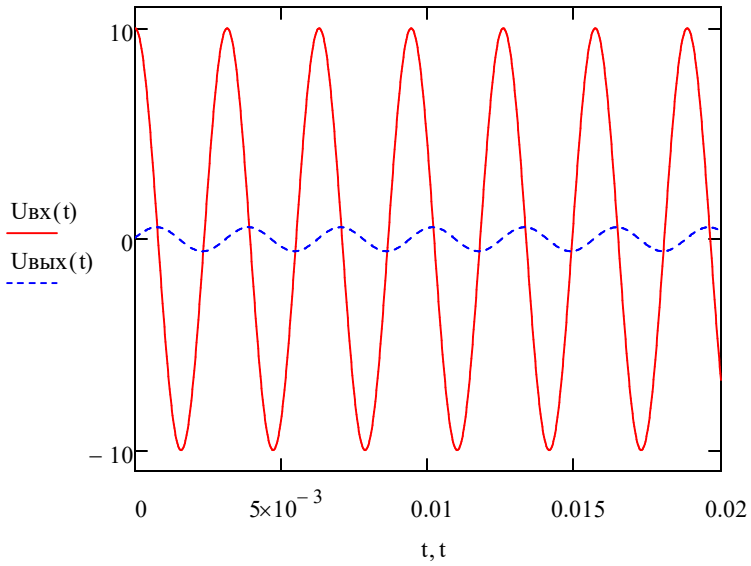
4 Пункт:

$U_{вх}(t) := 10\cos(2000t)$

$U_{вых}(t) := 0.57\cos(2000t - 1.446)$



8 пункт:

$w := 2000$

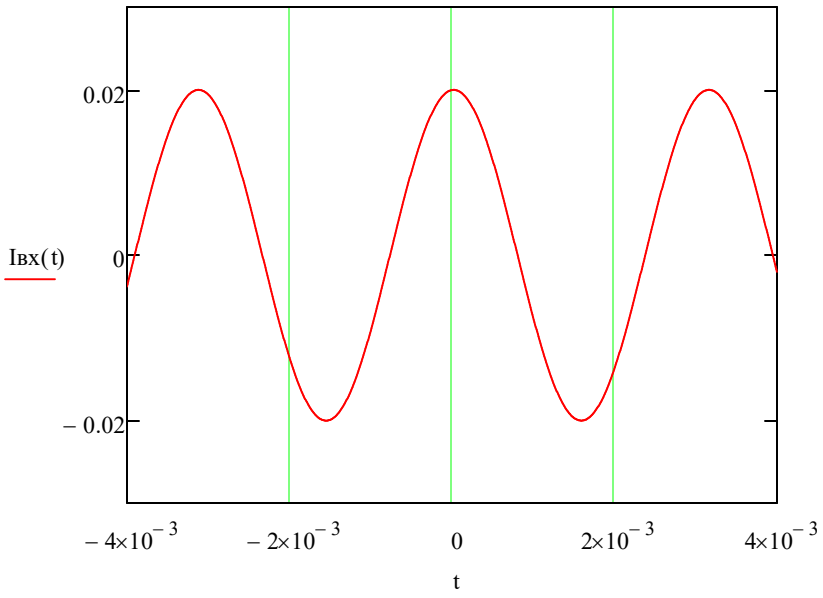
$I := \frac{(136 + 0.4j \cdot w)}{10000 + 40j \cdot w}$ $\quad I = 0.01 - 4.431i \times 10^{-4}$

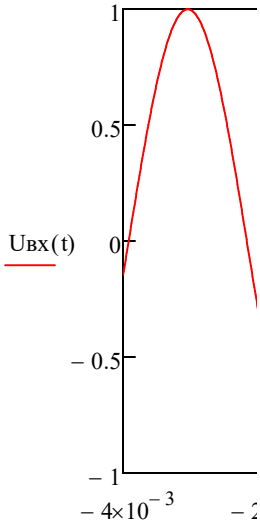
$|I| = 0.01$

$phi := -0.044281$

$Iвх(t) := 0.02 \cos(2000t - 0.044281)$

$Uвх(t) := \cos(2000t)$





9 пункт:

$K(w) := \frac{114}{250 + j \cdot w}$

$K(w) = 7.015 \times 10^{-3} - 0.056i$

$$R := \left[76 \frac{(24 + 0.4j \cdot w)}{100 + 0.4j \cdot w} \right] = 75.111 + 7.109i$$

$$Zэ := 64(R) = 4.807 \times 10^{3} + 454.971i$$

$$\left| Zэ \right| = 4.829 \times 10^{3}$$

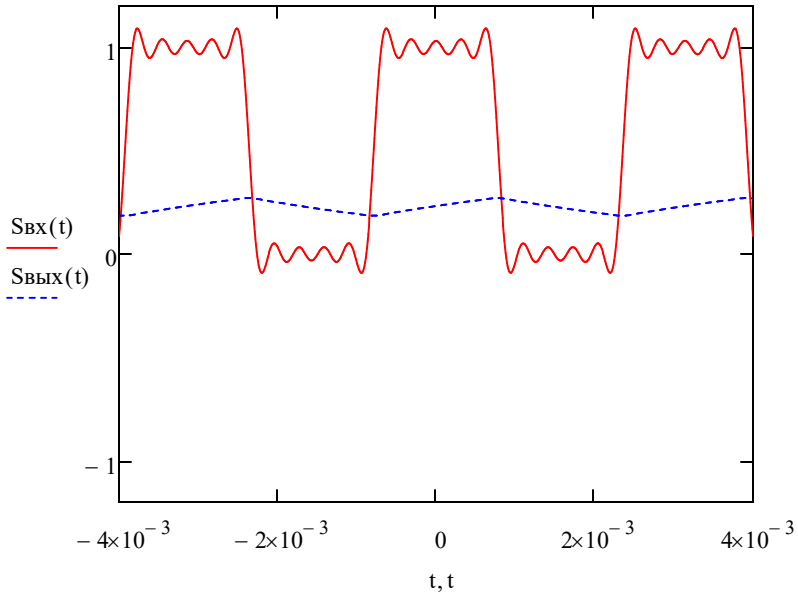
$$pi := 3.14$$

5 пункт:

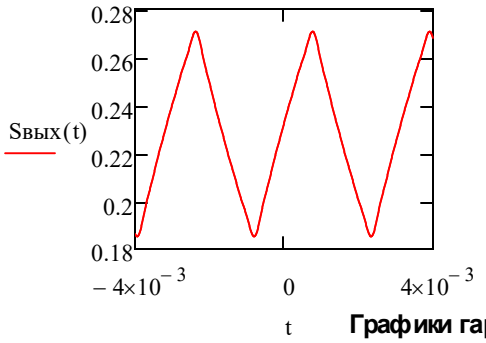
Диаграммы напряжений на входе и на выходе

$$Sвх(t) := \frac{1}{2} + 2 \frac{\cos(2000t)}{pi} + 2 \frac{\cos(6000t + pi)}{3pi} + 2 \frac{\cos(10000t)}{5pi} + 2 \frac{\cos(14000t + pi)}{7pi} + 2 \frac{\cos(180}{9 \cdot pi}$$

$$Sвых(t) := 0.228 + 2 \cdot 0.057 \frac{\cos(2000t - 1.446)}{pi} + 2 \cdot 0.019 \cdot \frac{\cos(6000t + 1.612)}{3pi} + 2 \cdot 0.011 \frac{\cos(10000t}{5pi}$$



Увеличенный сигнал на выходе (необяз)



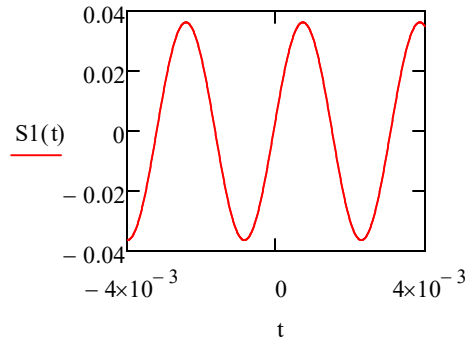
Графики гармоник выходного напряжения:

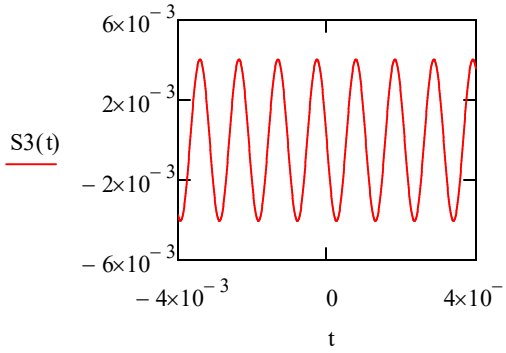
$$S1(t) := 2\,\frac{0.057\cos(2000t - 1.446)}{pi} \qquad S3(t) := 2\,\frac{0.019\cos(6000t + 1.612)}{3pi}$$

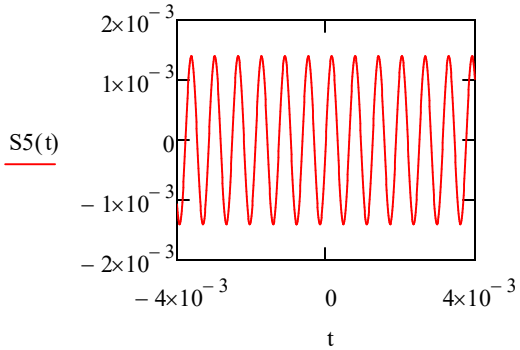
$$S5(t) := 2\,\frac{0.011\cos(10000t - 1.546)}{5pi}$$

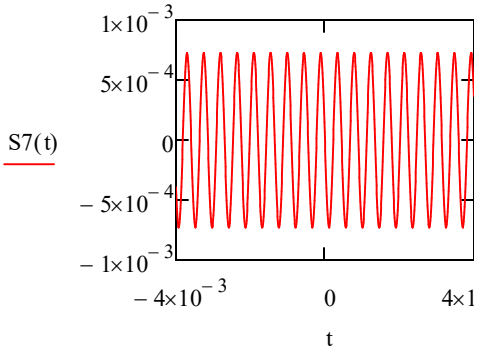
$$S7(t) := 2\,\frac{0.008\cos(14000t + 1.589)}{7pi}$$

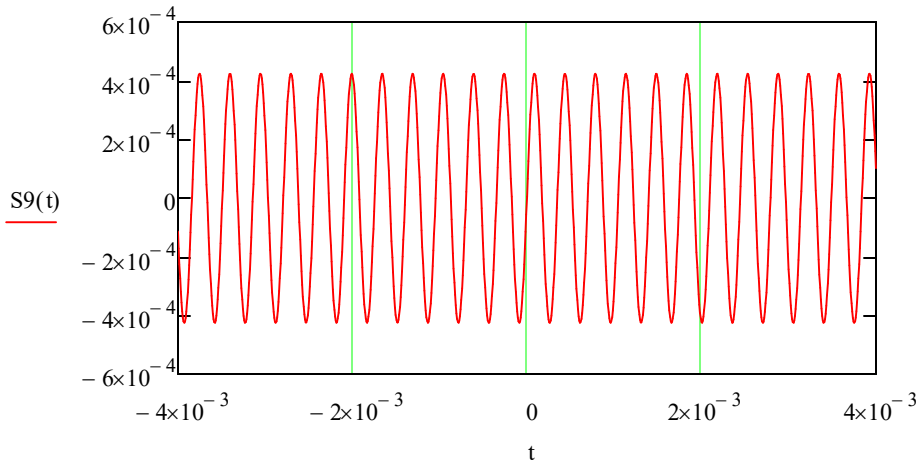
$$S9(t) := 2\,\frac{0.006\cos(18000t - 1.557)}{9pi}$$







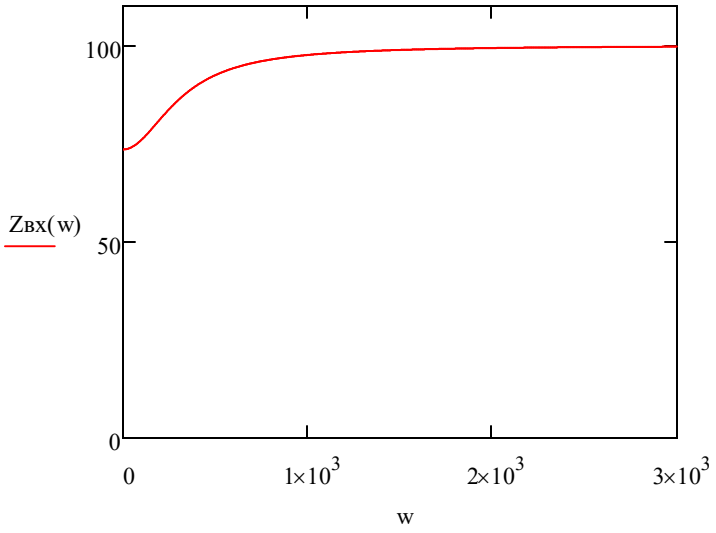



S9(t)
6×10^−4
4×10^−4
2×10^−4
0
−2×10^−4
−4×10^−4
−6×10^−4
−4×10^−3
−2×10^−3
0
2×10^−3
4×10^−3
t

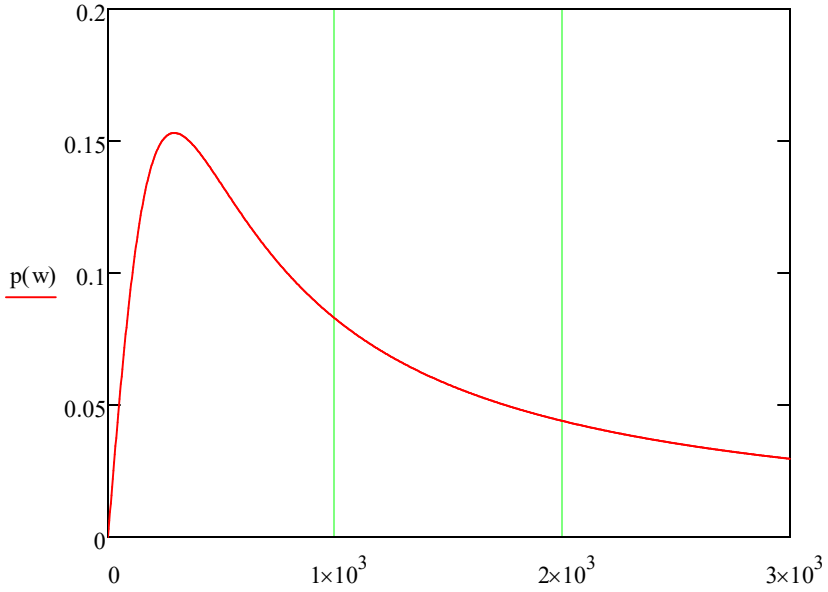
7 пункт:

$$Z(w) := 40 + \frac{(24j \cdot w + 60 \cdot 76)}{136 + 0.4j \cdot w}$$

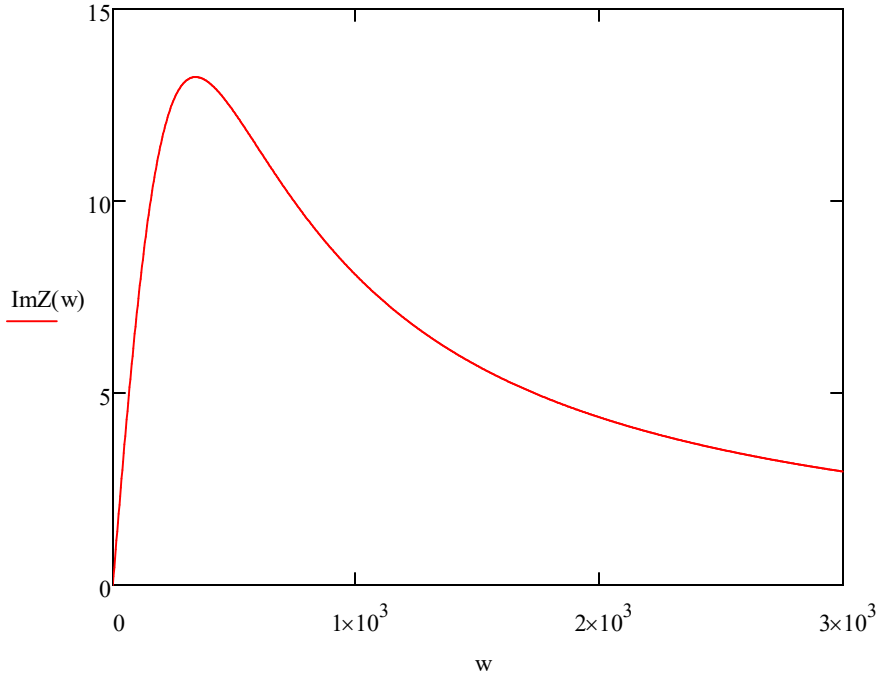
$$Z_{вх}(w) := \frac{\left[\left(1360000 + 16 \cdot w^2\right)^2 + (40 \cdot 36 \cdot w)^2\right]^{\frac{1}{2}}}{136^2 + 0.4^2 w^2}$$

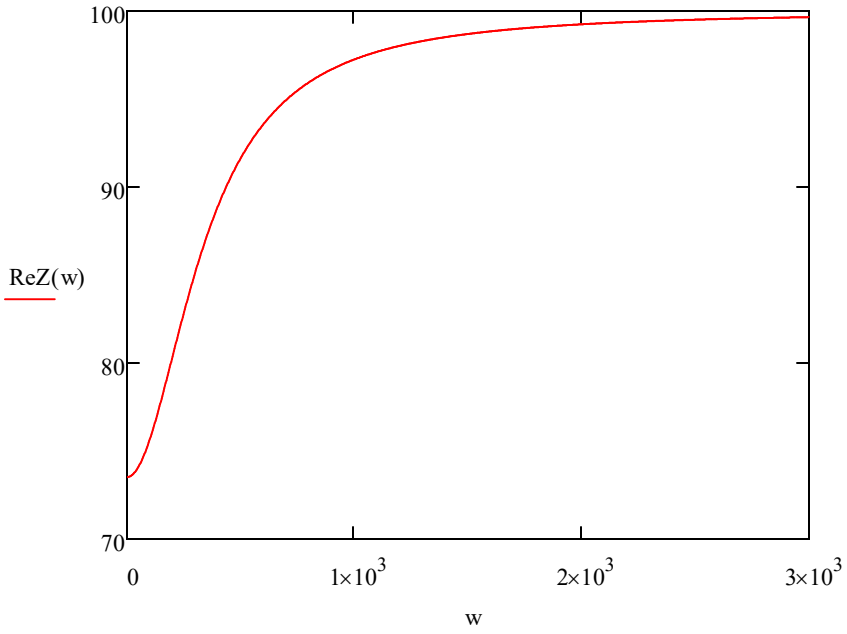


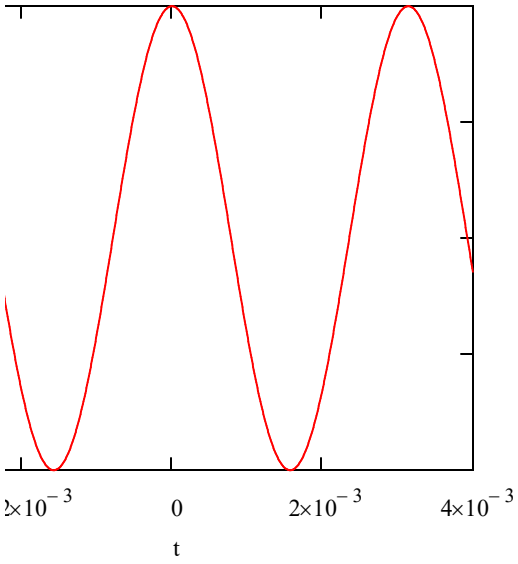
$$p(w) := \operatorname{atan}\left[\frac{(40 \cdot 36 \cdot w)}{1360000 + 16w^2}\right]$$



$$ImZ(w) := \frac{(40 \cdot 36 \cdot w)}{136^2 + 0.4^2 w^2} \qquad ReZ(w) := \frac{\left(1360000 + 16 \cdot w^2\right)}{136^2 + 0.4^2 w^2}$$




100
90
80
70
ReZ(w)
0
1×10^3
2×10^3
3×10^3
w


2×10^−3
0
2×10^−3
4×10^−3
t

)0t)

$$\frac{\text{- 1.546)}}{} + 2\cdot 0.008\,\frac{\cos(14000t + 1.589)}{7pi} + 2 \times 0.006\,\frac{\cos(18000t - 1.557)}{9pi}$$

3

0^{-3}