Problem 12–1. A transfer function has a passband gain of 500. At a particular frequency in its stopband, the gain of the transfer function is only 0.00025. By how many decibels does the gain of the passband exceed that of the frequency in the stopband?

We have the following calculations:

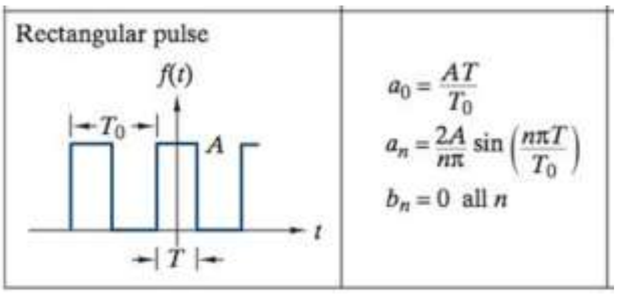
$$K = 20\log_{10}\left(\frac{500}{0.00025}\right) = (20)(6.301) = 126.02 \text{ dB}$$

Problem 12–2. A particular filter is said to be 56 dB down at a desired stop frequency. How many times reduced is a signal at that frequency compared to a signal in the filter's pass-band?

$20\log(x) = -56 \;\rightarrow\; \log(x) = -2{,}8 \;\rightarrow\; x = 10^{-2{,}8} \;\rightarrow\; x = 0{,}00158$ gg

Opgave 13-20

Signalets Fourierrække fås fra fig. 13-4



A = 10; $T_0 = \pi\cdot 10^{-3}$; $T = \pi/4\cdot 10^{-3}$

Signalets grundfrekvens er $2\pi / \pi\cdot 10^{-3} = 2000$

ao = 2,5;   a1 = 4,5;   a2 = 3,18;   a3 = 1,5

$$v_S(t) = 2.5 + 4.5\cos(2000t) + 3.18\cos(4000t) + 1.5\cos(6000t) \text{ V}$$

Filteret har overføringsfunktionen: $$T(s) = \frac{\frac{R}{L}}{s + \frac{R}{L}} = \frac{4000}{s + 4000}$$

T(jω) udregnes for:

$\omega = 0$ $T(j\omega) = 1\ \underline{/0}\,^\circ$

$\omega = 2000$ $T(j\omega) = 0{,}894\ \underline{/-26{,}6}\,^\circ$

$\omega = 4000$ $T(j\omega) = 0{,}707\ \underline{/-45}^\circ$

$\omega = 6000$ $T(j\omega) = 0{,}555\ \underline{/-56{,}3}^\circ$

$$\underline{\underline{v_o(t) = 2{,}5 + 4{,}03\cdot\cos(2000t-26{,}6^o) + 2{,}25\cdot\cos(4000t-45^o) + 0{,}832\cdot\cos(6000t-56{,}3^o)\text{ V}}}$$