— ÖRNEK —

1/ Kesim frekansı 10kHz olan
2/ 200kHz'de en az 130dB zayıflamaya sahip olan.
3/ $\omega = 0$'da maksimum genlik 0dB.
4/ Geçirme bandında kabul edilebilir maksimum kırpışma 1dB

olan bir Butterworth ve Chebyshev filtreleri tasarlayın.

BUTTERWORTH

$$n = \left\lceil \frac{130}{20 \log \frac{200}{10}} \right\rceil = 5$$

MATLAB
n = buttord(10^4, 2*10^5, 3, 130, 's')

$$H(s_n) = \frac{K}{(s_n+1)(s_n^2+0.618 s_n+1)(s_n^2+1.618 s_n+1)}$$

✓ $K=1 \quad H(0) = 1.$

$$H(s_n) \longrightarrow s_n = \frac{s}{2\pi \cdot 10^4} \longrightarrow H(s)$$

CHEBY

$$20 \log \frac{1}{(1+\varepsilon^2)^{1/2}} = -1 \implies \varepsilon = 0.509$$

$$R_s = \left[20 \log \varepsilon + 20 \log \left(2^{n-1} \omega_p / \omega_s \right) \right] = \left[20 \log \varepsilon + 20(n-1) \cdot \log 2 + 20 \log \frac{\omega_p}{\omega_s} \right]$$

$$n = 4.43$$

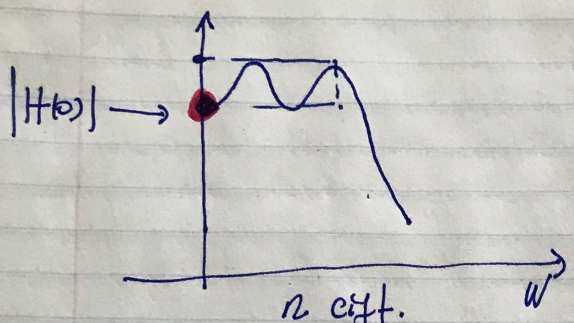
MATLAB
chebord(10^4, 2*10^5, 3, 130, 's')

$$n = 5. \implies H(s_n) = \frac{K}{D_n(s_n)}$$

$$D_n(s_n) = (s_n + 0.2895)(s_n^2 + 0.1789 s_n + 0.9883)(s_n^2 + 0.4684 s_n + 0.4293)$$

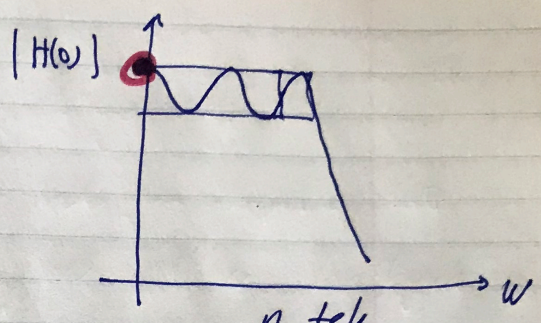
$$H(s_n) = \frac{K}{s_n^5 + \dots + 0.1228}$$

$$|H(0)| = \frac{K}{0{,}1228}$$



n çift.

$$|H(0)| = \frac{1}{(1+\varepsilon^2)^{1/2}}$$



n tek

$$|H(0)| = 1.$$

Bizim örneğimizde n tek

$$|H(0)| = 1 = \frac{K}{0{,}1228}$$

$$\boxed{K = 0{,}1228}$$

$$H(s_n) = \frac{K}{D_n(s_n)} \qquad s_n = \frac{s}{2\pi \cdot 10^4} \qquad H(s) = \dots$$