

Wiener Filter and Matched Filter Spectral Functions

Section 11.5.7, Figure 11-25

f_11-25.mcd

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i := 0..127 j := 0..64 s := 0..64 f_{max} ≡ 64 f ≡ 0 A ≡ 10 B ≡ 0.9 α ≡ 1.0 a ≡ 12 σ ≡ 20 τ ≡ 36

Define signal and noise spectra:

$$P_{s_j} := A \cdot e^{-\frac{|j|}{a}}$$

$$P_{n_j} := B \cdot \exp\left[\frac{-(j-\tau)^2}{2 \cdot \sigma^2}\right] \cdot \cos\left(2 \cdot \pi \cdot f \cdot \frac{j-\tau}{128}\right)$$

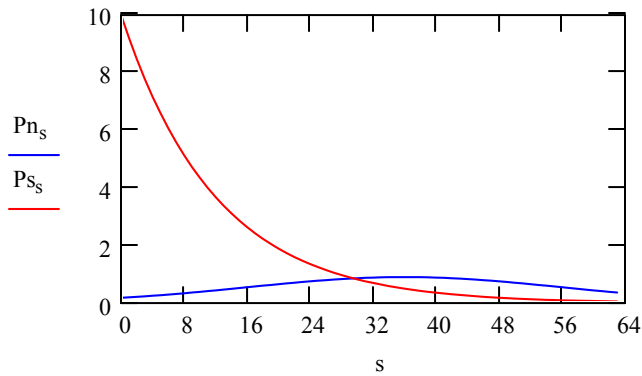
And the spectral functions of interest:

$$H_j := \frac{P_{s_j}}{P_{s_j} + P_{n_j}}$$

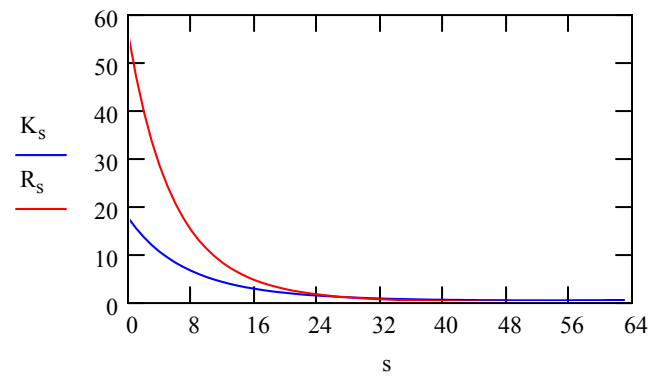
$$K_j := \frac{\sqrt{P_{s_j}}}{P_{n_j}}$$

$$R_j := \frac{P_{s_j}}{P_{n_j}}$$

$$\text{MSE}_j := \frac{P_{s_j} \cdot P_{n_j}}{P_{s_j} + P_{n_j}}$$



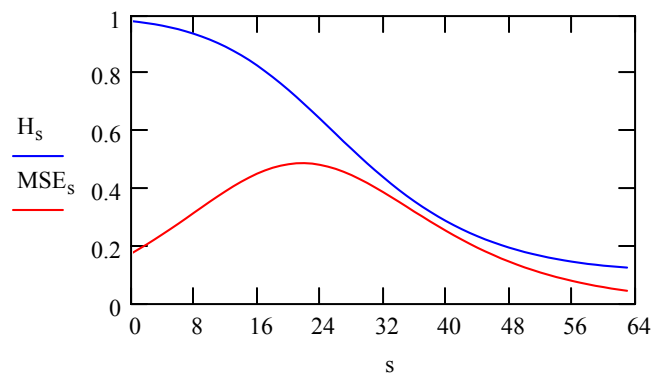
(a)



(b)

$$K_0 = 17.755$$

$$R_0 = 56.145$$



(c)

Figure 11-25 Wiener filter and matched filter spectral functions