ECS332 2015 Quiz 1 Solution

Example 3.24. Consider the two-path channels in which the receive signal is given by

$$y(t) = \beta_1 x(t-\tau_1) + \beta_2 x(t-]\tau_2).$$

Four different cases are considered.

(a) Small $|\tau_1 - \tau_2|$ and $|\beta_1| \gg |\beta_2|$

(b) Large $|\tau_1 - \tau_2|$ and $|\beta_1| \gg |\beta_2|$

(c) Small $|\tau_1 - \tau_2|$ and $|\beta_1| \approx |\beta_2|$

(d) Large $|\tau_1 - \tau_2|$ and $|\beta_1| \approx |\beta_2|$

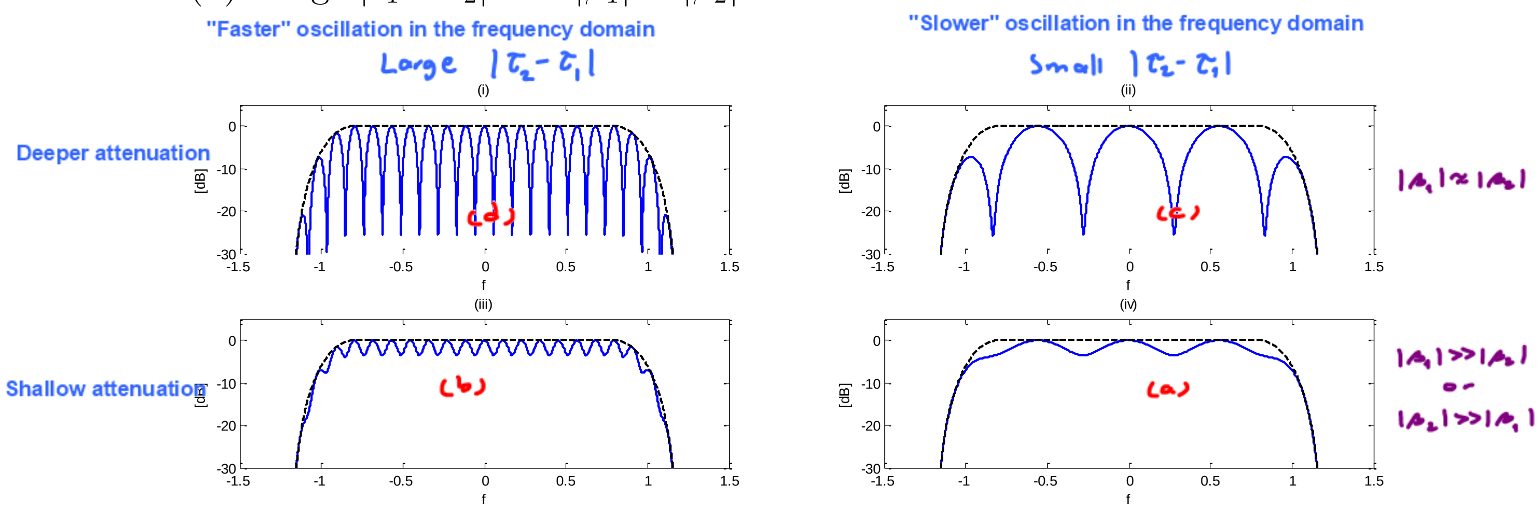

Figure 11: Frequency selectivity in the receive spectra (blue line) for two-path channels.

Figure 11 shows four plots of normalized[14] $|X(f)|$ (dotted black line[15]) and normalized $|Y(f)|$ (solid blue line) in [dB]. Match the four graphs (i-iv) to the four cases (a-d).

[14] The function is normalized so that the maximum point is 0 dB.

[15] For those who are curious, $x(t)$ is a raised cosine pulse with roll-off factor $\alpha = 0.2$ and symbol duration $T = 0.5$.