

Pre-workshop questions

Question 1

Given:

$$u(t) = \sum_n I_n g(t - nT) \quad (1)$$

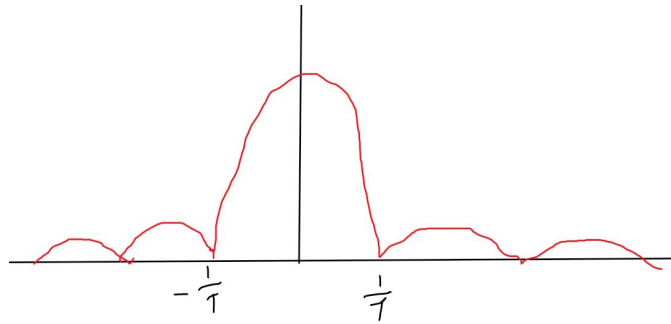
where $g(t)$ is a rectangular pulse.

with $I_n \in \{\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}\}$, the $S_I(z) = \sum_{k=-\infty}^{\infty} R_I[k]z^{-k}$, The PSD for QPSK is:

$$S_{BPSK}(f) = S_I e^{j2\pi fT} \frac{|P(f)|^2}{T} = \frac{1}{2} A^2 T \text{sinc}^2(fT) \quad (2)$$

The QPSK can be treated as 2 BPSK, therefore:

$$S_{QPSK}(f) = A^2 T \text{sinc}^2(fT) \quad (3)$$



Question 2

In the same way the PSD of BPSK with $g(t) = A \sin(2\pi t/T)$ is given by :

$$S_{BPSK}(f) = \frac{1}{4} A^2 \left[\text{sinc}\left(Tf - \frac{1}{2}\right) + \text{sinc}\left(Tf + \frac{1}{2}\right) \right]^2 \quad (4)$$

The QPSK can be treated as 2 BPSK, therefore:

$$S_{BPSK}(f) = \frac{1}{2} A^2 \left[\text{sinc}\left(Tf - \frac{1}{2}\right) + \text{sinc}\left(Tf + \frac{1}{2}\right) \right]^2 \quad (5)$$

