ECE/EEE F311 Communication Systems (First Semester 2023-2024)
Lab-5 (Tuesday) (26-09-2023)

Objectives

In this task, the objective is to study SSB and Angle Modulation.

Basic USSB,LSSB ,PM and AM

m_t_int=cumsum(m_t); for sinc

Task 1

Plot time and frequency domain signals for USSB, LSSB, PM (with $k_p = 10\pi$), and FM (with $k_f = 20$) modulated signals. The carrier signal is 100 Hz with amplitude 1. The message signals are $m_1(t) = sin(40\pi t)$ and $m_2(t) = 40sinc(40t)$. Use a single .m file with IF conditions. Time duration -5 to 5 seconds. Write your observations on the bandwidth of modulated signal.

Task 2

Pass the FM signal (with $m_1(t) = sin(40\pi t)$ as the message) generated in the Task 1 to a BPF with center frequency 100 Hz and BW 50 Hz.

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b_t = 50.*sinc(50*t).*cos(2*pi*100*t); %center frequency 100 Hz and BW 50 Hz.
f_s = conv(x_t,b_t,"same") %x_t is the origina function
X_f=fft(f_s);
freq_axis=linspace(-fs/2, fs/2, length(X_f));
figure(4)
hold all
plot(freq_axis,(fftshift(abs(X_f))))
xlabel(Frequency)
ylabel(Frequency)
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USSB: x_t=(m_t).*(cos(2*f_c*pi*t))-mh_t.*sin(2*f_c*pi*t);

LSSB: x_t=(m_t).*(cos(2*f_c*pi*t))+mh_t.*sin(2*f_c*pi*t);

PMMO: x_t=cos(2*f_c*pi*t+k_p*m_t); $-2\pi f_c t + k_p t$

FMMO: x_t=cos(2*f_c*pi*t+2*pi*k_f*m_t_int); $-2\pi k_f \int m(t)$