ELEC361 ANALOG COMMUNICATION SYSTEMS Fall 2022

MATLAB Project

Submission Date: 29 December (in class)

The message signal $m(t) = \sin(200\pi t) + 5\cos(400\pi t)$ modulates the carrier signal $c(t) = 10\cos(2\pi f_c t)$, where $f_c = 2$kHz.

a) Plot the message signal for one period. Plot the magnitude spectrum of the message signal.

b) For Double Sideband Suppressed Carrier Amplitude Modulation (DSB-SC-AM),

   i. Plot the modulated signal and its spectrum.

   ii. If the carrier signal generated at the demodulator is $\hat{c}(t) = \cos(4000\pi t)$, plot the signal at the input of the LPF (with only simulation) and its spectrum.

   iii. Plot the signal at the output of the LPF and its spectrum.

c) For Double Sideband Large Carrier Amplitude Modulation (DSB-LC-AM),

   i. Plot the modulated signal and its spectrum. The modulation index is $\mu = 0.6$.

   ii. Demodulate the AM signal generated in part (i) by the computing the envelope of the AM signal and subtracting the DC value term to obtain the demodulated signal. Plot the demodulated signal. (With only simulation)

- *Do all the steps above analytically (unless otherwise stated) and compare to simulation results and comment on them.*
- *The project must include* ***MATLAB codes with explanations, MATLAB figures, analytical solutions and comments****. Assignments without analytical solutions or MATLAB codes or MATLAB figures will not be evaluated.*

Note: The explanations of MATLAB codes are not comment.