

ELEC361 ANALOG COMMUNICATION SYSTEMS

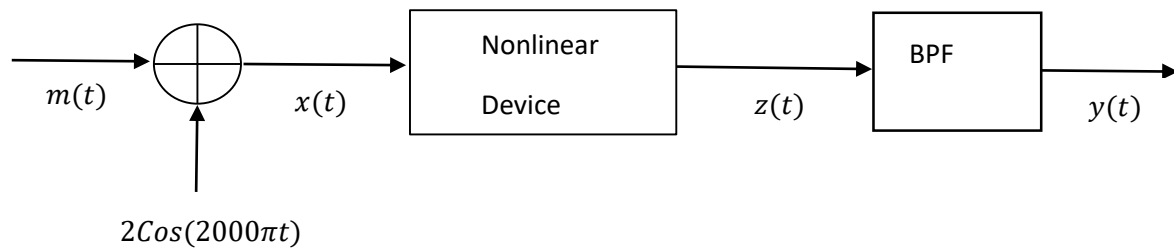
MATLAB PROJECT ASSIGNMENT

Fall 2023

Submission Date: Dec. 15, 2023, Friday, in class, in the first hour.

E-postadan veya Teams üzerinden ödev kabul edilmeyecektir. Her türlü kopya işlemi hakkında yaptırım uygulanacaktır.

The message signal $m(t) = 5\cos(200\pi t) + 10\cos(400\pi t)$ is transmitted by using the DSB-Large Carrier (LC)-AM modulator given below. The nonlinear device has the input-output relationship $z(t) = 60x(t) + x^2(t)$. The bandpass filter (BPF) has a gain of 1, $BW = 2B = 400\text{ Hz}$, center frequency $f_c = 1\text{ kHz}$.



- Plot $m(t)$, $x(t)$, $z(t)$, $y(t)$.
- Find and plot $M(f)$, $X(f)$, $Z(f)$, $Y(f)$. (Do the filtering in frequency domain. Do not use filter command!)
- Demodulate $y(t)$ by using envelope detector. Plot the demodulated signal $\tilde{m}(t)$ and its spectra. Compare your result to the original message signal $m(t)$. (You can use envelope command of MATLAB. However, if you use the circuit of the envelope detector to demodulate, you get extra points.)

Your project must include program code with explanations, analytical solutions for all steps, MATLAB results, comparison of analytical and MATLAB results and comments on them.

You upload only m-file of your program to Teams by Dec. 15, 14:00 PM.