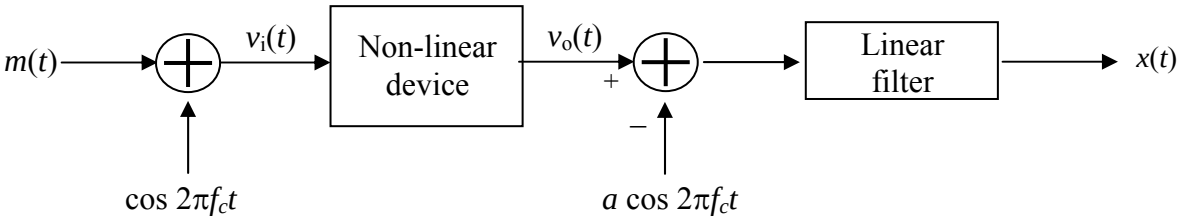
Southern University of Science & Technology
Department of Electrical and Electronic Engineering

Communication Principles

Assignment No. 2

1. The message signal $m(t) = 3\cos(2\pi 70t) + 4\sin(2\pi 70t)$ is input to the system shown below to generate a DSBSC-AM signal $x(t)$. Assume that $v_o(t) = a\, v_i(t) + b\, v_i^2(t)$ where a and b are constants, and the carrier frequency $f_c >> 70$Hz.
   (a) Sketch the amplitude spectrum of the filter input
   (b) Determine the center frequency and bandwidth of the filter in this modulator
   (c) Determine the minimum value of f_c permitted for this modulator



2. A suppressed-carrier AM signal $x_1(t)$ is generated by modulating $s_1(t) = rect\left(\frac{t}{4}\right) + 2\,rect\left(\frac{t-4}{4}\right)$ with $\sin(1000\,\pi t)$. Sketch the time waveform of $x_1(t)$.

3. A DSBSC-AM signal is

$$x(t) = 3\sin 180\pi t + 3\sin 220\pi t$$

   (a) Sketch the amplitude spectrum of x(t) to deduce the carrier frequency in x(t)
   (b) Given that x(t) was generated using a sine carrier signal with phase 0, demodulate x(t).