Communications Lab

Experiment 2

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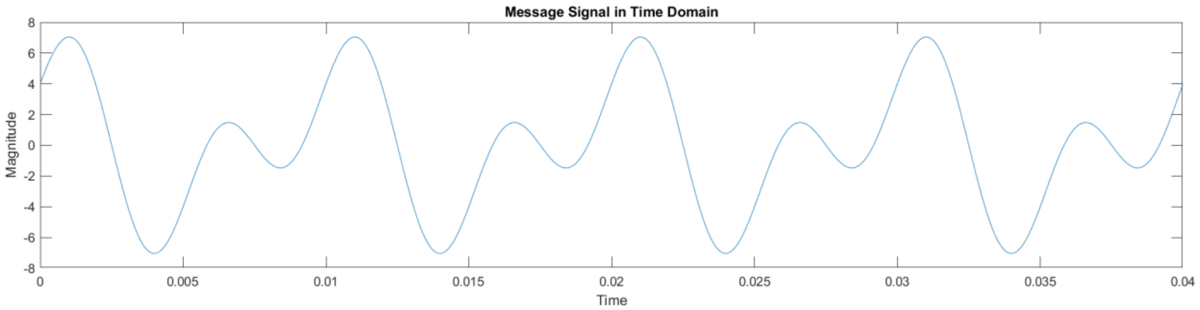
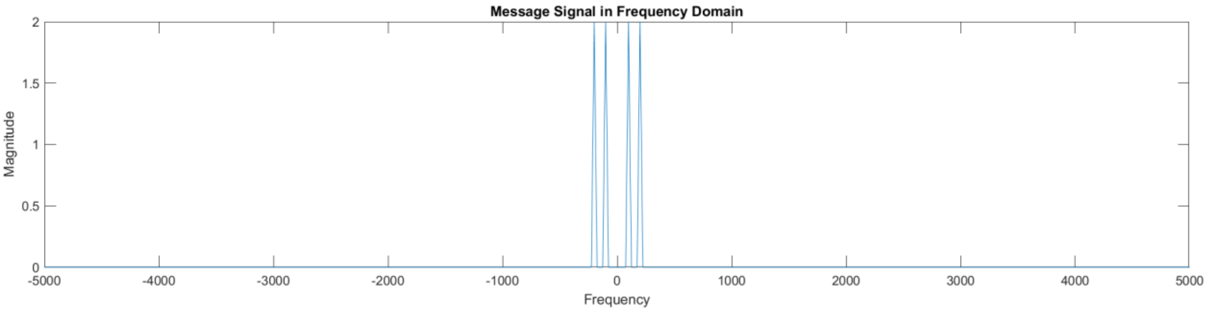
Message Signal:

The message signal is generated as:

$$m(t) = A_m\,[\cos(2\pi f_m t) + \sin(4\pi f_m t)]$$

$$f_m = 100\ Hz, \qquad A_m = 4$$





Frequency Modulation (FM) and Demodulation:

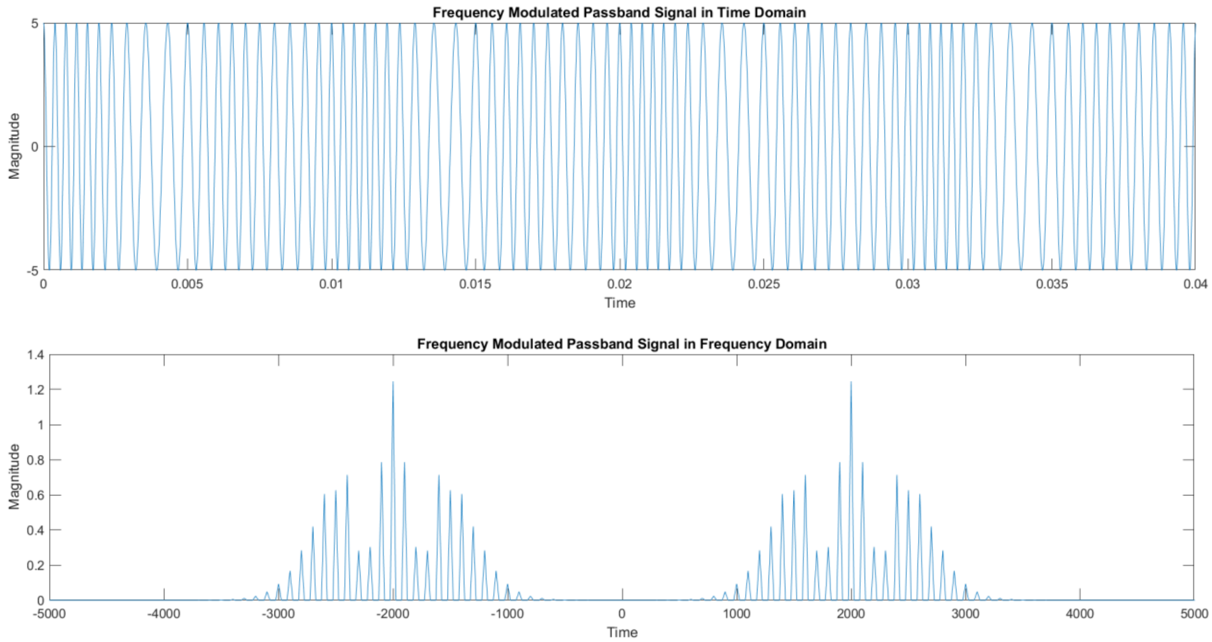
The modulated passband signal is given as follows:

$$u_p(t) = A_c \cos(2\pi f_c t + \theta(t))$$

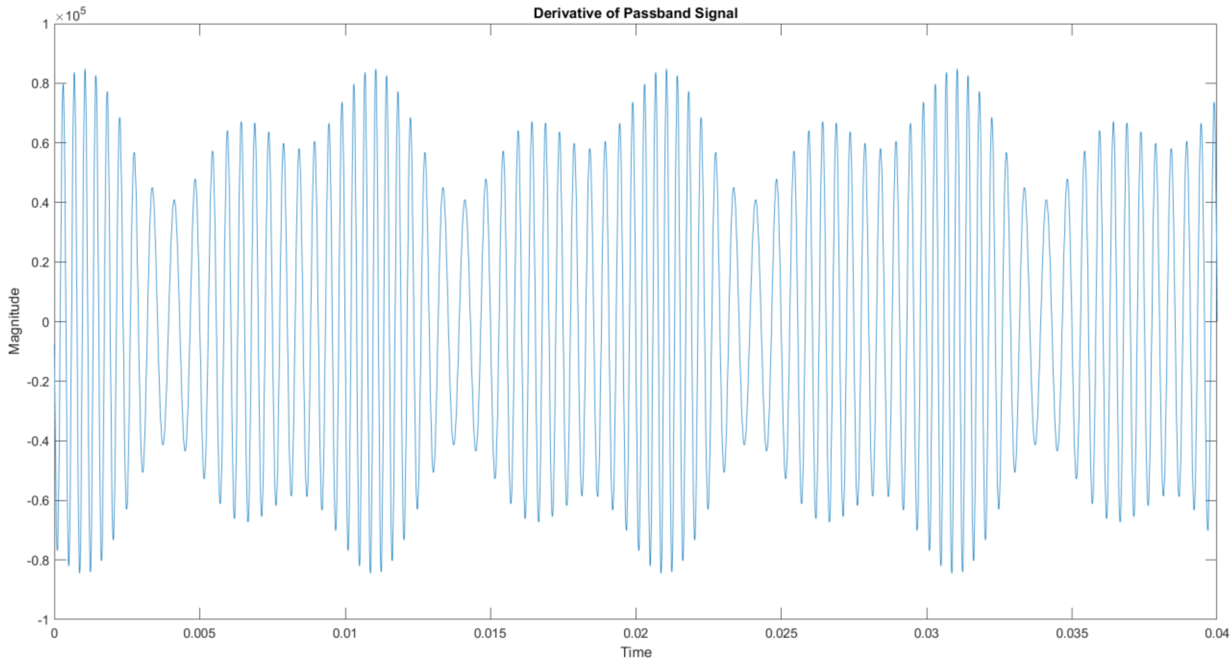
$$\theta(t) = 2\pi k_f \int_0^t m(\tau)d\tau$$

$$f_c = 2000\ Hz, \qquad A_c = 5, \qquad k_f = 100$$

The frequency modulated signal looks like the following:



The derivative of the passband signal looks like the following in time domain:



We detect the upper envelope of this derivative (using Hilbert transform) to obtain the message signal.

The demodulated signal looks like the following: