Title of the Experiment

Design of Binary Phase Shift Keying (BPSK) Modulator & Demodulator using eSim

Theory:

Binary Phase Shift Keying (BPSK) is a two-phase modulation scheme, where the 0's and 1's in a binary message are represented by two different phase states in the carrier signal: $\theta = 0^o$ for binary 1 and $\theta=180^o$ for binary 0. The circuit contains two ASK generation circuits; one ASK circuit generates the waveform for logic1 and the other ASK circuit generates the waveform for logic 0, which are then fed to a differential amplifier. The differential amplifier subtracts the two-input signal resulting in a phase shift of 180^o at positive and negative edges of the message signal (called as Phase Shift Keying (PSK) signal).

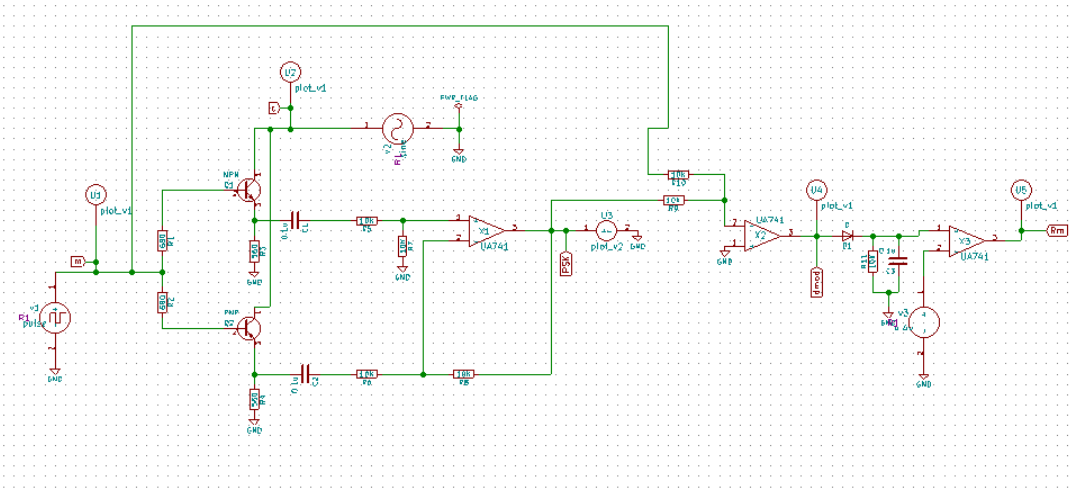

Figure 1. BPSK Modulator and Demodulator eSim circuit

This PSK signal is then demodulated by the help of summing amplifier-envelope detector-comparator stages to get back the original message signal transmitted.

Simulation Results:

1. Ngspice plots:

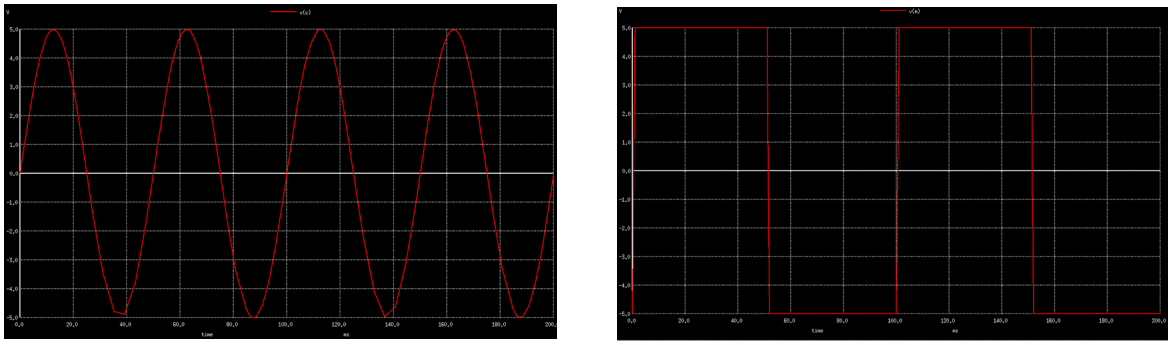

Figure 2. ngspice plot of message signal c(t) and m(t)

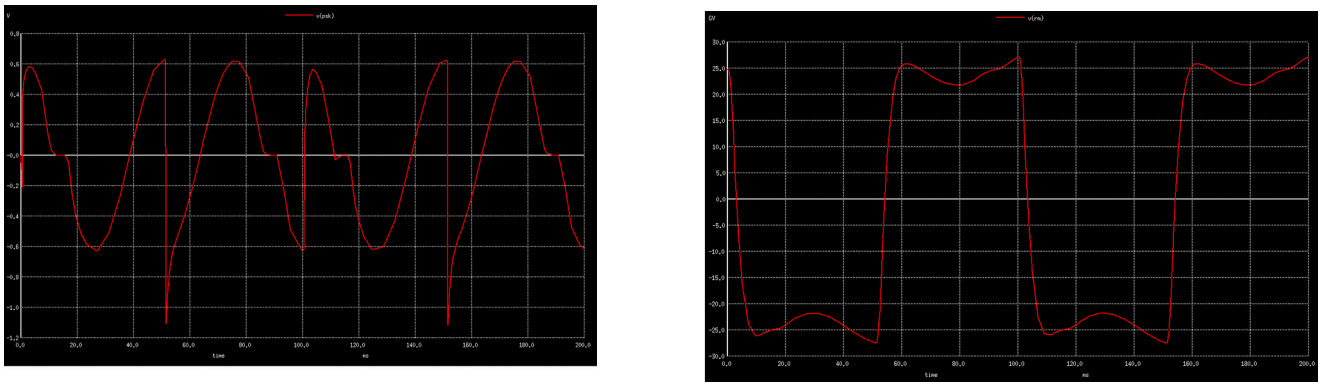

Figure 3. ngspice plot of PSK and de-modulated signal

2. Python Plots:

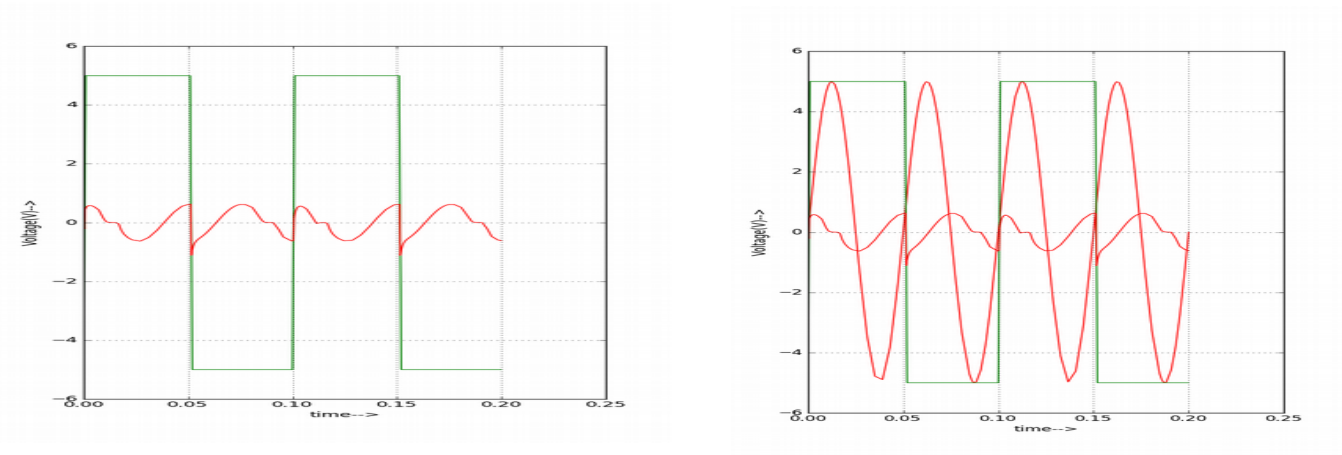

Figure 4. python plot of msg and PSK modulated signal

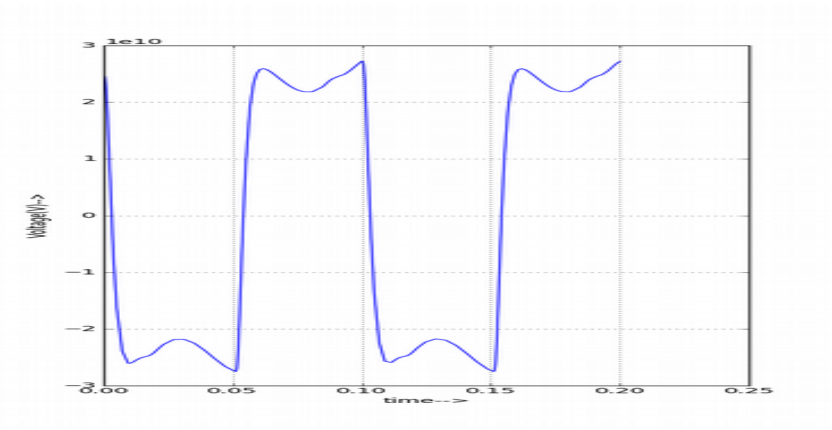

Figure 5. python plot of de-modulated signal

Conclusion:

Thus we have designed and implemented BPSK modulator & demodulator using eSim and we have got the appropriate waveforms.

References:

1. https://www.google.co.in/search?biw=360&bih=269&tbm=isch&sa=1&ei=dEIEWrX3GMzVvATbyIbwCw&q=bpsk+modulator+and+demodulator+transistor&oq=bpsk+modulator+and+demodulator+transistor (6-11-2017).
2. Digital Communications by Simon Haykin, 3rd edition, pearson.
3. Digital Communications by Sklar, 2nd edition.