

BITT POLYTECHNIC, RANCHI

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Communication Systems

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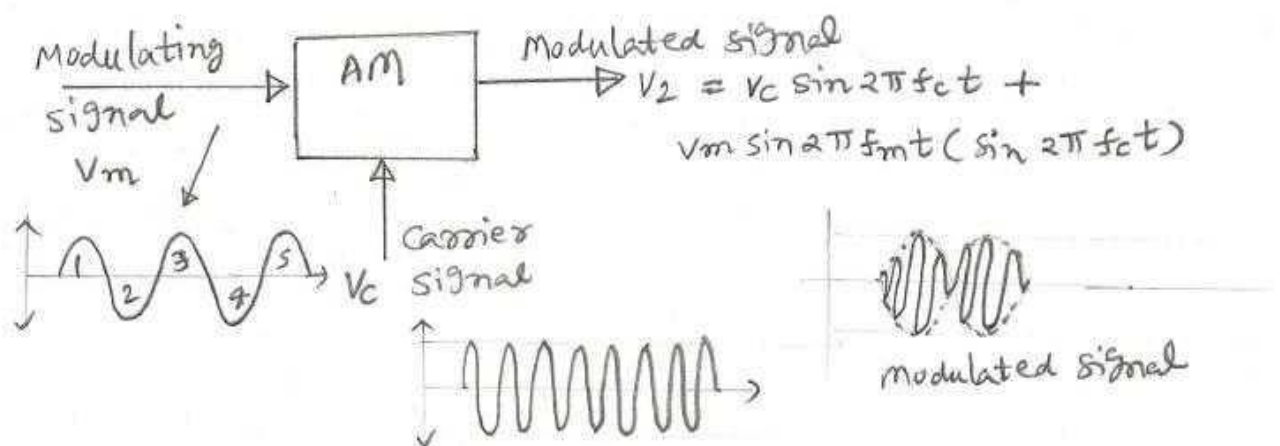
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Comparisons of AM, FM & PM:

All these modulation types are analog modulation techniques. All the modulation types are used to transmit information from one place to the distant place. Mostly this techniques are employed in wireless communication.

For any analog modulator type, there are two inputs and one output. The two inputs are modulating signal (i.e. analog information to be transmitted) and carrier signal waveform. The output is referred as modulated waveform.

Amplitude Modulation (AM)



Amplitude Modulation(AM) is the modulation technique in which carrier amplitude varies based on analog baseband information signal to be transmitted using wireless device.one of the application of amplitude modulation is radio.

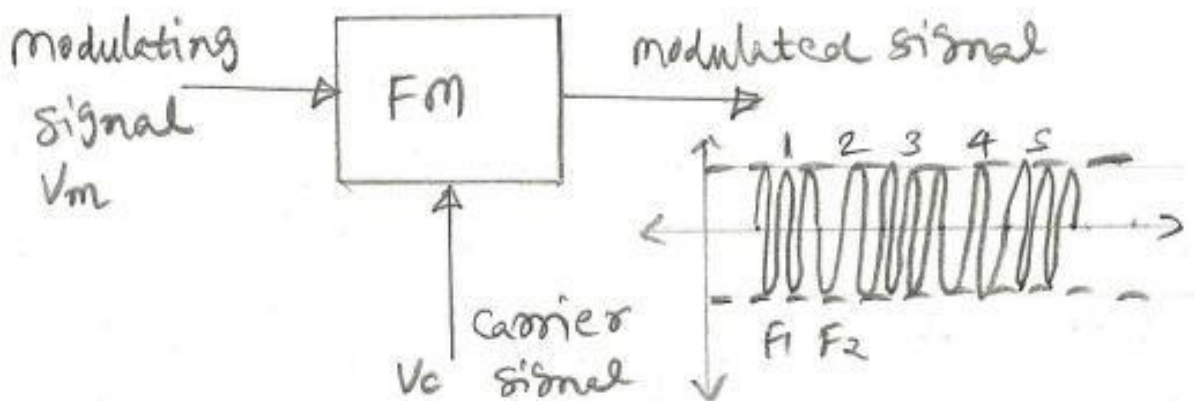
AM broadcast signals are mainly propagated by ground waves during the day and by sky waves at night time.

Advantages, disadvantages and applications of AM:

Different amplitude modulation techniques have their own advantages and disadvantages as mentioned below:

- DSB-SC: It has lower power consumption and it is simple technique of modulation. But it is complex in detection at AM receiver. It is used in analog TV transmission systems to transmit color information.
- SSB-SC: It is used for efficient management of spectrum. But generation of SSB modulation is difficult and it is complex in detection at receiver. It is used for 2-way radio FDM.
- VSB-SC: It is compromise between DSB and SSB types. But demodulation system is complex. Bandwidth of VSB-SC is 25% higher than SSB-SC. It is used for analog TV broadcast systems.

Frequency Modulation (FM)

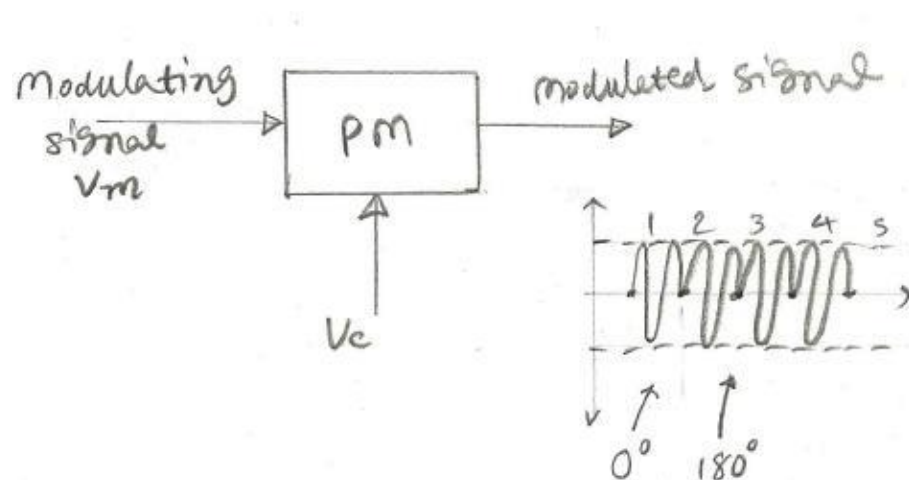


Frequency Modulation(FM) is the modulation technique in which carrier frequency varies based on analog baseband information signal to be transmitted using wireless device. Frequency modulation is considered to be superior compare to the Amplitude modulation due to better noise immunity and its ability to reject the interfering signals due to the capture effect.

Advantages, disadvantages and applications of FM

- Advantages: Increased immunity to noise.
- Disadvantage: Requires larger bandwidth.
- Application: Radio Broadcasting, Direct Satellite Broadcasting

Phase Modulation (PM)



Phase Modulation(PM) is the modulation technique in which carrier phase varies based on analog baseband information signal to be transmitted using wireless device. If a constant amplitude as well as constant frequency sine wave carrier is given to the phase shifter the output is phase modulated signal. Phase modulation is referred as indirect frequency modulation due to the fact that

phase modulation produces frequency modulation. The effect of variation in amount of phase shift is proportional to change in the carrier frequency.

Advantages, disadvantages and applications of PM

- Advantages: Increased immunity to noise.
- Disadvantages: More complex hardware at receiver.
- Applications: Used in data communication systems.

Following table mentions difference between AM, FM and PM modulation techniques.

Feature	AM	FM	PM
Function	amplitude of carrier wave varies as per amplitude or voltage of modulating signal input.	Frequency of carrier wave varies as per voltage of modulating signal input.	Phase of carrier wave varies as per voltage of modulating signal input.
Carrier parameter	frequency of carrier wave is kept constant	amplitude of carrier wave is kept constant	amplitude of carrier wave is kept constant
Types	AM types include DSB-SC, SSB, VSB etc. Refer DSB-SC vs SSB-SC and SSB vs VSB modulation	Digital FM types include FSK, GFSK, Offset FSK etc. Refer MSK and GMSK modulation	Digital PM types include BPSK, QPSK, QAM(combination of amplitude and phase modulation types) Refer BPSK and QPSK,QAM modulation types.