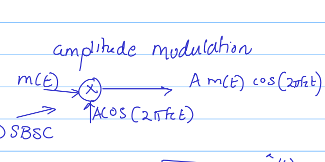
Lecture 12 19/08/2019

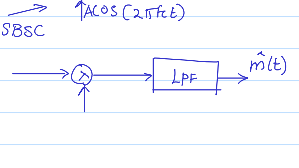
Review

Passband communication schemes.

modulation at the transmitter — amplitude modulation

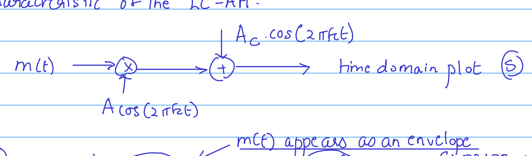


demodulation at the receiver.



a) DSBSC
b) Plain AM, Large carrier AM.

Characteristic of the LC-AM.

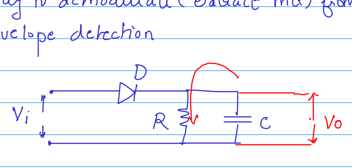


(S)

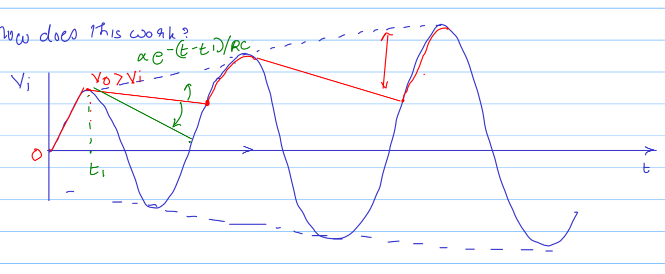
Suppose $m(t)$ is $A_m \sin(2\pi f_m t)$

$f_c \gg f_m$

A simple way to demodulate (extract $m(t)$ from the passband signal) is to do envelope detection



how does this work?



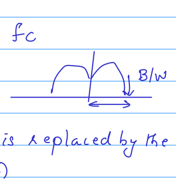
If RC is large?
If RC is small? } how does one choose RC such that Vo follows the envelope but does not follow the carrier?

what characterises the rate of change of the envelope?
what is the envelope? $m(t)$
f_m decides the rate of change of the envelope.

$RC < 1/f_m$ so that the ED follows the envelope.

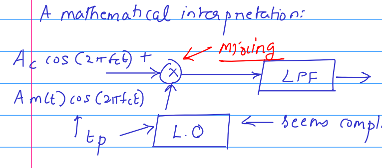
what decides variation rate of the carrier? f_c

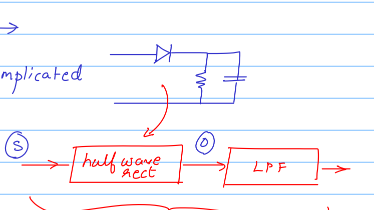
$1/f_c < RC$

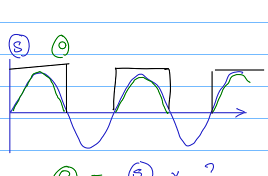


$1/f_c < RC < 1/f_m$ and in general f_m is replaced by the one sided B/W of $m(t)$

A mathematical interpretation:





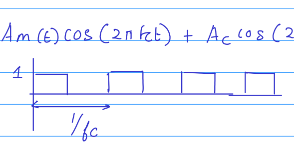


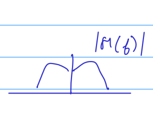
(O) = (S) × ?
(S) × (q)

(S) is replaced with a LC-AM signal
as long as H/W rectification happens (S) × (q) :

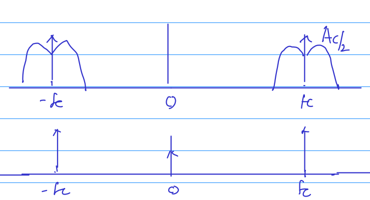
(S) $= A m(t) \cos(2\pi f_c t) + A_c \cos(2\pi f_c t)$

(q) =

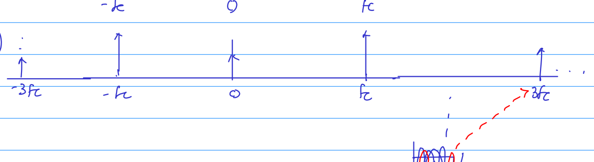


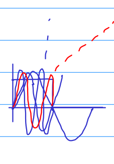


F((S)) :



F((q)) :





F((S) × (q))

convolution ppty : $\left(x(t) * y(t) = x(t) * (y_1(t) + y_2(t))\right)$