Diffence
q
DPM

Delta Modulation → Delta modulation (DM) is a DPCM scheme in which the difference signal $\Delta(t)$ is encoded into just a single bit. The signal bit providing for just two possibilities, is used to increases or decrease the estimate $\hat{m}(t)$.

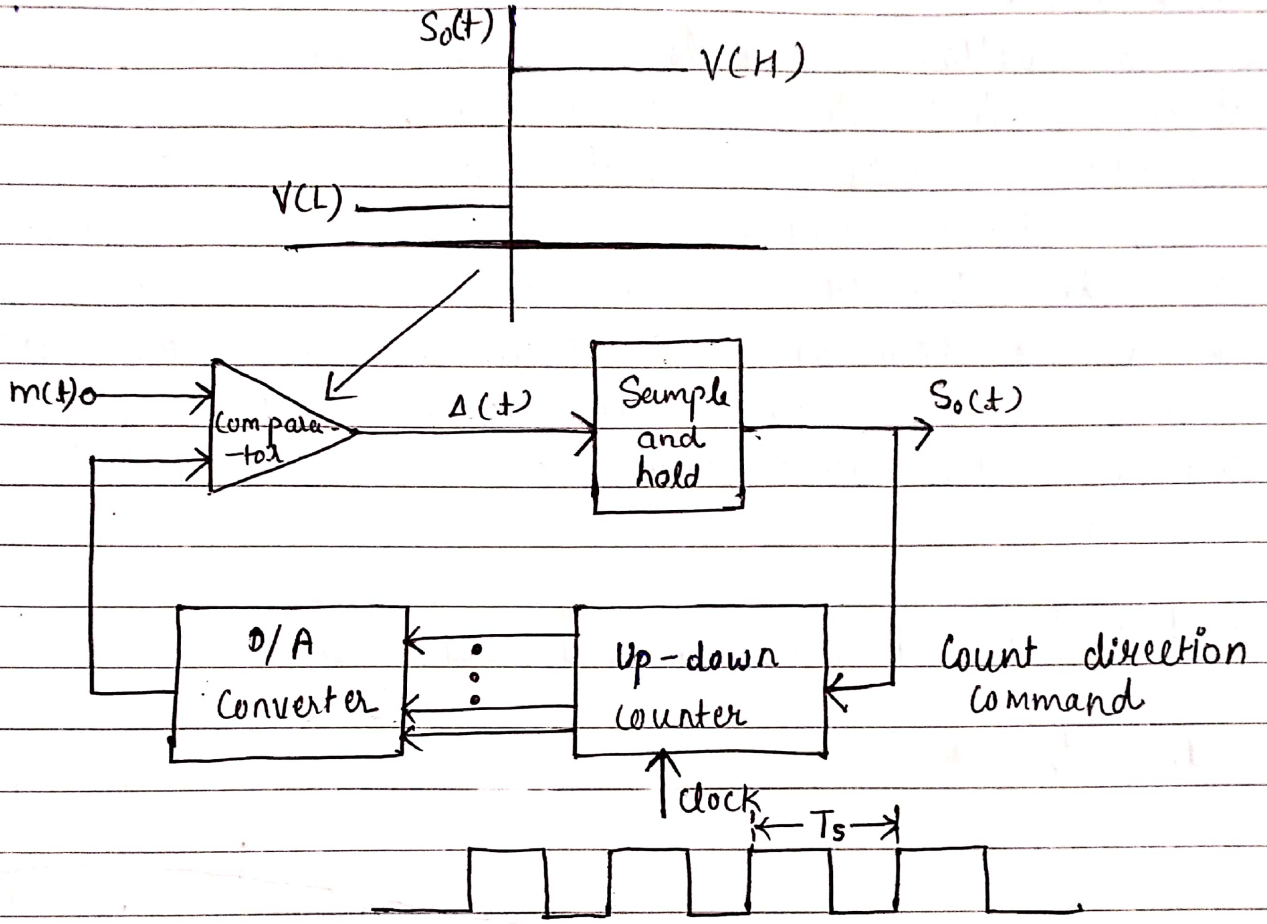


Fig:- A delta modulator.

This scheme is known as linear delta modulation. The original signal $m(t)$. The original signal $m(t)$ and the approximated signal $\hat{m}(t)$ are applied as inputs to a comparator and comparator makes a comparison b/w two inputs. The comparator

~~makes~~ a comparison between two inputs has fixed o/p V(H) when $m(t) > \hat{m}(t)$ and a different o/p V(L) when $m(t) < \hat{m}(t)$.

The up-down counter increments or decrements its count by 1 at each active edge of clock wave form. The count direction is determined by the voltage levels at the input to the counter. When this binary input is at the levels V(H), the counter counts up and when it is at the level V(L) the counter counts down. The digital o/p of the counter is converted to the analog signal with the help of D/A counter. The wave form obtain by the system in fig (a) is fig(c). By assuming that the active edge is the falling edge.

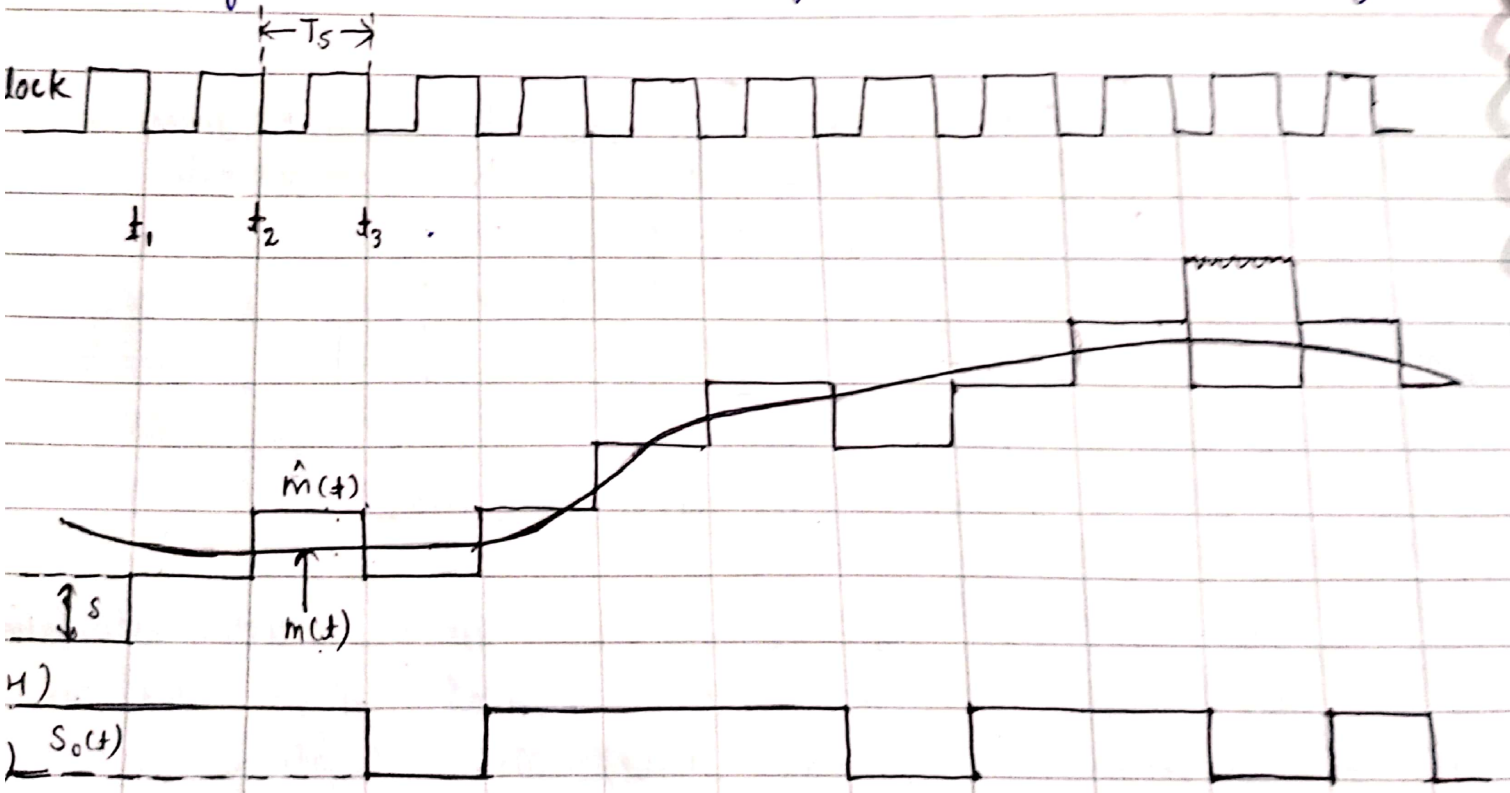


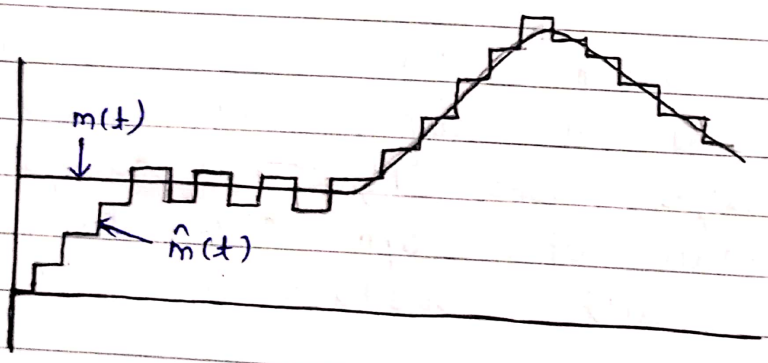
Fig (b) The response of a delta modulator to a bandband signal m(t)

For time before t_1 we find $m(t)$ is greater than $\hat{m}(t)$ so that o/p is V(H). at time t_1, when the active clock edge appear the counter is increamented and immediately the signal $\hat{m}(t)$ jumps by an amount equals to step size.

At time t_2 we still find $m(t)$ is greater than $\hat{m}(t)$ so that o/p remains at V(H) and there is another upward jump in $\hat{m}(t)$.

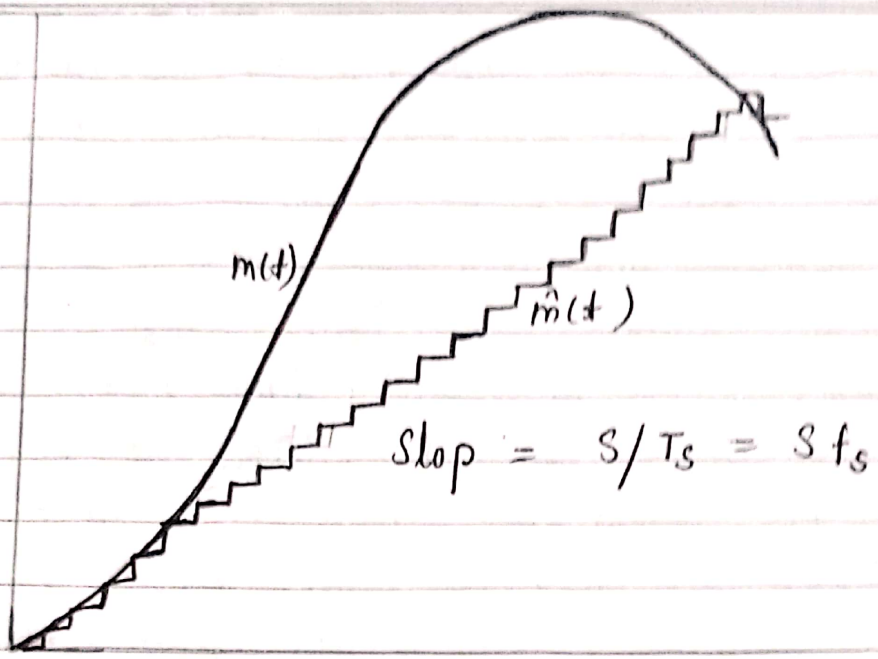
At time t_3 $m(t)$ is less than $\hat{m}(t)$ so o/p is V(L) the counter decrement and there is a downward jump in $\hat{m}(t)$ and so on.

From fig it is clear that even when $\hat{m}(t)$ has caught up $m(t)$ and even though $m(t)$ remains almost constant. $\hat{m}(t)$ swings up and down, above and below $m(t)$



Fig(c) Illustrating the "Start-up" response in delta modulation and the "hunting" of $\hat{m}(t)$ about $m(t)$

The limited ability of delta modulation is described in fig.



fig(d) Slope overload in the linear DM.

Here we have a signal m(t) which over an extended time exhibits a slope which is so large that o/p m̂(t) can not keep up with it. The large disparity b/w m(t) and m̂(t) is known as slope overload error.

Slope overload error occur whenever original signal has a slope larger than S/Ts where S = step size and Ts = Sampling time. The linear form of o/p accounts for the name linear delta modulation.