

Adaptive Data Modulation (ADM) - Adaptive data modulation is a modification of ASK and modulation. In ASK, the step size is not fixed, varies when slope overload occurs the step becomes larger (i.e. to allow this) to catch up the original signal rate) not rapidly. It's whole diagram is represented in fig 4

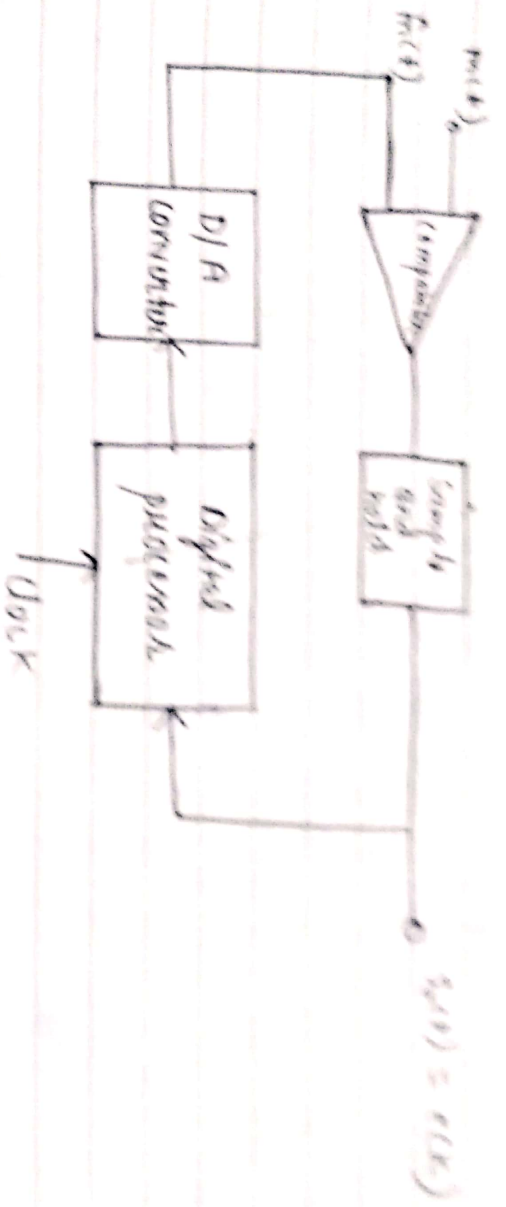


Fig An adaptive DTM

Here the digital processor has an accumulator and at each active edge of clock wave form generates a step of size S which increase or decrease the accumulator. In ASK, the generated step size is not fixed but it is always a multiple of basic step. So, the process generates step size as follows. In k^{th} active clock edge, the processor generates a step which

is equal in magnitude to the step generated in $(k-1)^{\text{th}}$ active edge. This step is a step which is added or subtracted from the accumulator as required to move $\hat{m}(t)$ to $m(t)$. If the direction of the step at edge k is same as edge $(k-1)$ then the processor increase the magnitude of the step by amount S_0 and if the direction is opposite then the processor decrease the magnitude of step size by amount S_0 .

Now we consider that the o/p $\hat{m}(t)$ is represented as $e(k)$ which show the error then it is convenient to arrange that

$e(k) = +1$ if $m(t) > \hat{m}(t)$ immediately before the k^{th} edge.

$e(k) = -1$ if $m(t) < \hat{m}(t)$ immediately before the k^{th} edge.

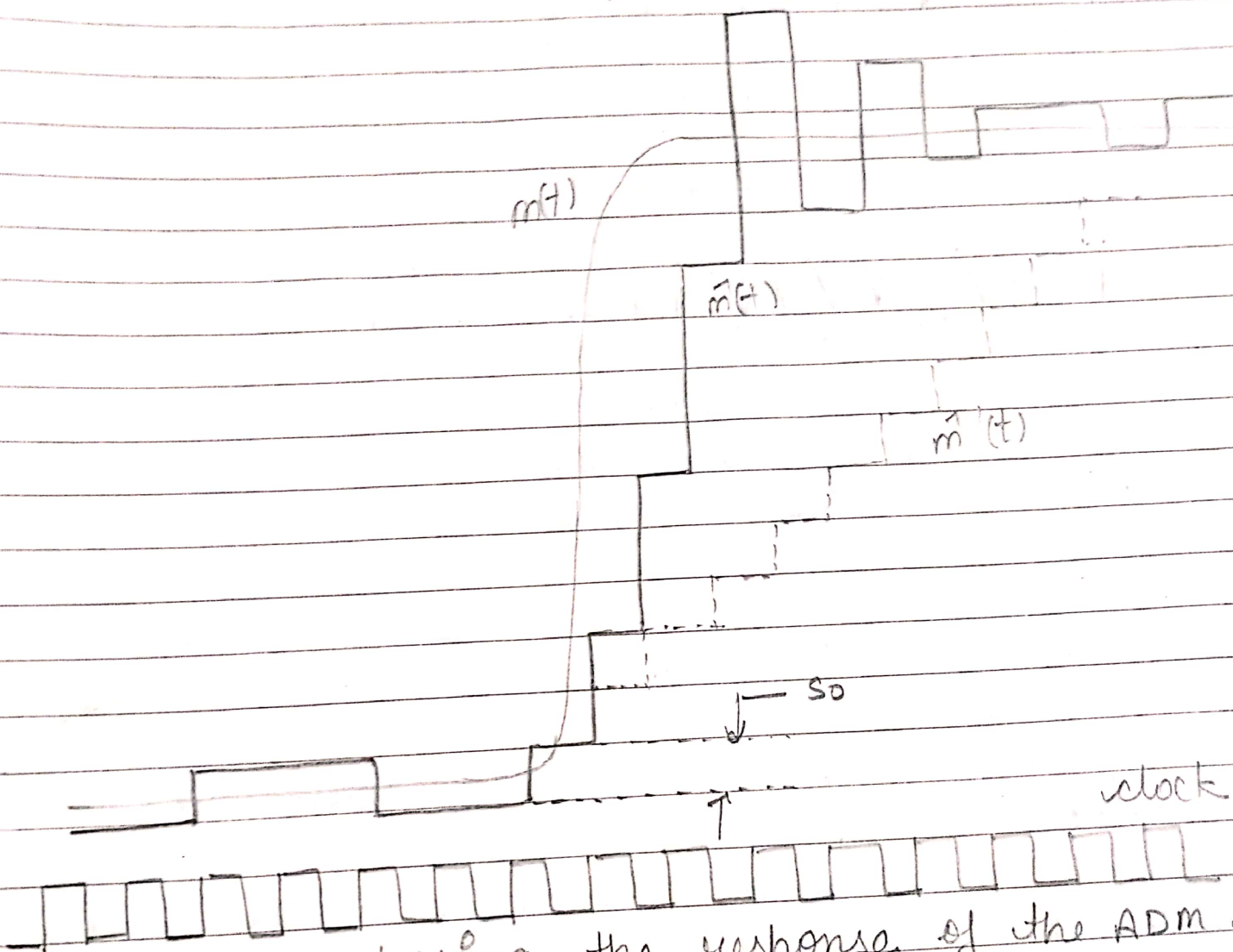
Thus at sampling time k the step size is given as

$$S(k) = |S(k-1)| e(k) + S_0 e(k-1)$$

Now we consider a fig \rightarrow (b)

From fig, it is clear that as long as $m(t) > \hat{m}(t)$, the jump in $\hat{m}(t)$ becomes larger and longer. So that, in the case of adaptive delta modulation the o/p catches the original signal soonly. It is also observed from the fig that ADM system reduces slope error but increases the quantized

error and when the original signal becomes constant the o/p oscillate about original signal but the clock freq. of oscillation is $\frac{1}{2}$ to the clock frequency.



Waveforms comparing the response of the AD converter