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"If you can think, you can Achieve"
So start thinking..

Renu Raj Garg
M.Tech (VLSI Design)
13 Year of Teaching Experience
Worked 10 Year in NTRO

GATE 2024

प्रचण्ड Batch

COMMUNICATION

QUESTIONS FROM DELTA MODULATION

TIME- 9:00PM

RENU SIR

Chapter-2

Digital Communications

In today's lecture we will cover the following Topis :

1. *Delta Modulation (DM)*

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GATE 2023 RESULT

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ENGINEERS

EE & EC ENGINEERING

EXAM TARGET	SUBJECT	TIME	FACULTY
ALL PSUs	ENGINEERING MATHS	11:00 AM	ANANT SIR
GATE 2024-25	NETWORK THEORY	6:00 PM	RAVI SIR
GATE 2024-25	ELECTRICAL MACHINE	7:30 PM	SANTAN SIR
GATE 2024-25	COMMUNICATION	9:00 PM	RENU SIR

FREE APP
CLASS SCHEDULE

EE & ECE ENGINEERING

GATE

NETWORK THEORY	SATURDAY Live @11AM	RAVI SIR
COMMUNICATION	WEDNESDAY Live @8PM	RENU SIR
ANALOG ELECTRONICS	THURSDAY Live @8PM	LAWRENCE SIR
ENGINEERING MATHEMATICS	FRIDAY Live @11AM	ANANT SIR
ELECTRICAL MACHINE	MONDAY Live @8PM	SANTAN SIR

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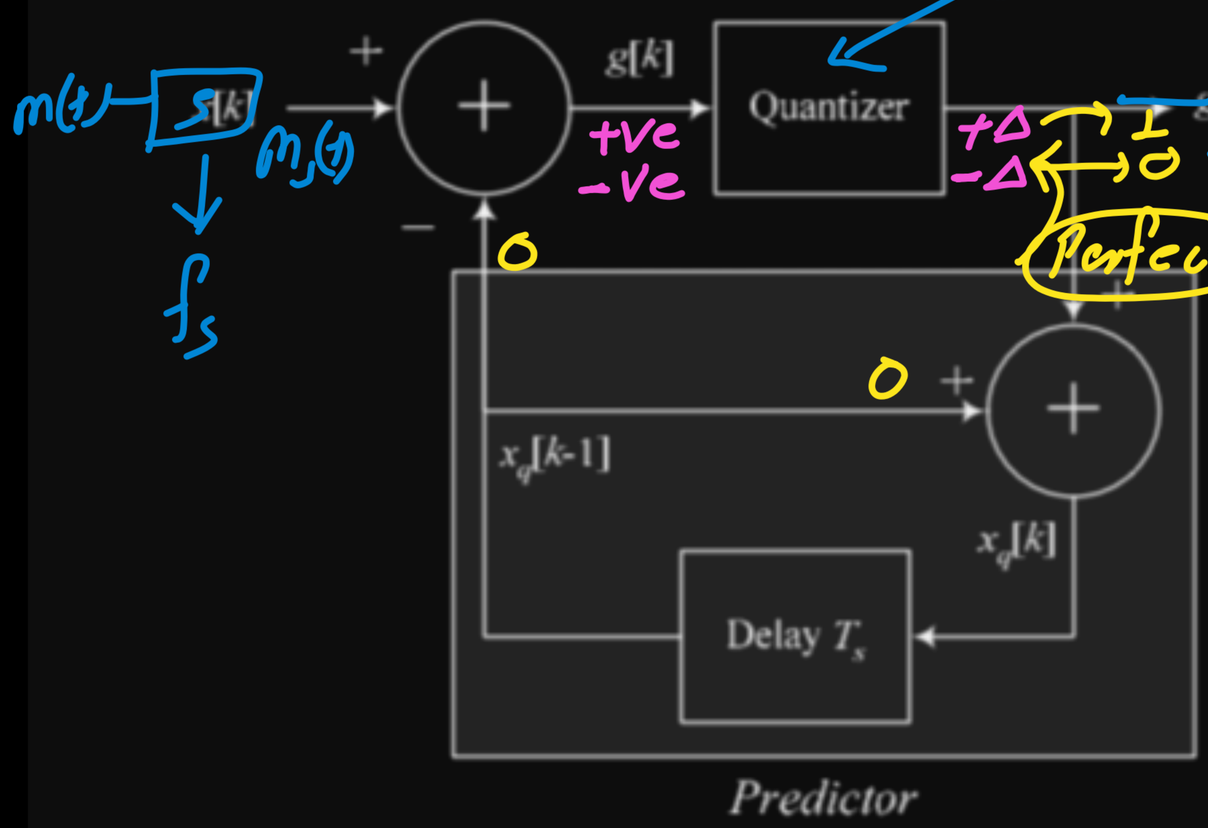
DPCM

DM

2 level Quantizer



$R_b = nf_s = f_s$

PCM → DPCM

R_b → R_b

Q_e → Q_e ' ↑↓

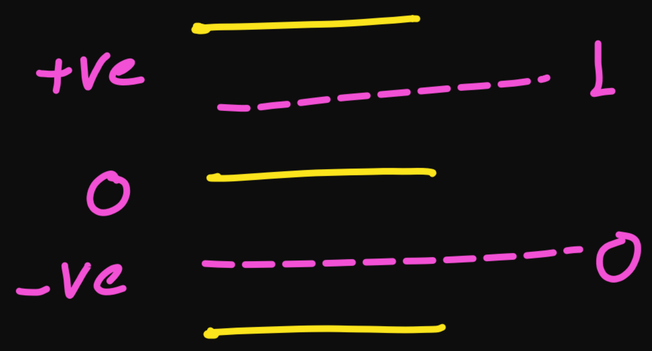
DPCM → Encoder (n=1 bit)

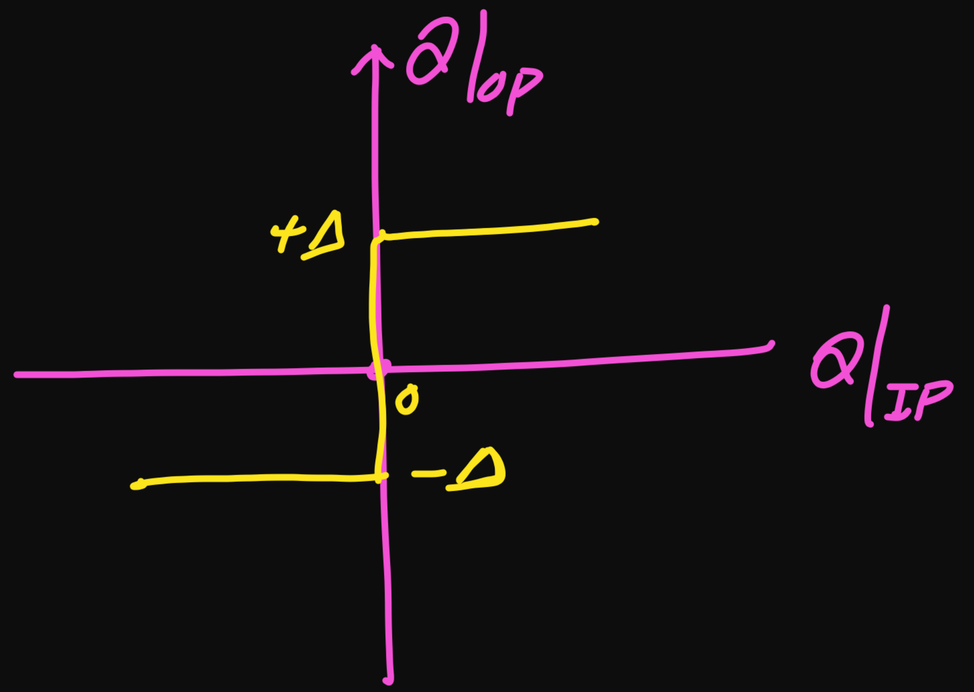
↓

DM

DM = 1 bit DPCM

DM → BW/R_b is Reduced → Q_e ↑↑





$m_s(t) \rightarrow$ 1, 2, 3, 2, 1

$\downarrow$ $\downarrow$ $\downarrow$ $\downarrow$ $\downarrow$

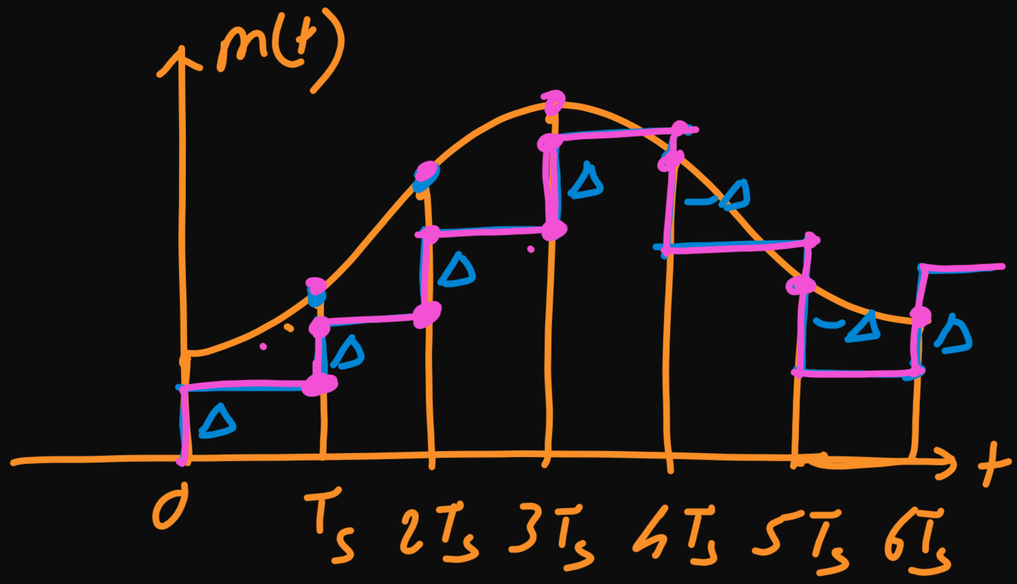
$+\Delta$ $+\Delta$ $+\Delta$ $-\Delta$ $-\Delta$ — E — 1 1 1 0 0

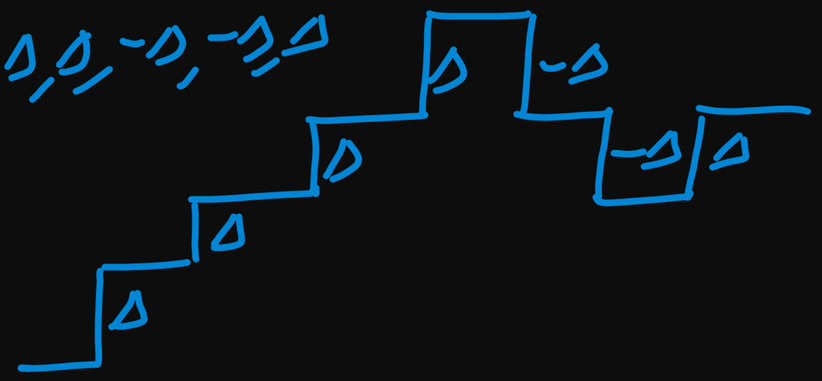
$\downarrow$ $\downarrow$ $\downarrow$ $\downarrow$ $\downarrow$

Δ 2Δ 3Δ 2Δ Δ

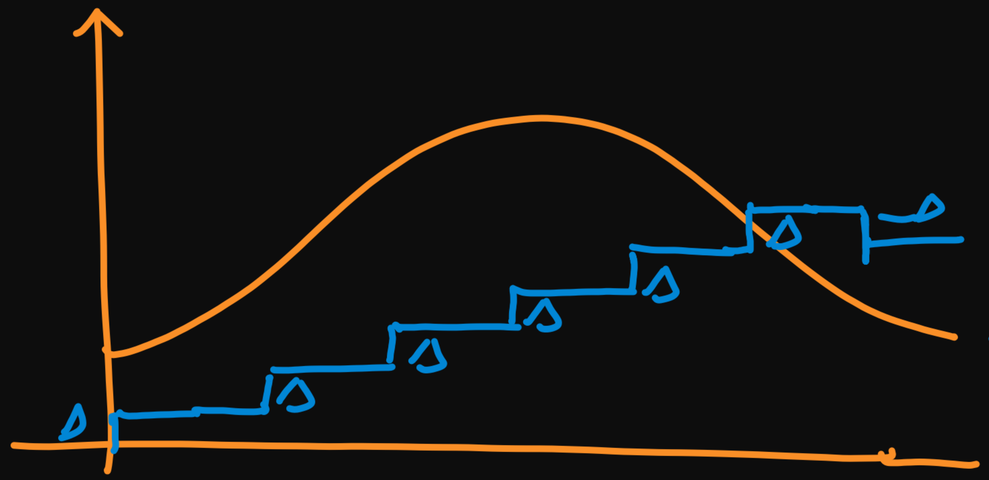
$n=1$

$$R_b = n f_s = f_s = \frac{1}{T_s} = \frac{1}{T_b}$$

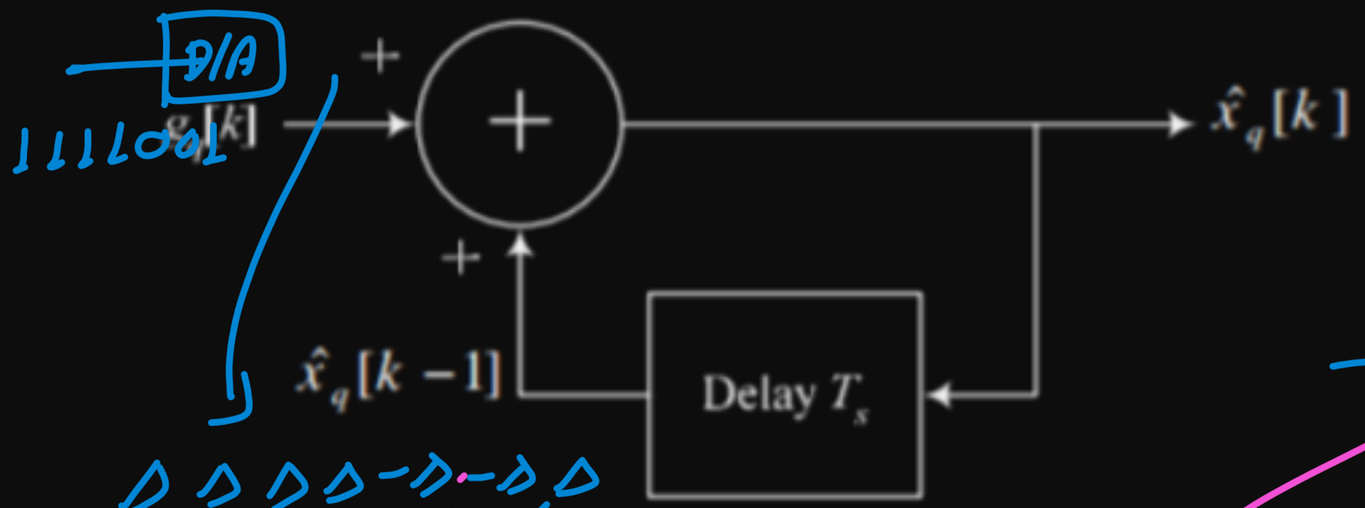


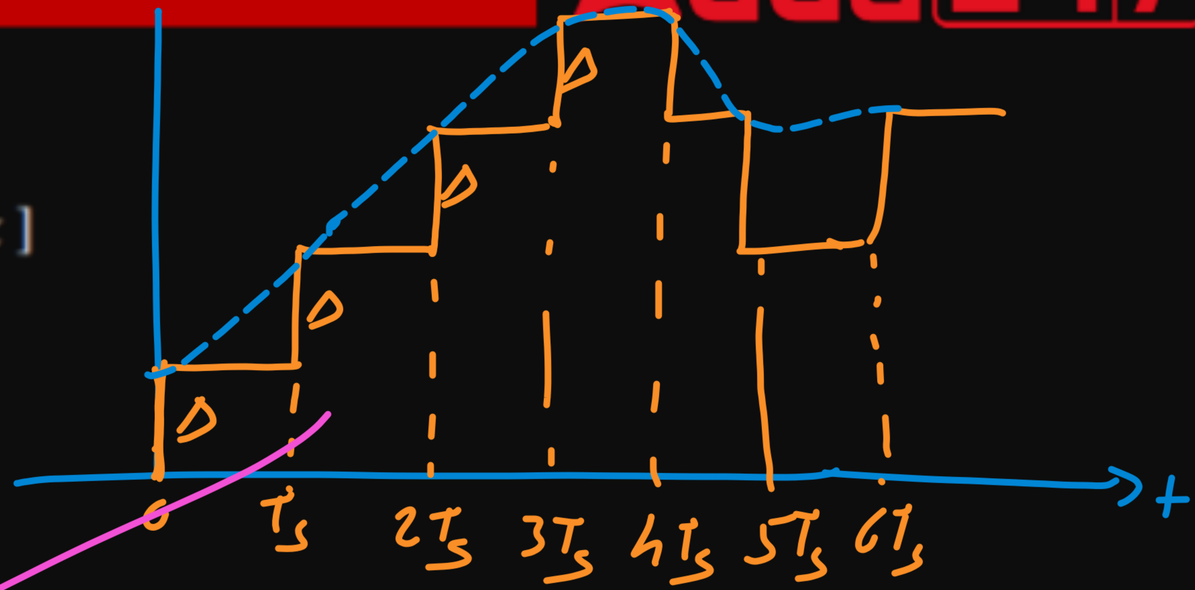


1 1 1 1 0 0 1



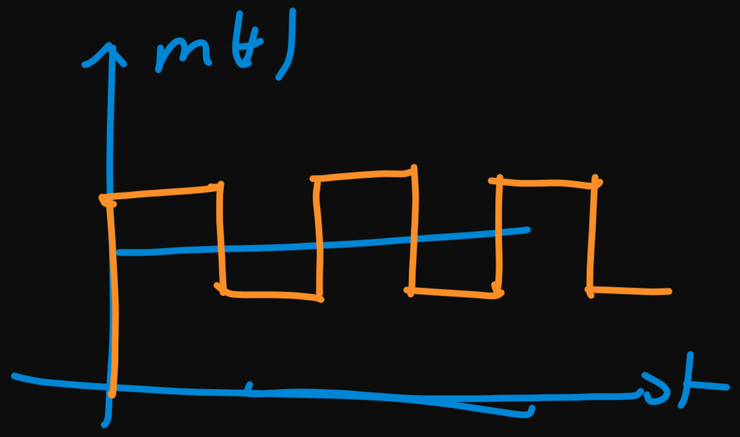
→ Δ, Δ, Δ, Δ, Δ, Δ, −Δ → 1 1 1 1 1 1 0





Δ & T_s should be Syn.

Slope of o/p of DM(Rx) = $\frac{\Delta}{T_s}$ (Very imp. Parameter)



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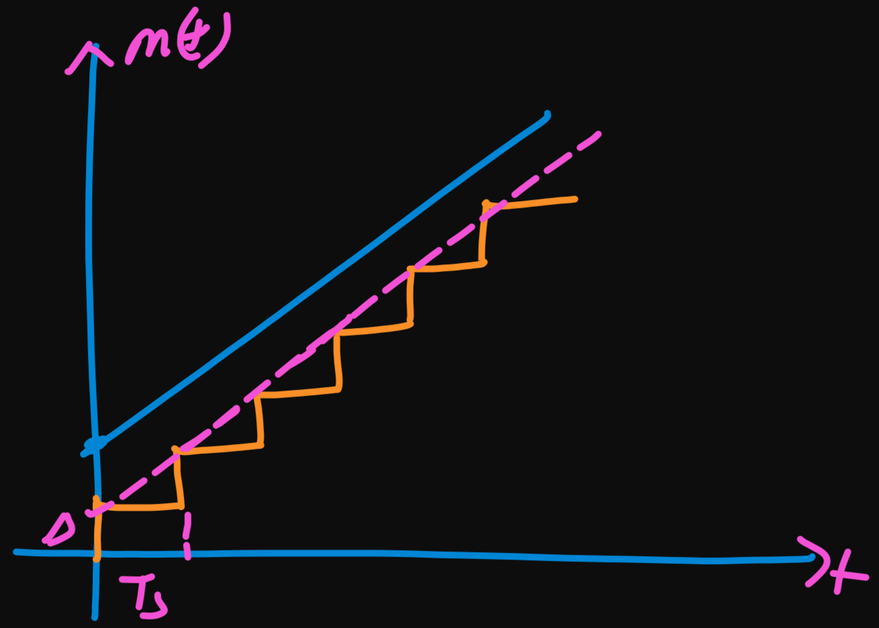
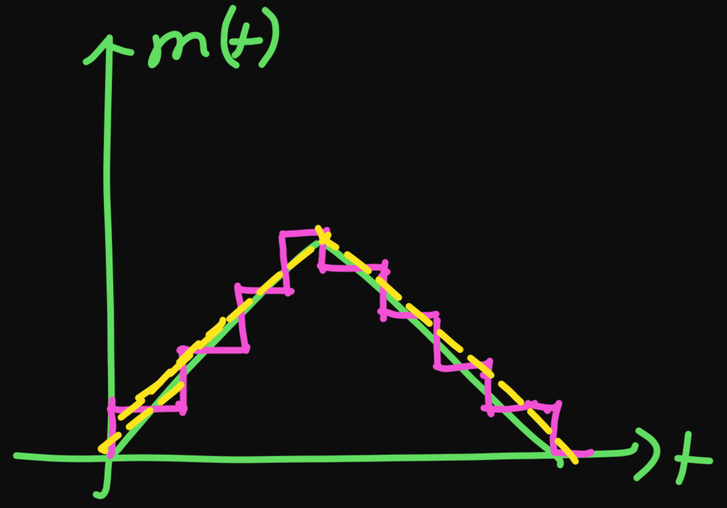
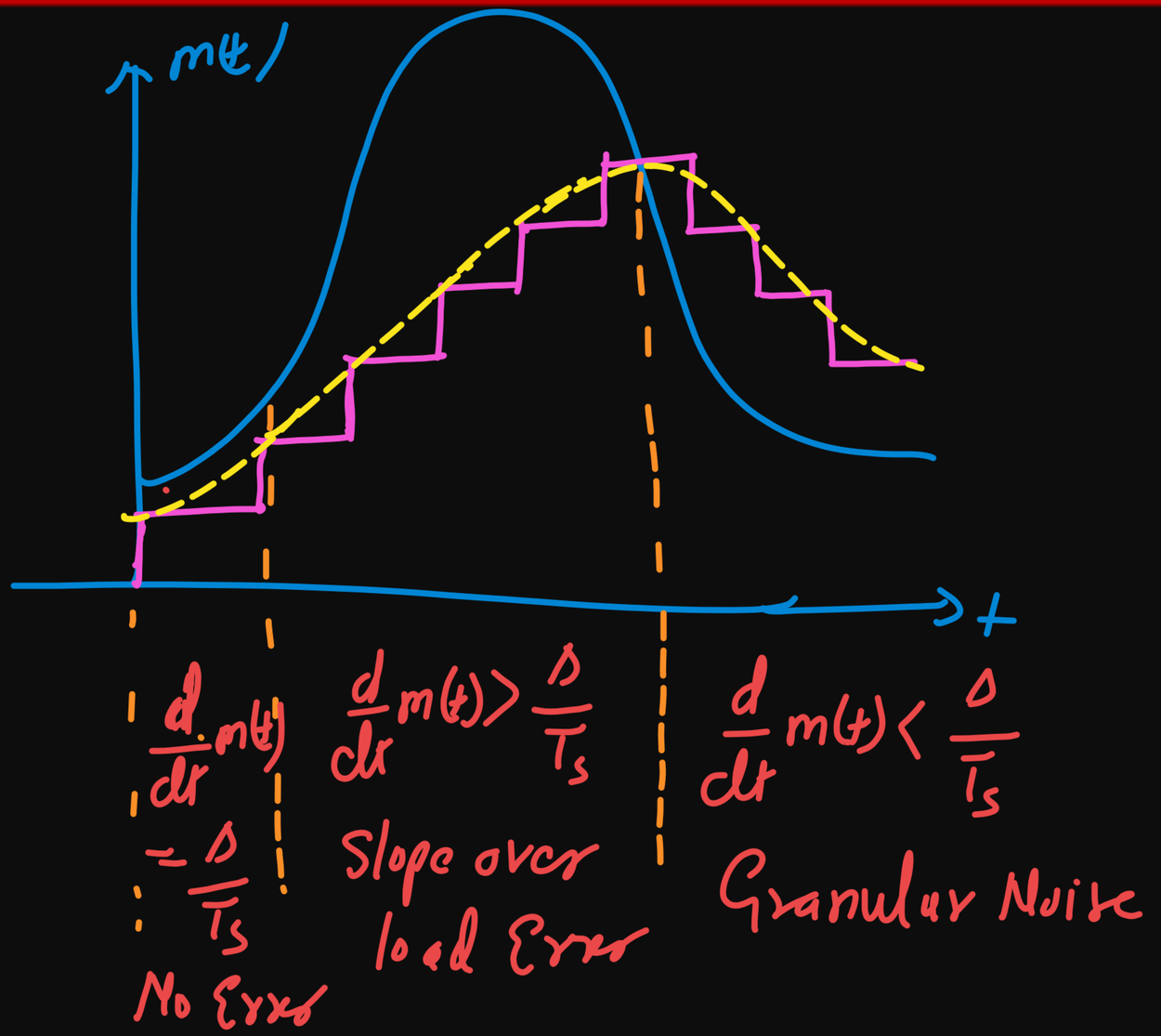
Constant slope msg:



$$\frac{d}{dt}m(t) = \frac{\Delta}{T_s}$$



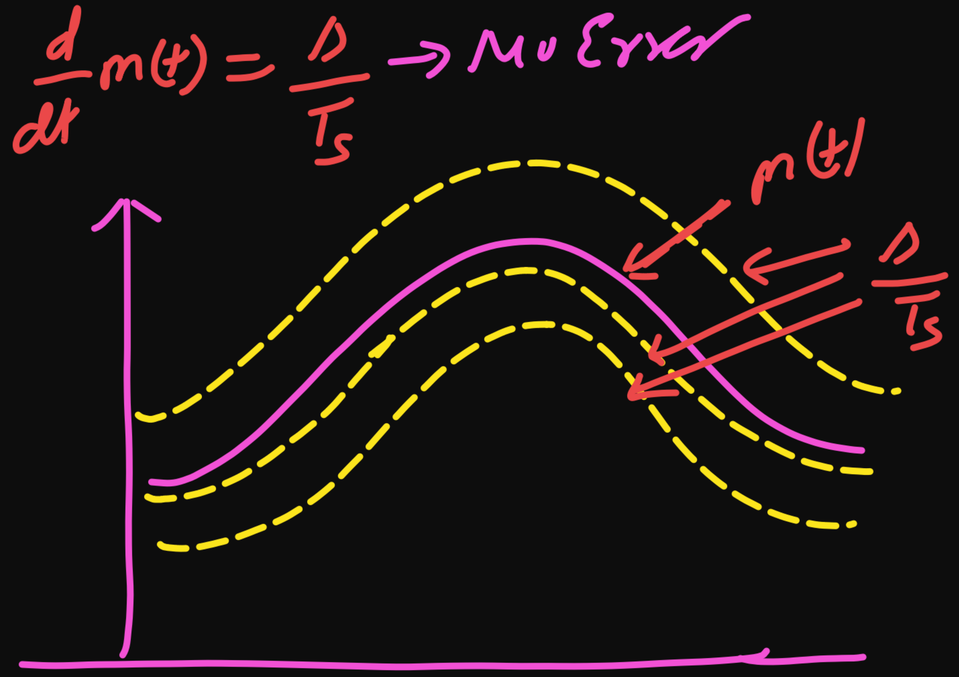


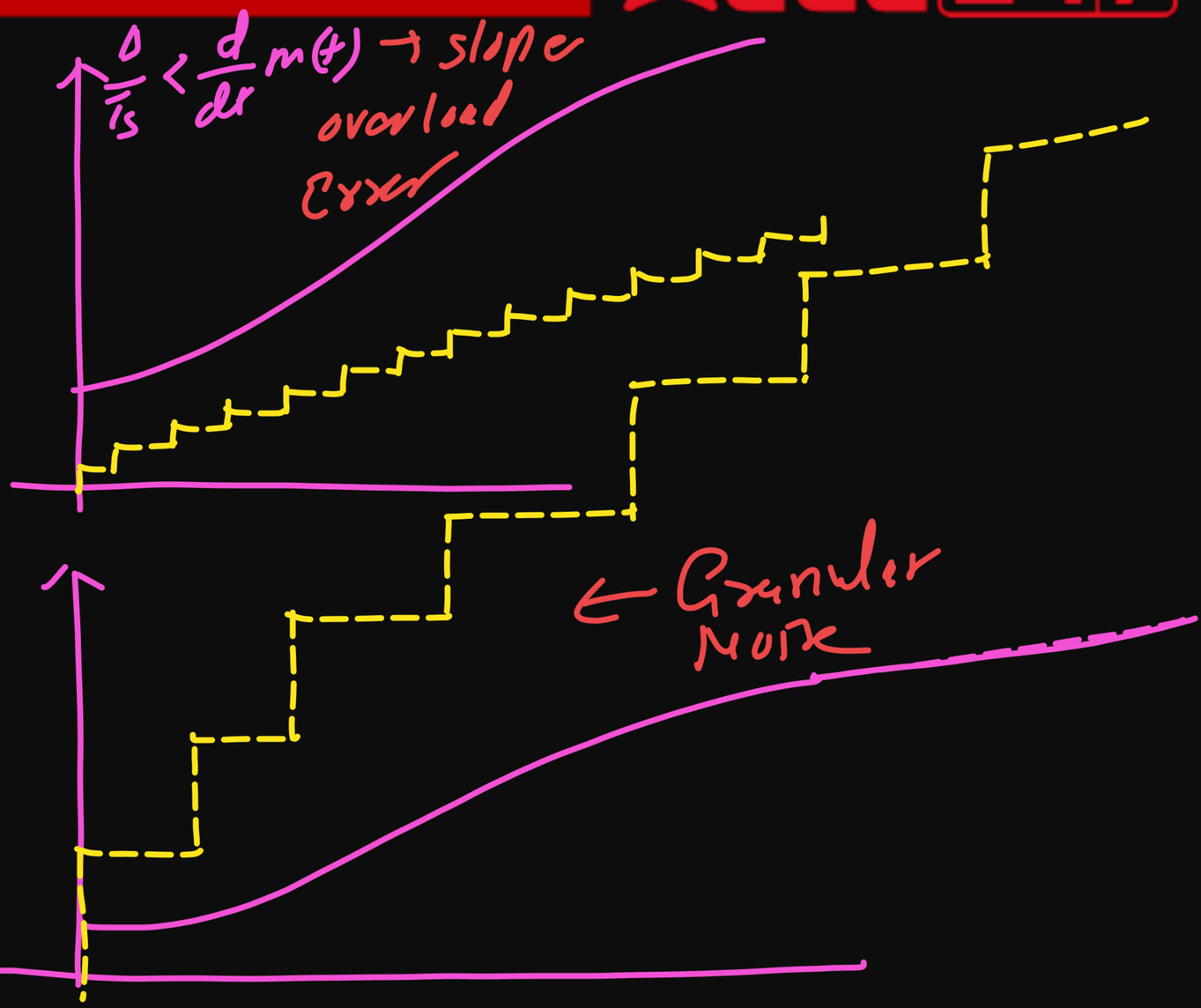
$$\frac{\Delta}{T_s} = \frac{d}{dt}m(t)\Big|_{max} \longrightarrow \text{No Error}$$

$$\frac{\Delta}{T_s} < \frac{d}{dt}m(t)\Big|_{max} \longrightarrow \text{Slope overload Error}$$

$$\frac{\Delta}{T_s} > \frac{d}{dt}m(t)\Big|_{max} \longrightarrow \text{Granular Noise}$$

PCM / DM


$\frac{d}{dt}m(t) = \frac{\Delta}{T_s}$ → Mu Error
m(t)
$\frac{\Delta}{T_s}$


$\frac{\Delta}{T_s} < \frac{d}{dt}m(t)$ → slope overload Error
← Granular Noise

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