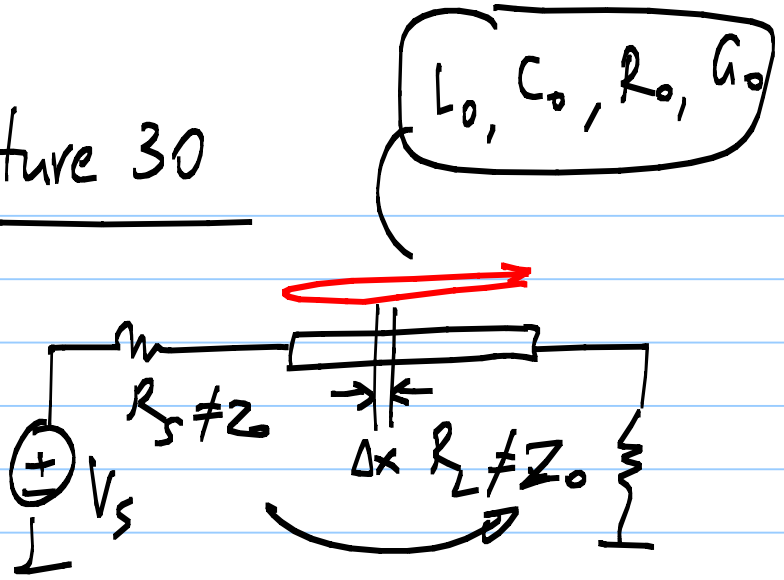
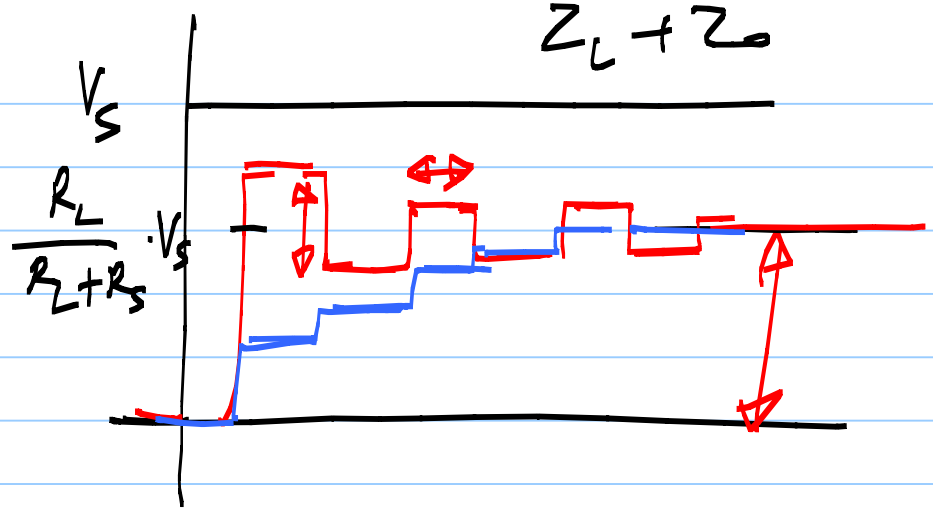
Lecture 30

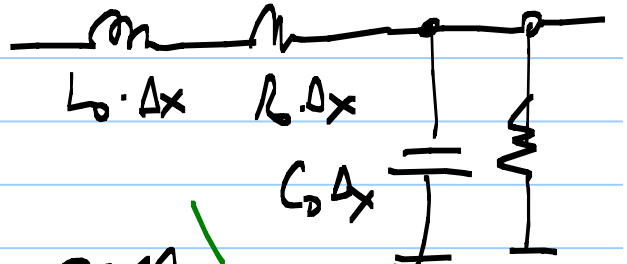


$$\Gamma = \frac{Z_L - Z_0}{Z_L + Z_0}$$



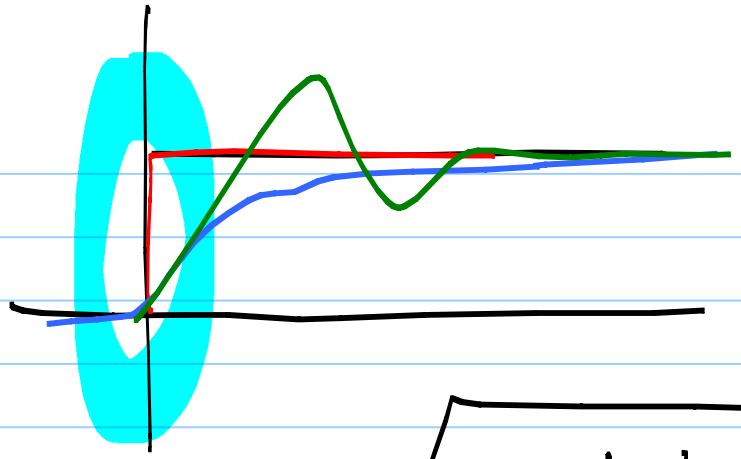
* Ideal, lossless T-line, w/ mis-termination

$$Z_0 = \sqrt{\frac{L}{C}} \quad : \text{real number}$$

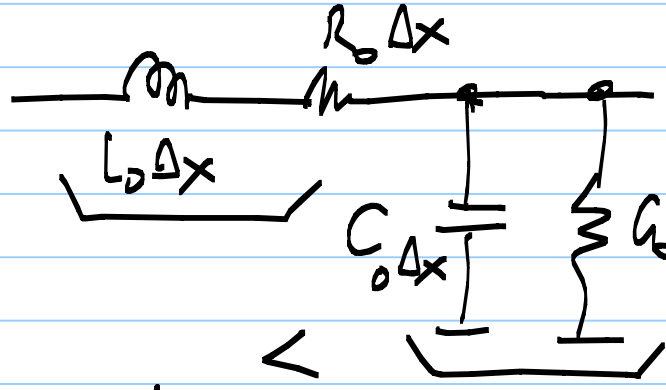


* Series resistance — transfer fn. lowpass
  - Skin effect → Resistance ↑ freq.

spread out the response



Lossy transmission line:

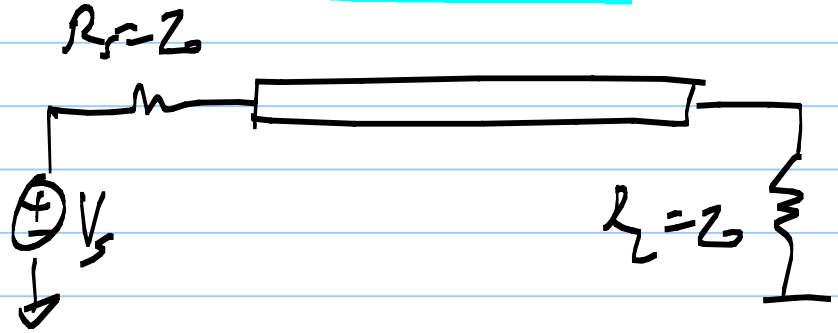


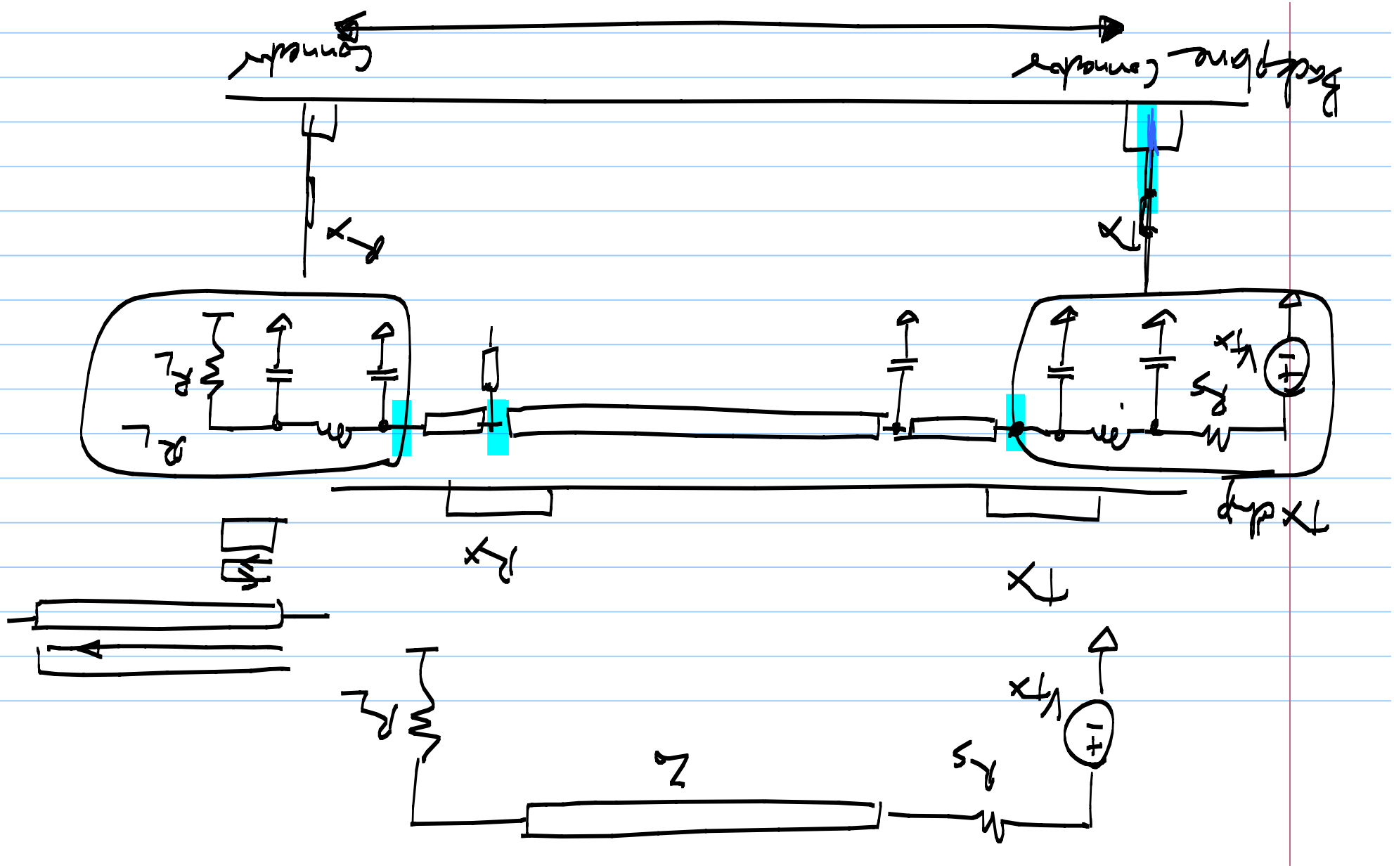
$$Z_0 = \sqrt{\frac{R_0 + j\omega L_0}{G_0 + j\omega C_0}}$$

Z_0 real

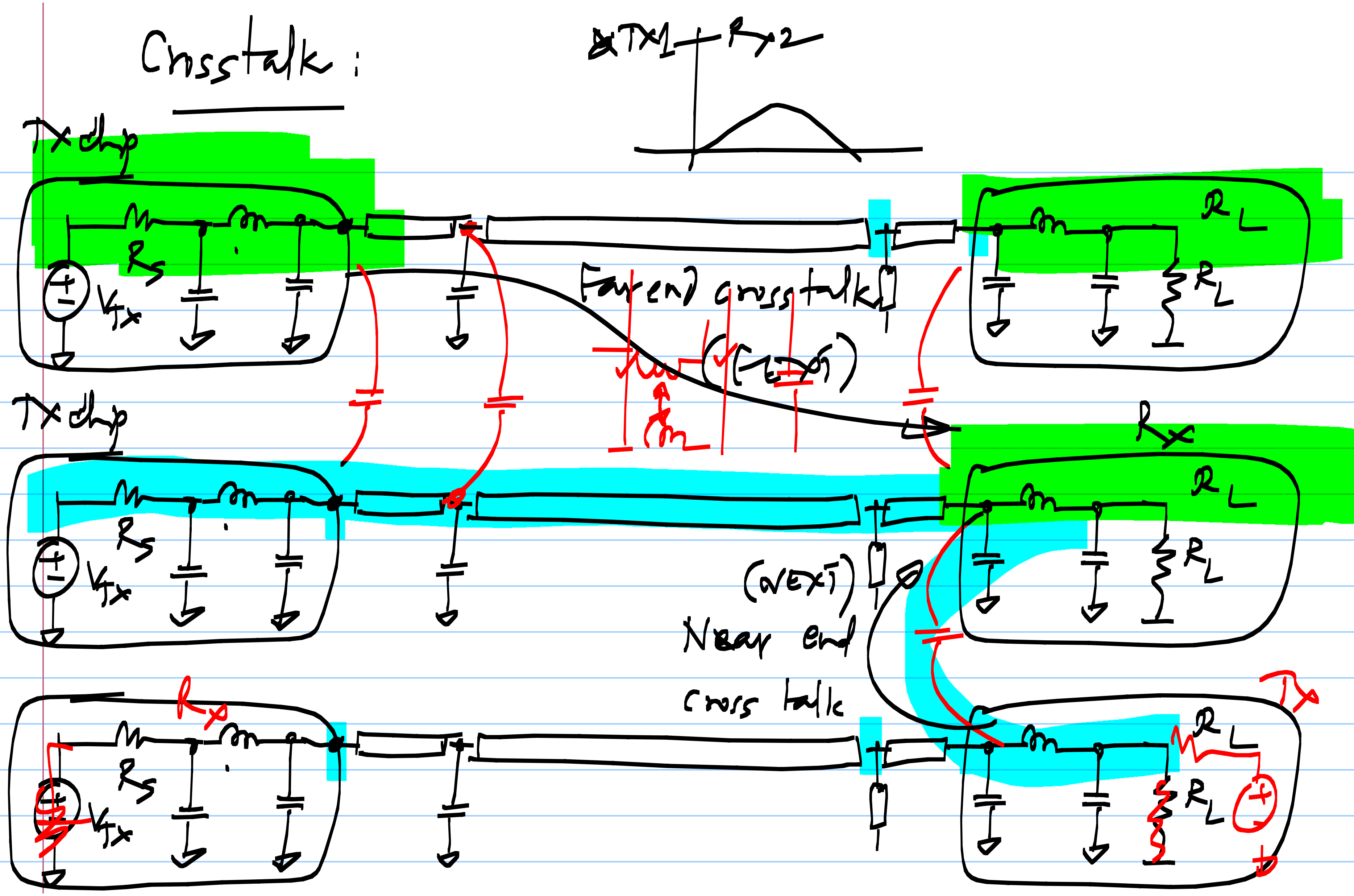
$$\frac{L_0}{R} = \frac{C_0}{G_0}$$

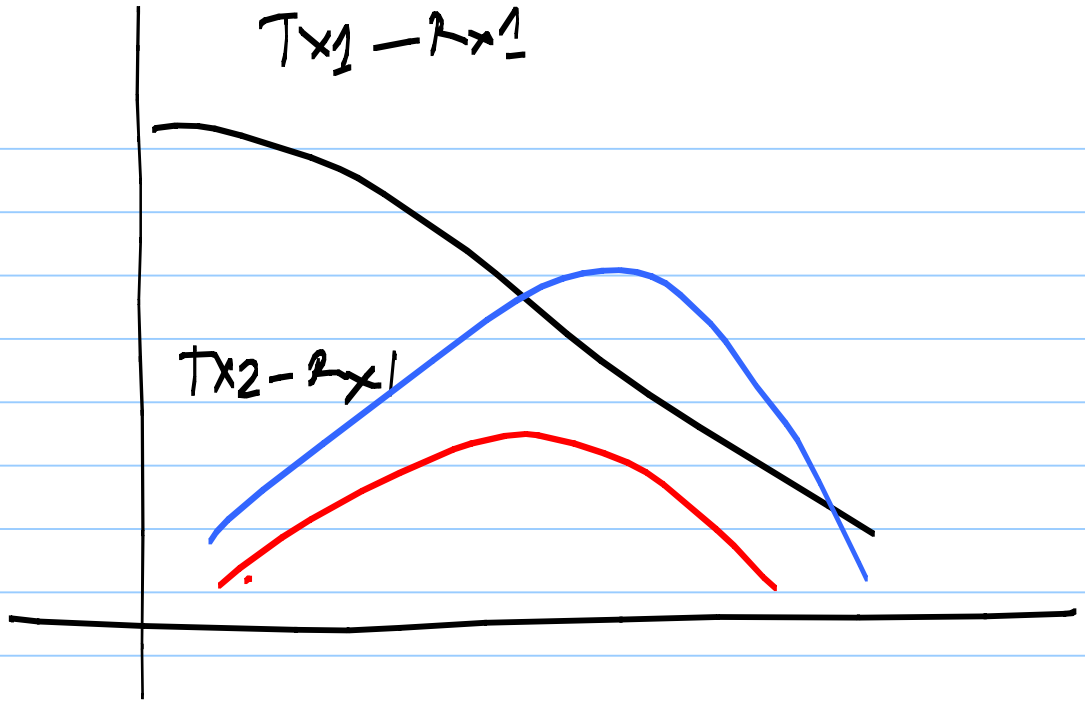
Distortionless

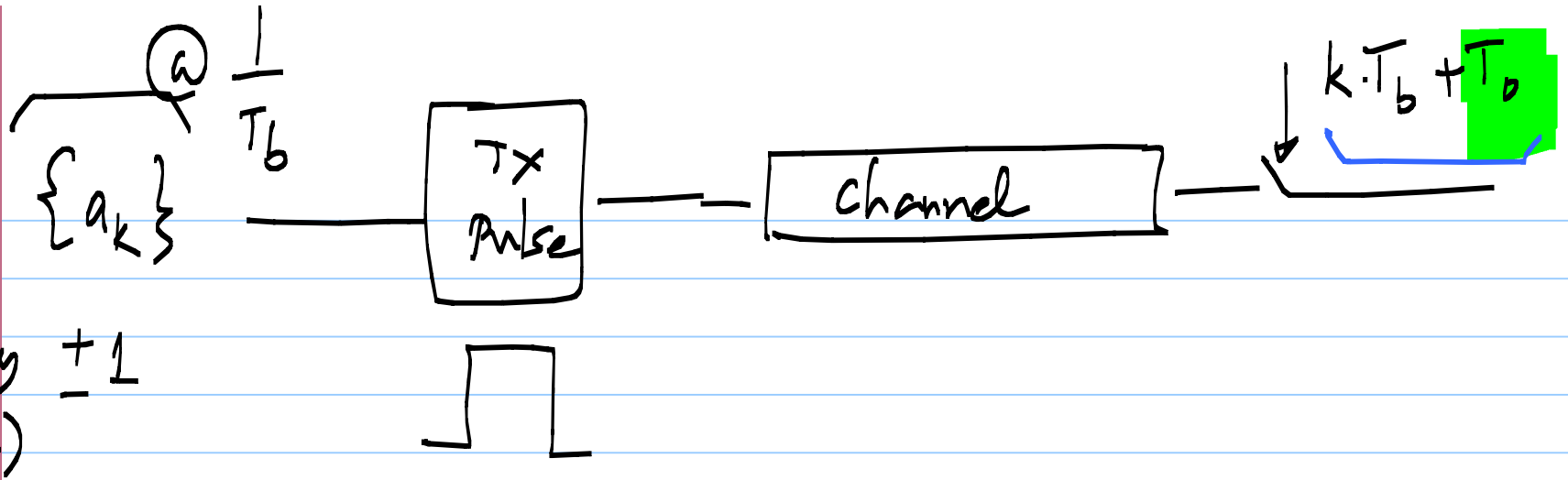




Crosstalk:

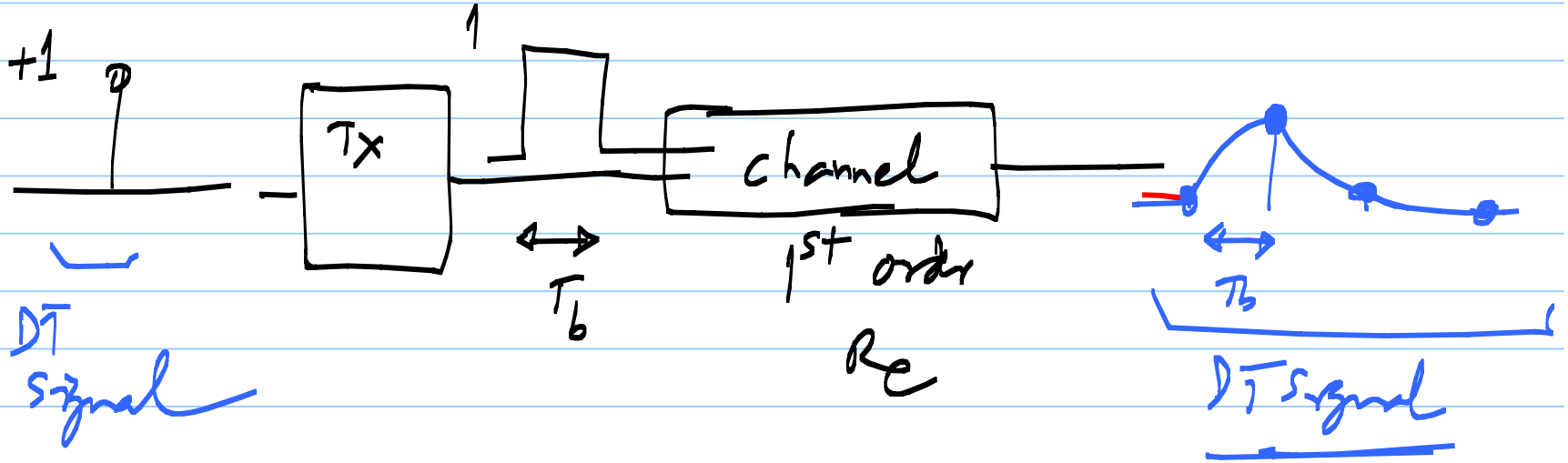

TX1 — Rx2
Tx chip
V_{Tx}
R_S
R_L
Tx chip
Rx
Far end crosstalk
Near end cross talk
(NEXT)
Rx
Tx


Tx1 – Rx1
TX2 – Rx1



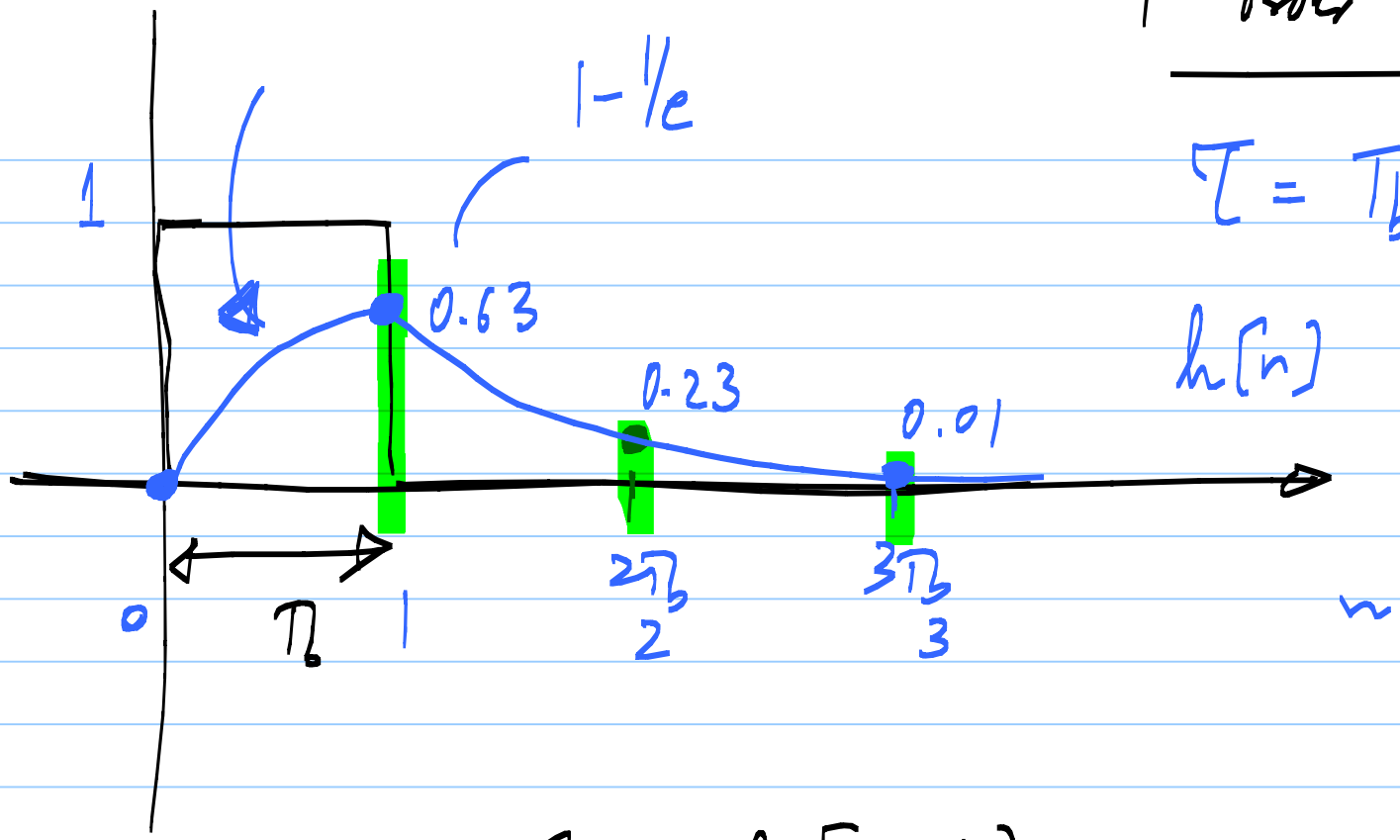
binary ±1
(PAM2)

PAM4 ±1, ±3



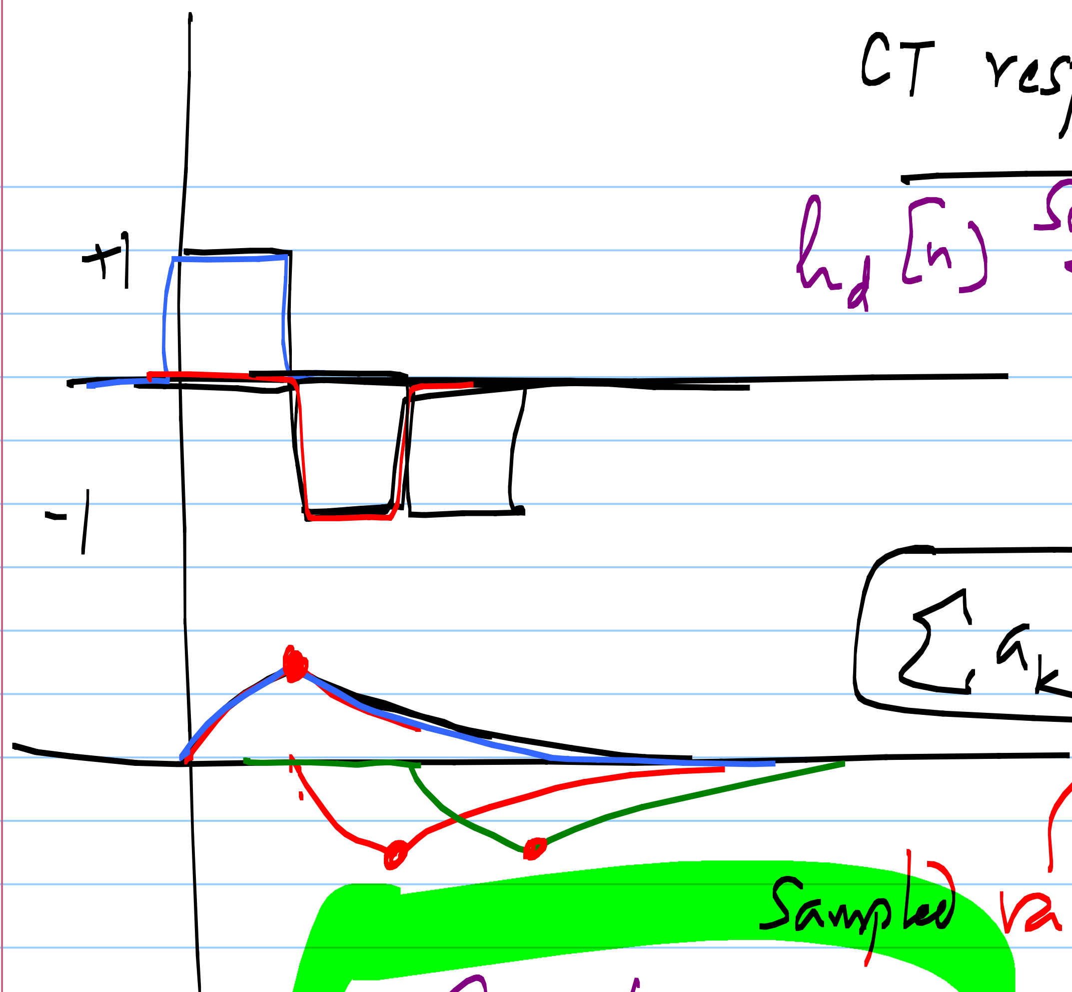
1st order RC

$\tau = T_b$



$\{a_k\}$

$\sum a_k h[n-k]$



CT response to a single "+1":

$h_d[n]$ sampled at $T_0 + kT_b$ ← $h_c(t)$

$\{a_k\}$: a_0, a_1, a_2

$$\sum_k a_k \, h_c(t - kT_b)$$

$a_0 \cdot h_c(t)$

$a_1 \, h_c(t - T_b)$

$a_2 \, h_c(t - 2T_b)$

Sampled values

$$\sum_k a_k \, h_d[n-k]$$