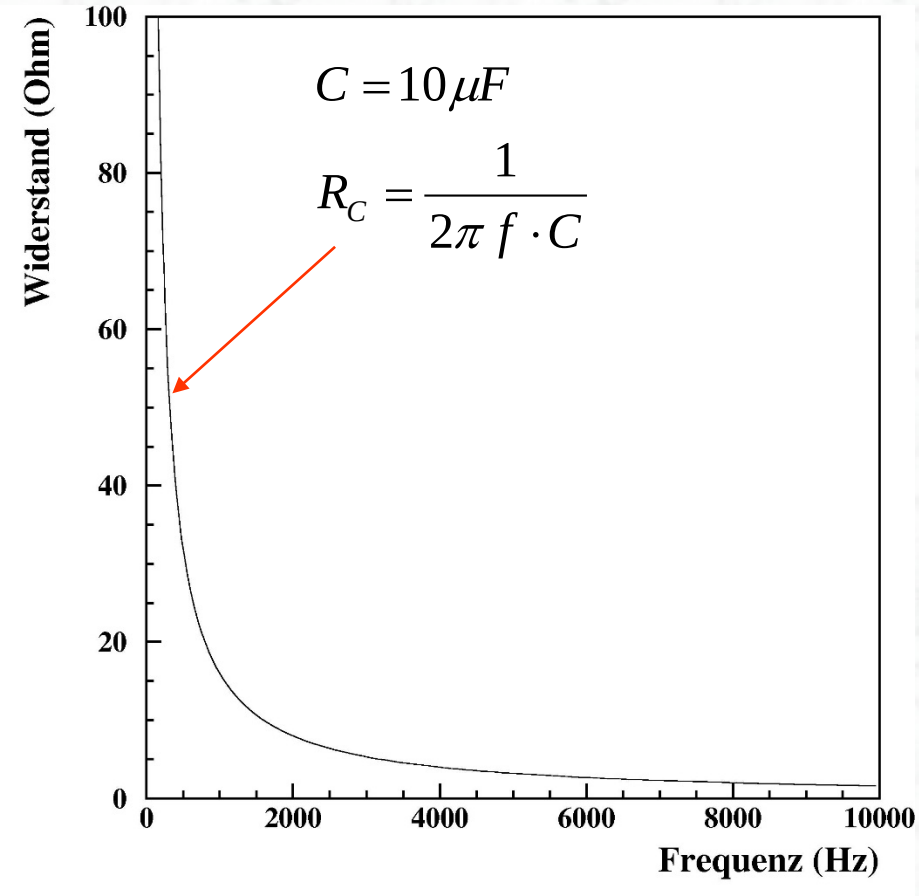
7. Pulsformung und Übertragung von Signalen auf Leitungen

7.1 RC, RL und RLC-Netzwerke

- RC-Tiefpass
- RL-Hochpass
- RLC-Netzwerke

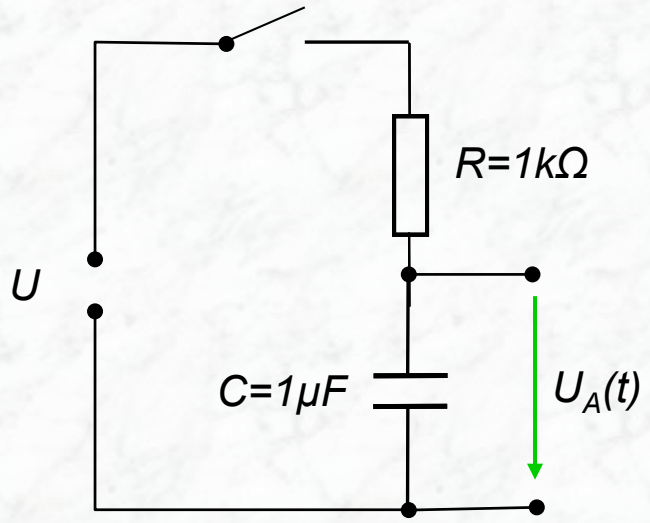
7.2 Übertragung von Signalen auf Leitungen

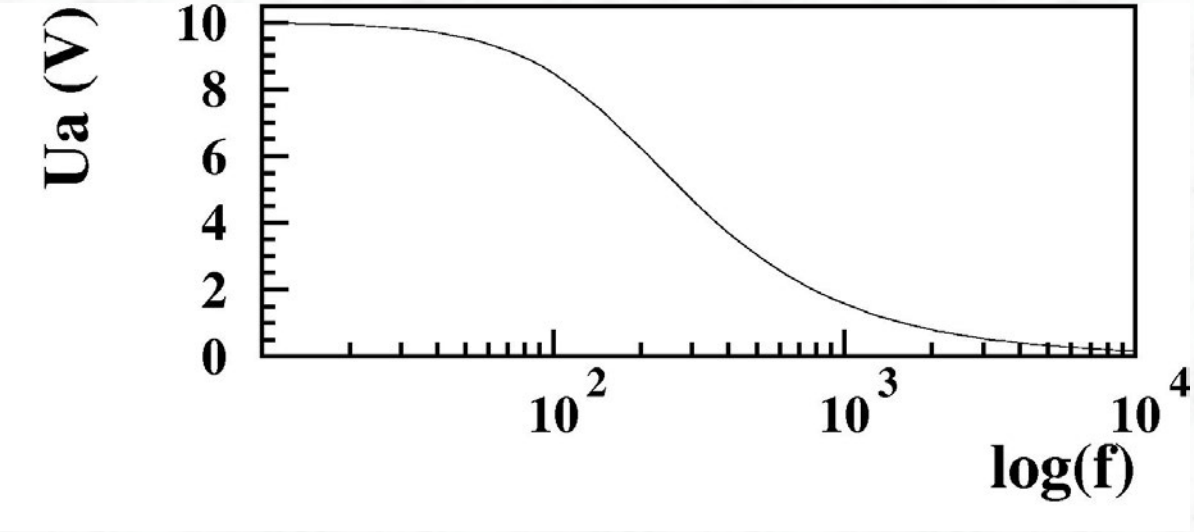
Frequenzabhängigkeit der Impedanz eines Kondensators



Frequenzgang eines RC Tiefpasses

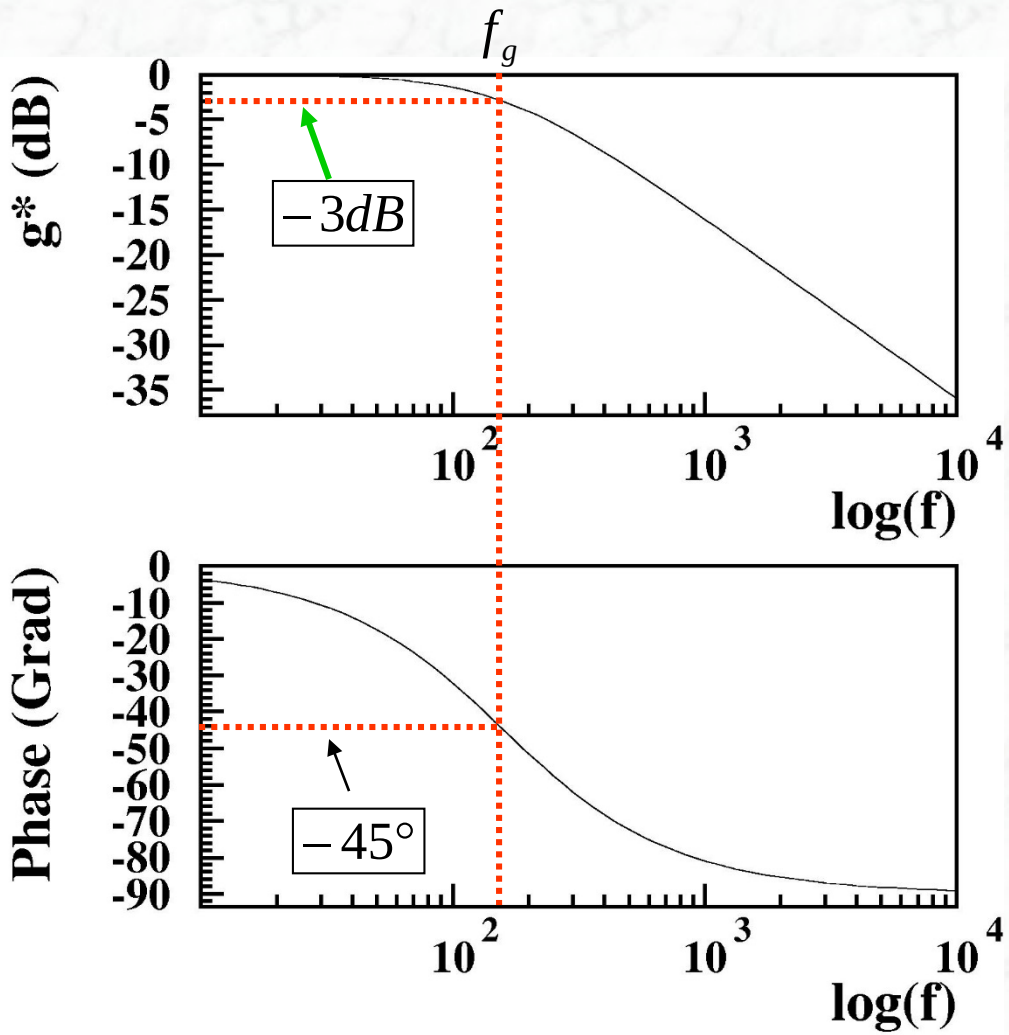
$$U_A = U \cdot \frac{1}{\sqrt{1+(2\pi f \cdot RC)^2}}$$





Logarithmische Übertragungsfunktion und Phase eines RC Tiefpasses

“Bode-Plot”



R=1kΩ

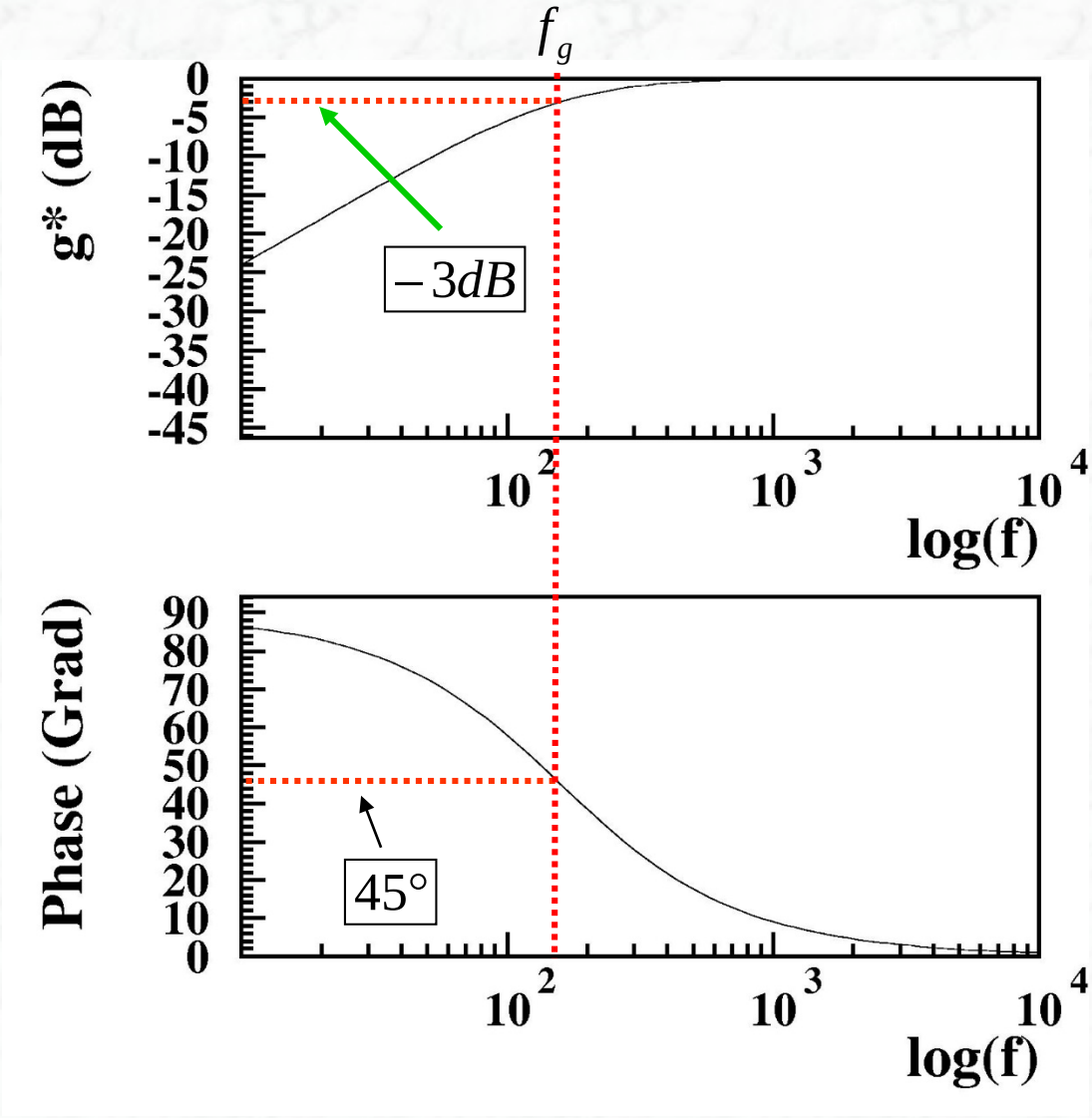
C=1μF

$$\omega_g = \frac{1}{RC} = 1000Hz$$

$$f_g = \frac{1}{2\pi \cdot RC} = 167Hz$$

Logarithmische Übertragungsfunktion und Phase eines RC Hochpasses

"Bode-Plot"



R=1kΩ

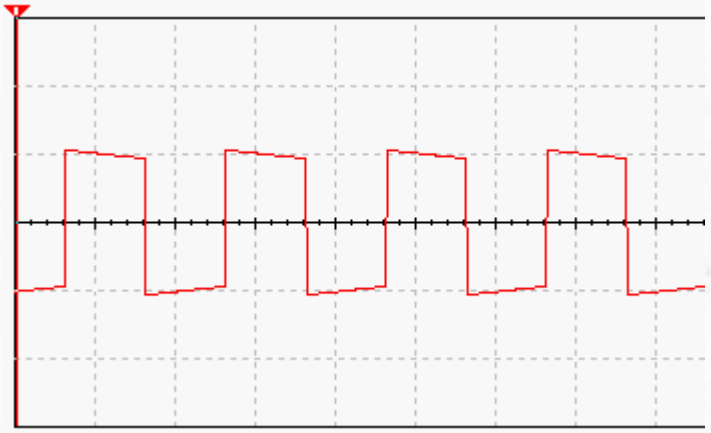
C=1μF

$$\omega_g = \frac{1}{RC} = 1000Hz$$

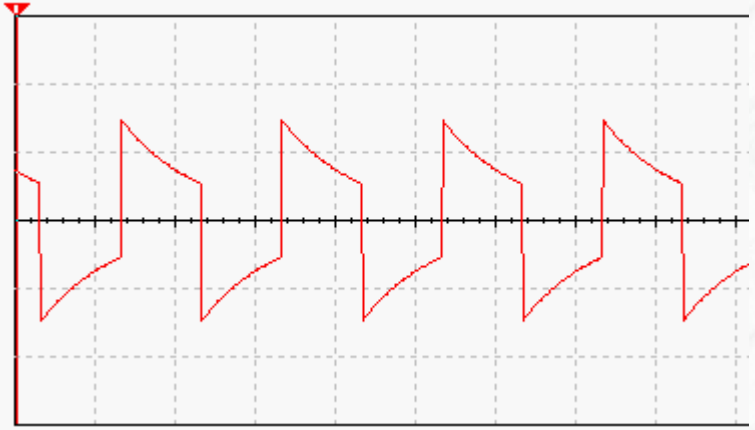
$$f_g = \frac{1}{2\pi \cdot RC} = 167Hz$$

Pulsfolge durch einen Hochpass

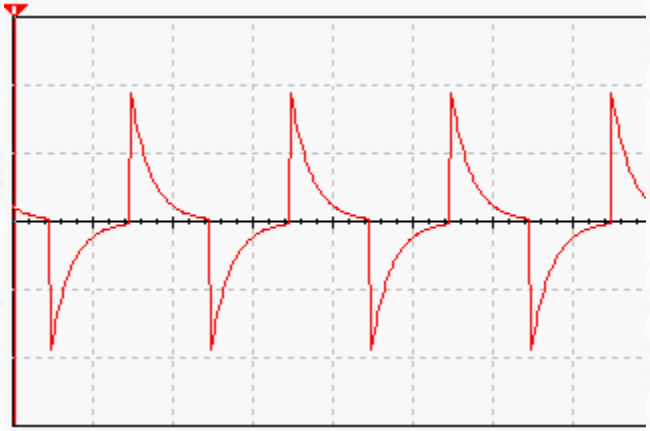
$\tau = RC >> t_d$



$\tau = RC > t_d$

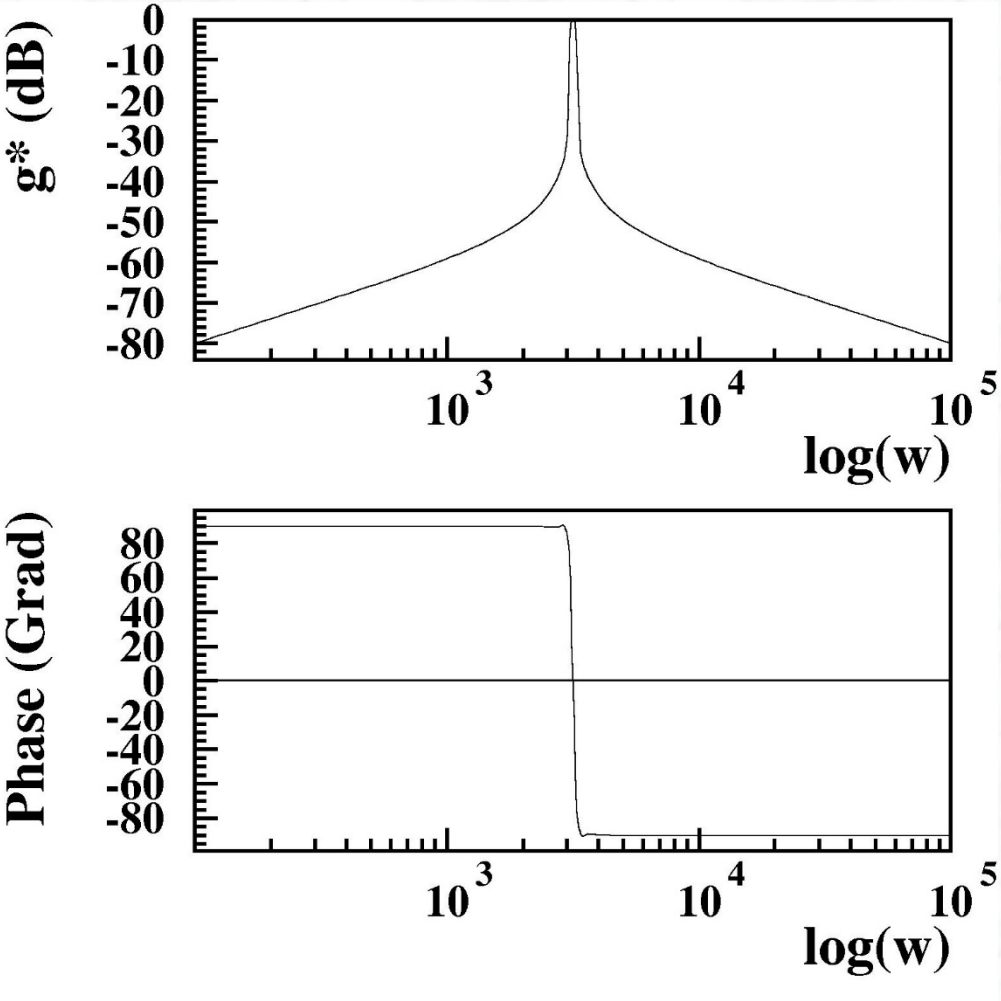


$\tau = RC < t_d$



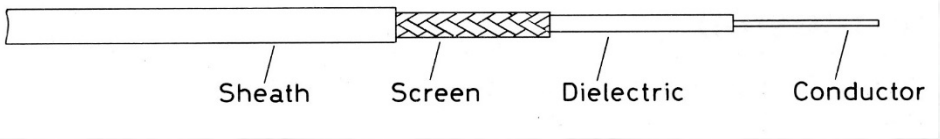
Resonanzkurve eines RLC-Netzwerkes

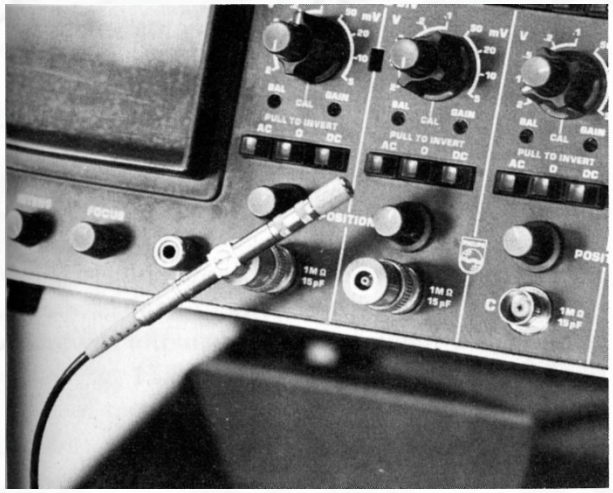
R =1kΩ
C =100µF
L =1mH

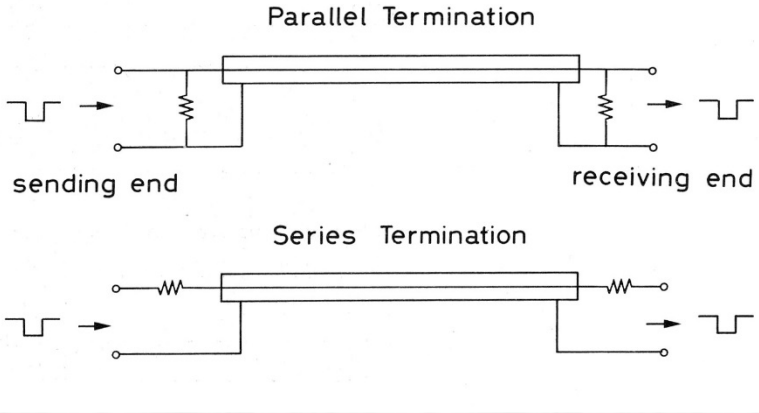


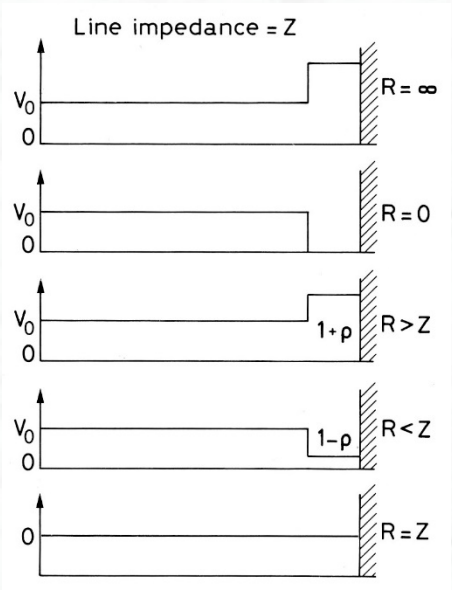
$$g^* = -10 \cdot \log\left[1 + R^2 \cdot \left(\frac{1}{\omega L} - \omega C\right)^2\right]$$

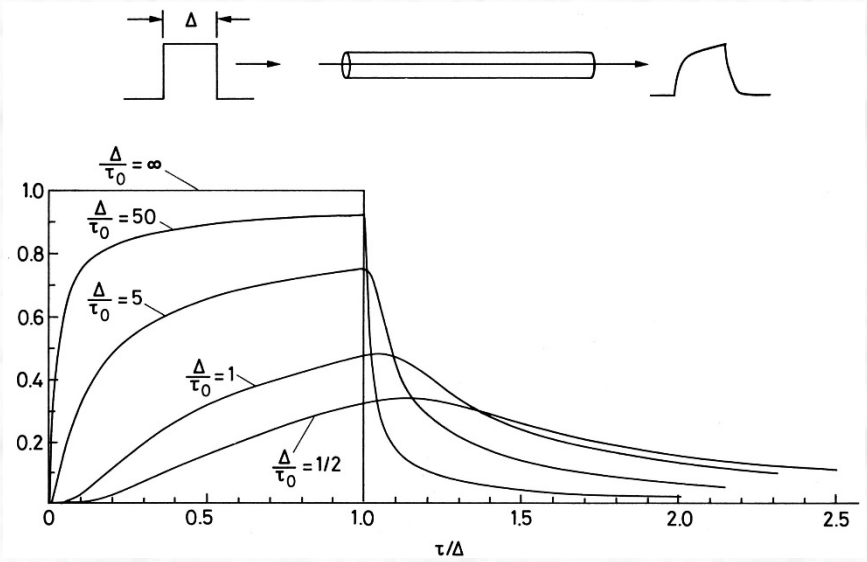
$$\phi = \arctan\left[R \cdot \left(\frac{1}{\omega L} - \omega C\right)\right]$$


Sheath
Screen
Dielectric
Conductor




Parallel Termination
sending end
receiving end
Series Termination


Line impedance = Z
V0
0
R = ∞
R = 0
1+ρ
R > Z
1−ρ
R < Z
R = Z


Δ
Δ/τ0 = ∞
Δ/τ0 = 50
Δ/τ0 = 5
Δ/τ0 = 1
Δ/τ0 = 1/2
1.0
0.8
0.6
0.4
0.2
0
0.5
1.0
1.5
2.0
2.5
τ/Δ