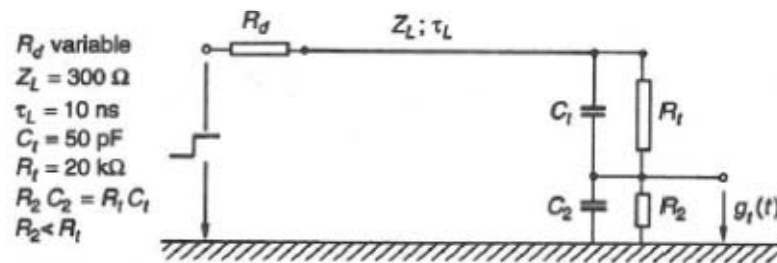


Exercise: Impulse voltage measuring systems

1. Calculate the relative difference in surge impedance for a horizontal 5 m long, 1,4 mm \varnothing conductor 3 m above a grounded plane in comparison to it's vertical continuation ending 20 cm above the ground plane. Also sketch the setup stating the distances and dimensions.
2. Calculate the response time T for a resistive voltage divider as sketched below with the stated values for resistance, stray capacitance etc.



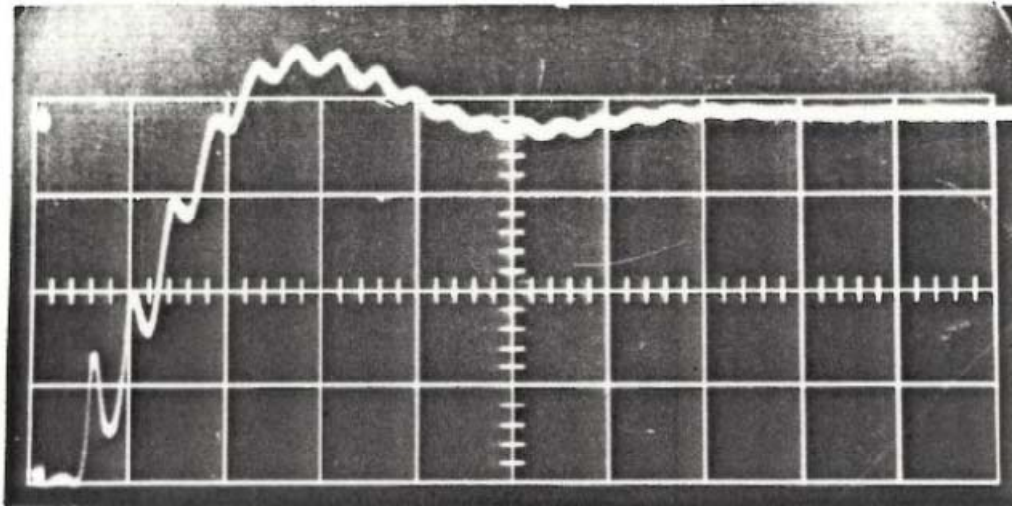
Explain the influence of damping resistor R_d value on the value of the response time T .

3. Calculate the transfer ratio of an impulse voltage measuring system consisting of a resistive voltage divider with a HV resistance of $1 \, \text{M}\Omega$ and a low-voltage resistance of $50 \, \Omega$. The voltage divider is connected to an oscilloscope with a $75 \, \Omega$ cable, which is terminated without reflections at the oscilloscope. Sketch the circuit and calculate the transfer ratio between HV and oscilloscope input.
4. The above mentioned voltage divider possesses a response time $T = 15 \, \text{ns}$. Calculate the measuring error for a chopped impulse voltage which rises to $500 \, \text{kV}$ in $0,4 \, \mu\text{s}$ before breakdown.

Exercise: Response time

The impulse voltage divider in the AAU/ET high voltage laboratory has a step response as shown below. Calculate the response time for this divider.

Uebertragungsverhalten des Stoss-
spannungsteilers CR 1200 kV



4235/1

200ns/div

