

## Task 8: Waves on Transmission Lines

(Laboratory F1-116)

Determine by measurement the voltage waveforms at the reflection of waves on different terminations of a transmission line.

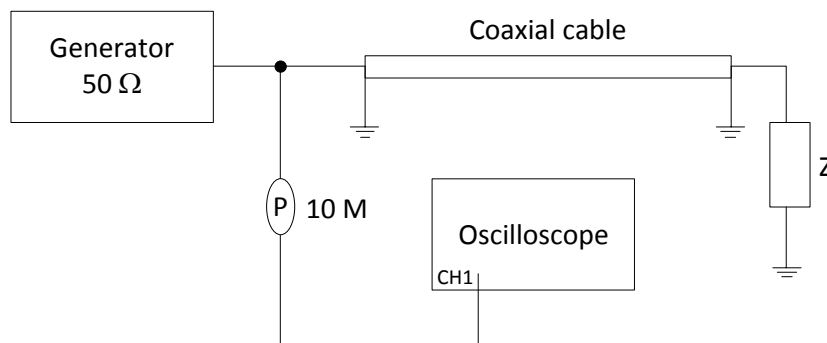
- Verify the wave impedance of coaxial cable and determine the speed of electromagnetic wave propagation in the cable.
- Record the voltage waveforms in the showed measurement circuit for these different cable terminations:

- no-load
- short circuit
- resistance higher and lower than the wave impedance
- resistance equal to the wave impedance
- capacitance 10 nF
- inductance 31  $\mu$ H

### Used equipment:

- G . . . . . function generator
- OSC . . . digital oscilloscope
- P . . . . . voltage probe 1:10
- C . . . . . coaxial cable
- Z . . . . . terminating impedance (resistor, capacitor, inductor)

### Measurement circuit:



### Recommended setup of measurements

- The generator output is with impedance 50  $\Omega$
- The coaxial cable is supplied by a square pulse signal with amplitude 4 V under 50  $\Omega$  output, measured voltage is led by voltage probe to oscilloscope input (the same time decay is chosen for all types of terminating  $\rightarrow$  500 ns/div)
- The offset should be set at +2 V  $\rightarrow$  output is square pulses 0 - 4V - 0 - 4V ...