Worksheet 7.6.4

From the waveform of figure 7.6.2, the amplitude of the step voltage measured by channel 1, at the end of the first exponential rise, is:

$$Vch1 := 0.39 \cdot V$$

The voltage applied to the input terminals of the line is related to Vch1 by equation (7.6.1)

$$Vin := \frac{96.2}{50} \cdot Vch1 = 0.75\,V$$

From the waveform of figure 7.6.5, the voltage measured by channel 2 is:

$$Vch2 := 0.016 \cdot V$$

The ratio of the amplitude of Vch2 to the amplitude of the current monitored by the current transformer is given by equation (7.2.6)

$$RT := 2.27 \cdot \Omega$$

Invoking equation (7.2.5) $\quad Iout := \dfrac{Vch2}{RT} = 7.048 \times 10^{-3}\,A$

The ratio of Vin to Iout gives a measure of the characteristic impedance of the cable:

$$Ro := \frac{Vin}{Iout} = 106\,\Omega$$

The waveform of figure 7.6.5 also gives a measure of the time taken for a current step to propagate to the far end and return to the near end. This is the time difference between the first and second edges of the waveform. This gives:

$$T := \frac{166 \cdot 10^{-9}}{2} \cdot sec$$

The capacitance and inductance of the cable can be determined by invoking equations (6.3.7) and (6.3.6)

$$Ca := \frac{T}{Ro} = 7.8 \times 10^{-10}\,F$$

$$La := T \cdot Ro = 8.8 \times 10^{-6}\,H$$

These results can be compared with those obtained from cable characterisation tests.
From figure 7.5.12.

$$Ca\_ := 2 \cdot \frac{1}{2} \cdot 929 \cdot pF = 9.29 \times 10^{-10}\,F$$

$$La\_ := 8 \cdot 1.05\mu H = 8.4 \times 10^{-6}\,H$$

Figure 7.6.9 Calculating values of components derived for 15 m cable, using data from transient tests and frequency response tests