

[lex110] TEM mode in coaxial cable II: impedance

Here we interpret the coaxial cable guiding a TEM wave from [lex109] as a device carrying an alternating current along the two conductors. The two currents are equal in value at all times and opposite in phase.

- (a) Calculate that current $I(z, t)$ and the potential difference $V(z, t)$ as functions of position and time.
(b) Calculate the impedance (with Ohm as its SI unit),

$$Z \doteq \frac{V(z, t)}{I(z, t)},$$

a device property independent of the length of the cable.

Solution: