Electrical Engineering
HSLU, Semester 2

Matteo Frongillo

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Contents

Part I

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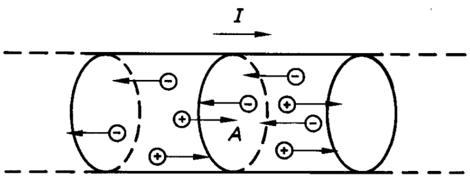
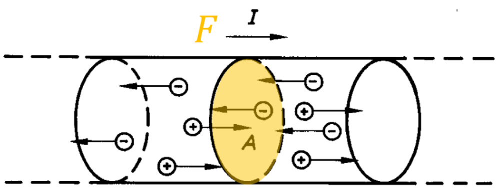
1.1 Current strength or current "I"



$$I\ [A] = \frac{\text{el. charge}}{t}$$

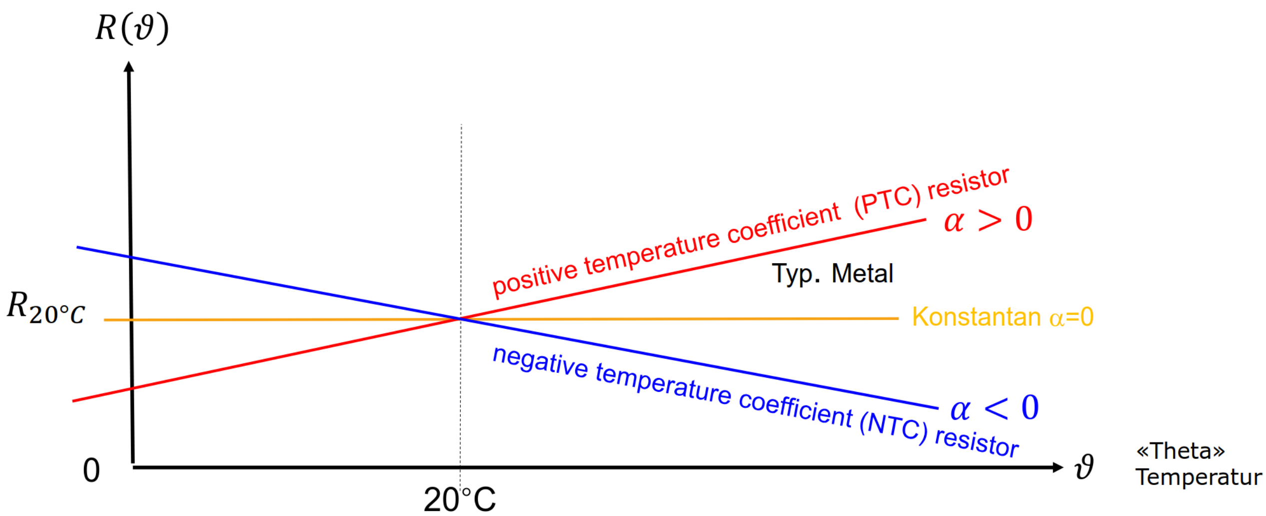
1.2 Current density "J"



The current density indicates how large the current per cross-sectional area (F) is:

$$J\ [\frac{A}{mm^2}] = \frac{I}{F}$$

1.3 Temperature dependence of the resistance



Depending on the material, the resistance can increase, remain the same or decrease with temperature. In ET+L we calculate using the linear approach.

$$\boxed{R(\vartheta) = R_{20}(1 + \alpha(\vartheta - 20°\text{C})) = R_{20}(1 + \alpha\Delta T)}$$

1.4 Object properties

The resistance indicates the voltage required for a current. In addition to the material, the cross-sectional area and also the length are decisive factors.

$$R = \frac{U}{I}$$

1.5 Reciprocal quantities

1.5.1 Specific resistance

To describe material properties, the resistance per length and cross-sectional area is specified (precondition: homogeneous conductor, direct current):

$$\rho \, [\frac{\Omega \cdot mm^2}{m}] = R \cdot \frac{A}{l}$$

1.5.2 Conductance

1.5.3 Specific conductivity