

Problem 1

Calculate the inductance of a rectangular straight conductor by constructing a reluctance network around the conductor. Make the reluctance network to represent the flux tubes so that:

- thicknesses of the flux tubes are equal
- fluxes of the flux tubes are equal.

In the two cases, the innermost tubes are the same. The expansion of the reluctance network can be stopped when the energy (inductance) of the outermost flux tube is less than 5% of the total energy.

The cross-sectional dimensions of the conductor are: height 40 mm, width 30 mm.

Problem 2

Calculate the permeance Λ of an inductor with a UI-core.

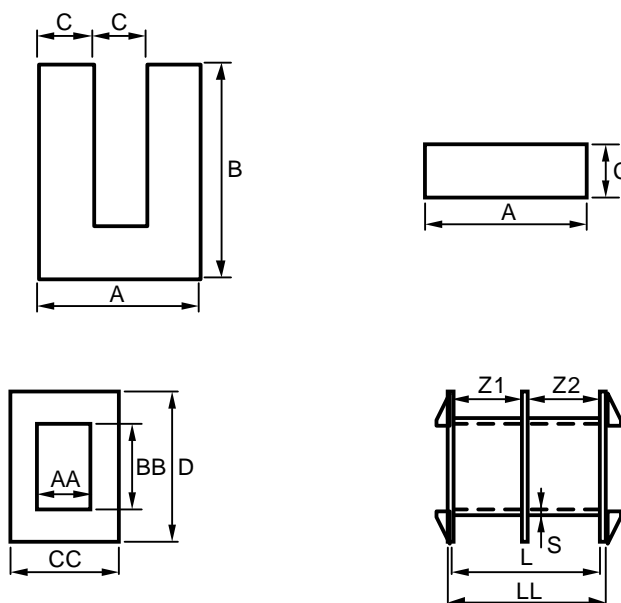
- Construct the reluctance network of the inductor. Calculate the permeance of the inductor assuming that the relative permeability of iron, $\mu_r = \infty$.
- Take the non-linearity of the core material into account and define such a flux density value at which the saturation has reduced the permeance of the inductor by 10%.

The core is a standard UI60a core with dimensions:

- U-part: width $A = 60$ mm, height $B = 80$ mm, thickness 0.5 mm
- I-part: width $A = 60$ mm, height $C = 20$ mm, thickness 0.5 mm
- the thickness of the core is 20 mm
- the air gap between the U- and I-parts is 2.5 mm.

Magnetic properties of the core:

- $B = f(H)$ characteristic is given on the next page
- filling factor of the laminated core is 0.95



Magnetointikäyrä levyille V230-50A vuontiheyden
huippuarvo kentänvoimakkuuden huippuarvon funktiona

