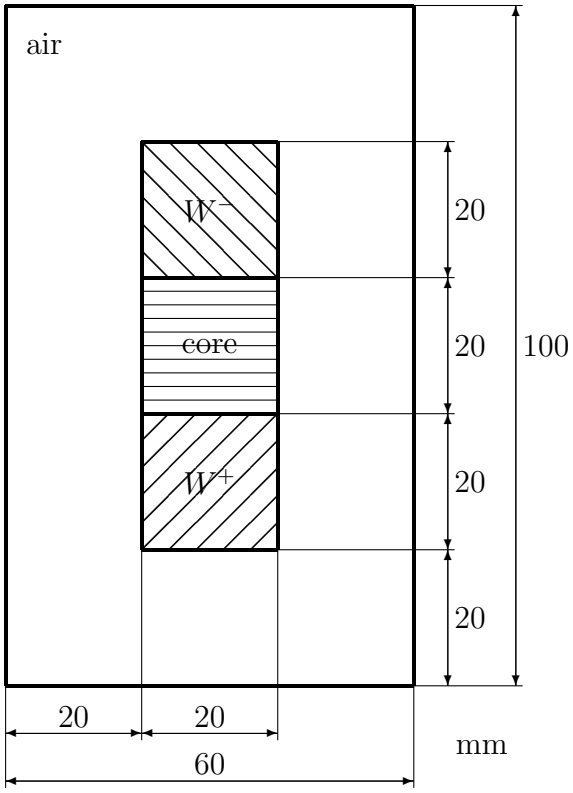
PA04 “MAGNET”: Magnetic field computation

Compute the electromagnetic potential



$$\mu_0 = 1.257 \cdot 10^{-6} \, \tfrac{\mathrm{V \cdot s}}{\mathrm{A \cdot m}}$$

$$\mu_r = \begin{cases} 1 & \text{air} \\ 1.5 & \text{coils} \\ 1000 & \text{core} \end{cases}$$

$$f(x,y) = \begin{cases} -318 \ \mathrm{A \cdot m^{-2}} & \text{in } W^- \\ +318 \ \mathrm{A \cdot m^{-2}} & \text{in } W^+ \\ 0 \ \mathrm{A \cdot m^{-2}} & \text{else} \end{cases}$$

Tasks:

- Derive the mathematical model. If possible use symmetries or reduction in the dimension
- Give the variational formulation
- Analysis: discuss existence and uniqueness of solutions
- Discretize the domain Ω
- Numerical analysis: provide an error estimate
- Choose a solver for the system of equations you obtain
- Implementation
- Visualize the results and (if possible) compare them to analytical solutions