

ELEC 0041: Homework 2 - due on March 30 2018

Starting from the optimal geometrical configuration of the conductor bundle obtained in homework 1, analyze the magnetic behavior of the 3-phase system made of three of such bundles arranged in a flat manner, with an a priori unknown inter-bundle distance of ℓ meters.

The 3-phase voltages are fixed to a maximum (peak) voltage of 500 kV, with phase-shifts of a balanced direct system.

You are asked to

- determine the inter-bundle distance ℓ to satisfy the same electric field constraints as in homework 1;
- using this inter-bundle distance, determine the allowed nominal current, taking into account skin and proximity effects, provided that the maximum (peak) current density is $1\text{A}/\text{mm}^2$;
- calculate the level of magnetic flux density on the floor;
- design a horizontal planar (magnetic and/or conducting) shield to be put on the floor such that the maximum magnetic flux density level below the floor (i.e. in the basement of the building) is divided by 10;
- compute the power losses (per meter) in the conductors and in the shield.

By groups of 2, write a 4 page report where you present and comment your results.

Send your report by email to cgeuzaine@uliege.be in PDF format together with your model files, bundled in a single `.zip` file. The file should be named: `hw2_Lastname1_Lastname2.zip`.