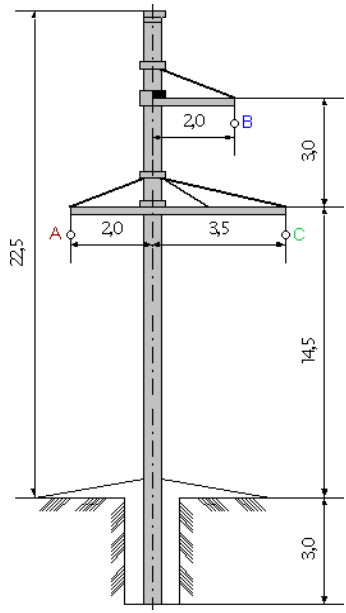
QuickField simulation report

Transmission line transposition

Calculation of the full impedance of a line



This automatically generated document consists of several sections, which specify the problem setup and finite element analysis simulation results. Navigation links in the top of each page lead to corresponding sections of this report.

Problem description and QuickField simulation files:
https://quickfield.com/advanced/transposition.htm

Problem info

Problem type: AC Magnetics , frequency: 50 Hz,
Geometry model class: Plane-Parallel
Problem database file names:

- Problem: *transposition.pbm*
- Geometry: *Transposition.mod*
- Material Data: *Transposition.dhe*
- Material Data 2 (library): *none*
- Electric circuit: *transposition.qcr*

Results taken from other problems:

- *none*

Geometry model

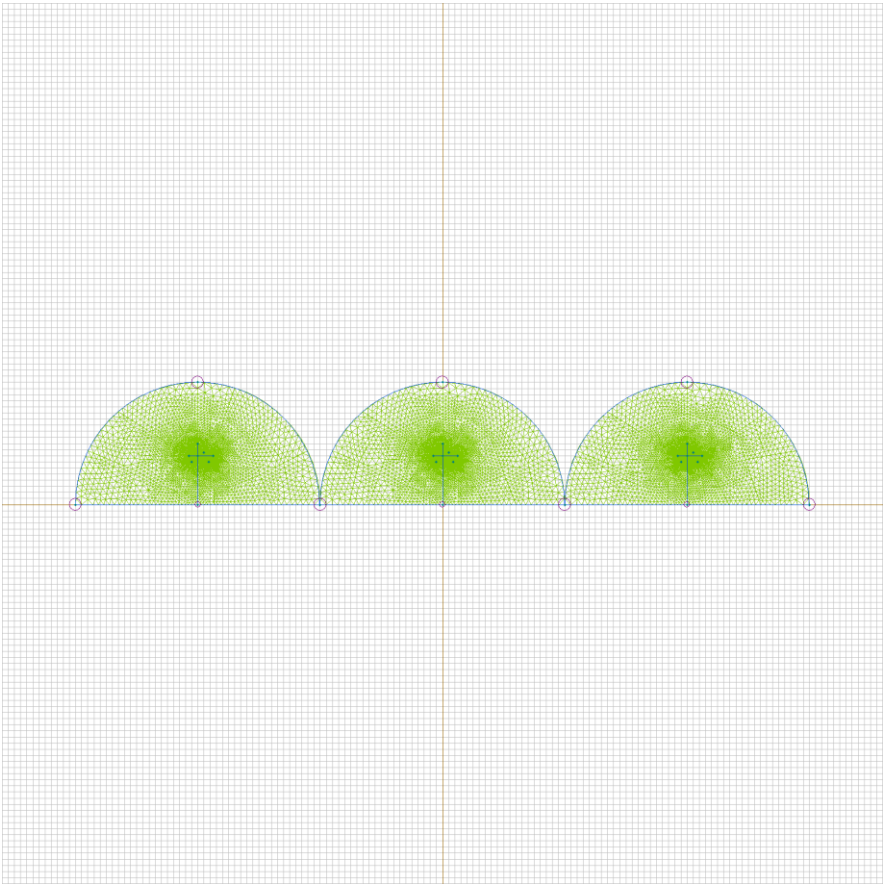


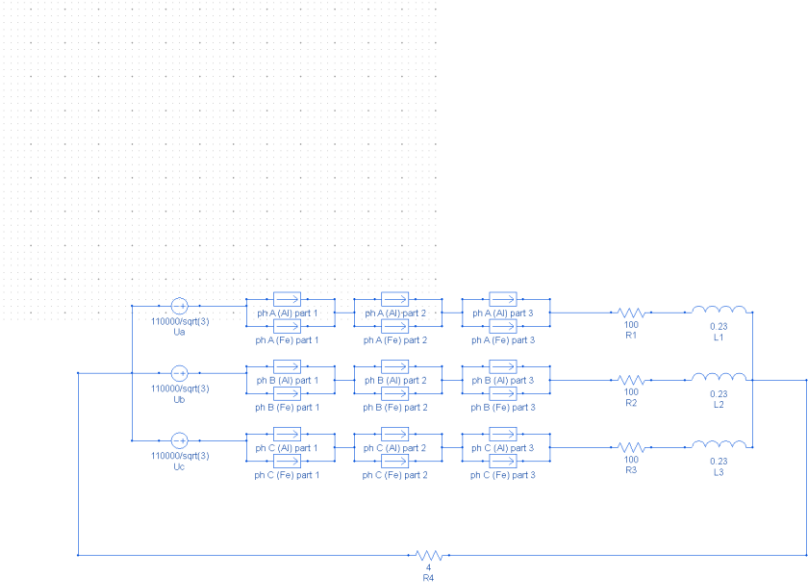
Table 1. Geometry model statistics

	With Label	Total
Blocks	19	21
Edges	2	60
Vertices	0	58

Number of nodes: 52283.

Electric circuit

Coupled electric circuit



Circuit elements:

Voltage source Ua=110000/sqrt(3) [V] 0 [deg]
Voltage source Ub=110000/sqrt(3) [V] 120 [deg]
Voltage source Uc=110000/sqrt(3) [V] 240 [deg]
QuickField block 'ph A (Al) part 1'
QuickField block 'ph A (Fe) part 1'
QuickField block 'ph B (Al) part 1'

QuickField block 'ph B (Fe) part 1'
QuickField block 'ph C (Al) part 1'
QuickField block 'ph C (Fe) part 1'
Resistor R1=100 [Ohm]
Resistor R2=100 [Ohm]
Resistor R3=100 [Ohm]
Inductor L1=0.23 [H]
Inductor L2=0.23 [H]
Inductor L3=0.23 [H]
QuickField block 'ph A (Al) part 2'
QuickField block 'ph A (Fe) part 2'
QuickField block 'ph B (Al) part 2'
QuickField block 'ph B (Fe) part 2'
QuickField block 'ph C (Al) part 2'
QuickField block 'ph C (Fe) part 2'
QuickField block 'ph A (Al) part 3'
QuickField block 'ph A (Fe) part 3'
QuickField block 'ph B (Al) part 3'
QuickField block 'ph B (Fe) part 3'
QuickField block 'ph C (Al) part 3'
QuickField block 'ph C (Fe) part 3'
Resistor R4=4 [Ohm]

Labelled objects

There are following labelled objects in the geometry model (Material Data file could contain more labels, but only those labels that assigned to geometric objects are listed)

Blocks:

- ph C (Al) part 3
- ph C (Fe) part 3
- ph A (Al) part 3
- ph A (Fe) part 3
- ph C (Fe) part 1
- ph B (Al) part 3
- ph B (Fe) part 1
- ph B (Fe) part 3
- ph A (Fe) part 1
- ph B (Fe) part 2
- air
- ph A (Fe) part 2

Edges:

- ground
- zero potencial
-

Vertices:

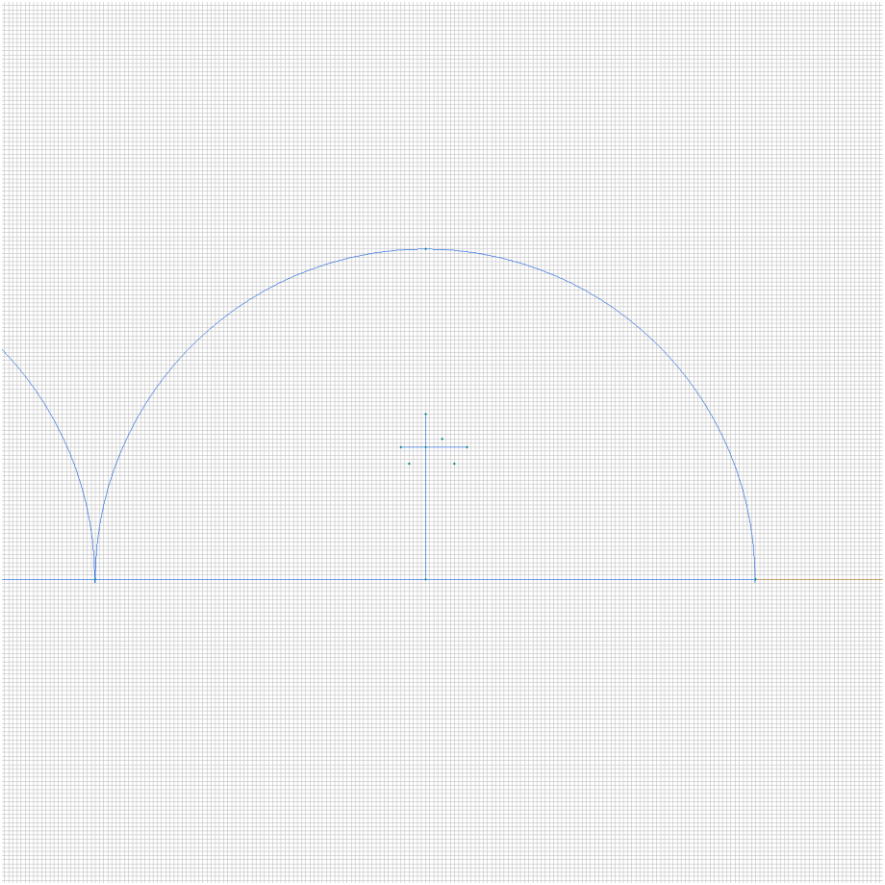
- ph A (Al) part 2
- ph C (Al) part 1
- ph C (Fe) part 2
- ph B (Al) part 1
- ph C (Al) part 2
- ph B (Al) part 2
- ph A (Al) part 1
-

Detailed information about each label is listed below.

Labelled objects: block "ph C (Al) part 3"

There are (1) objects with this label

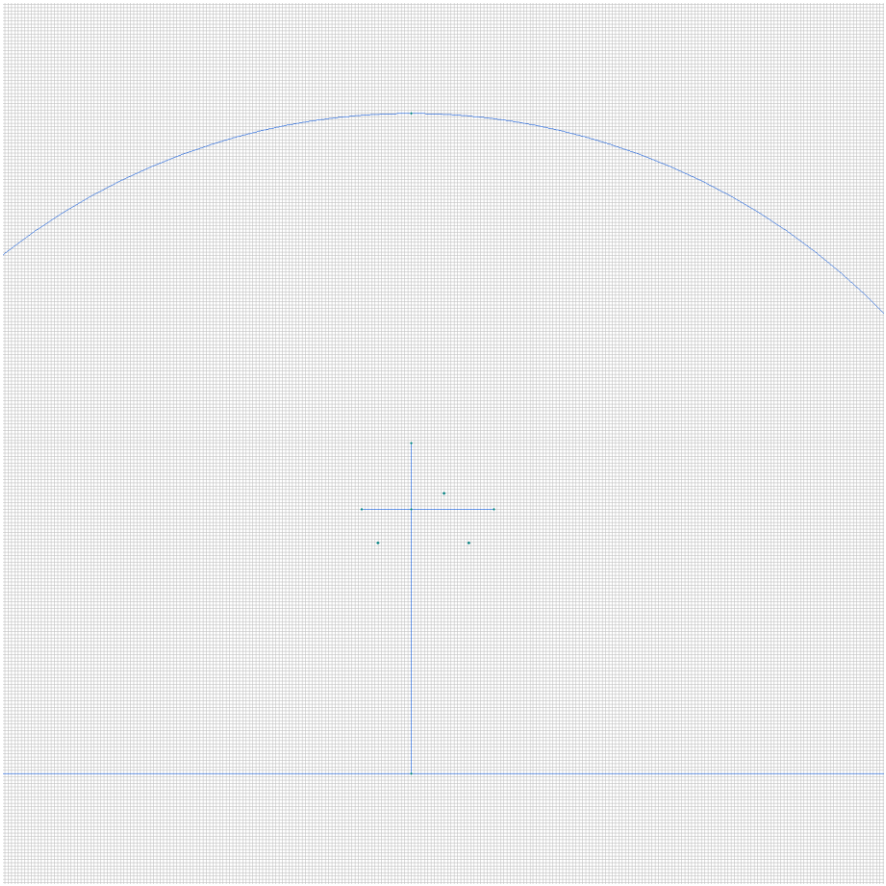
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=33500000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph C (Fe) part 3"

There are (1) objects with this label

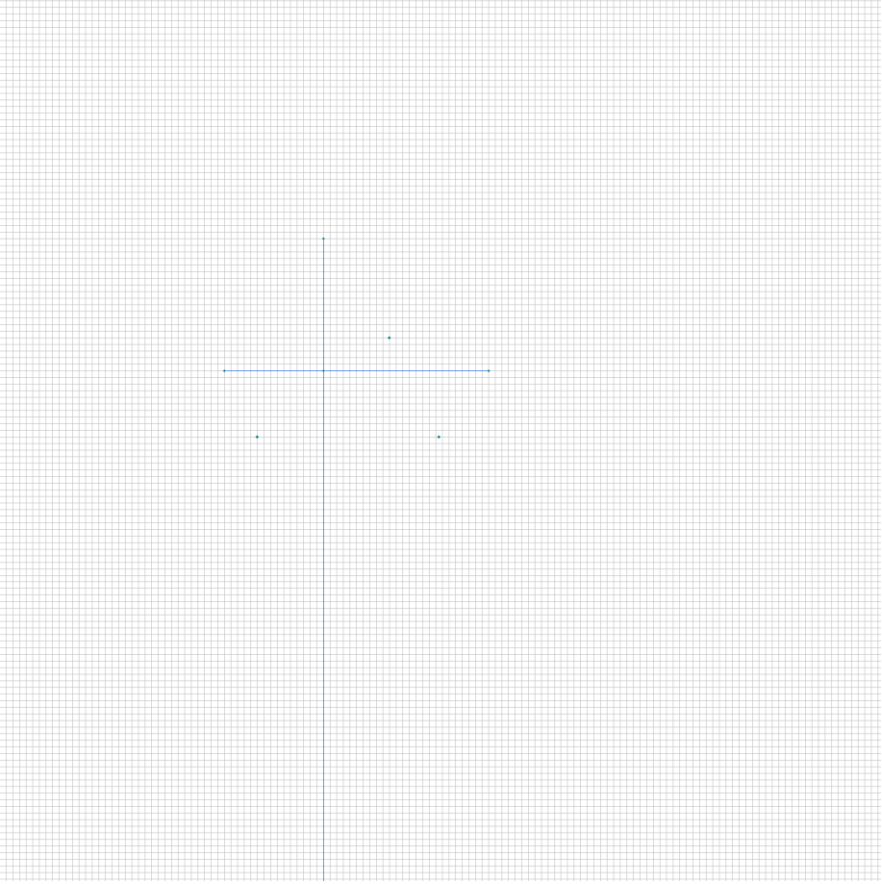
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=7700000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph A (Al) part 3"

There are (1) objects with this label

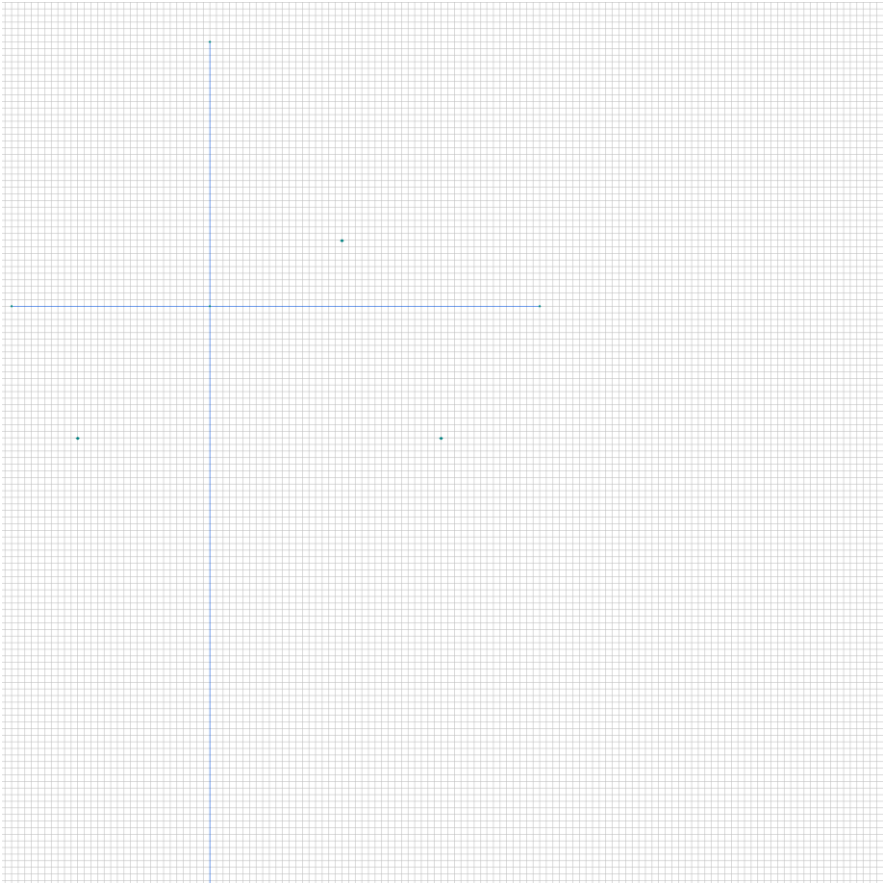
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=33500000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph A (Fe) part 3"

There are (1) objects with this label

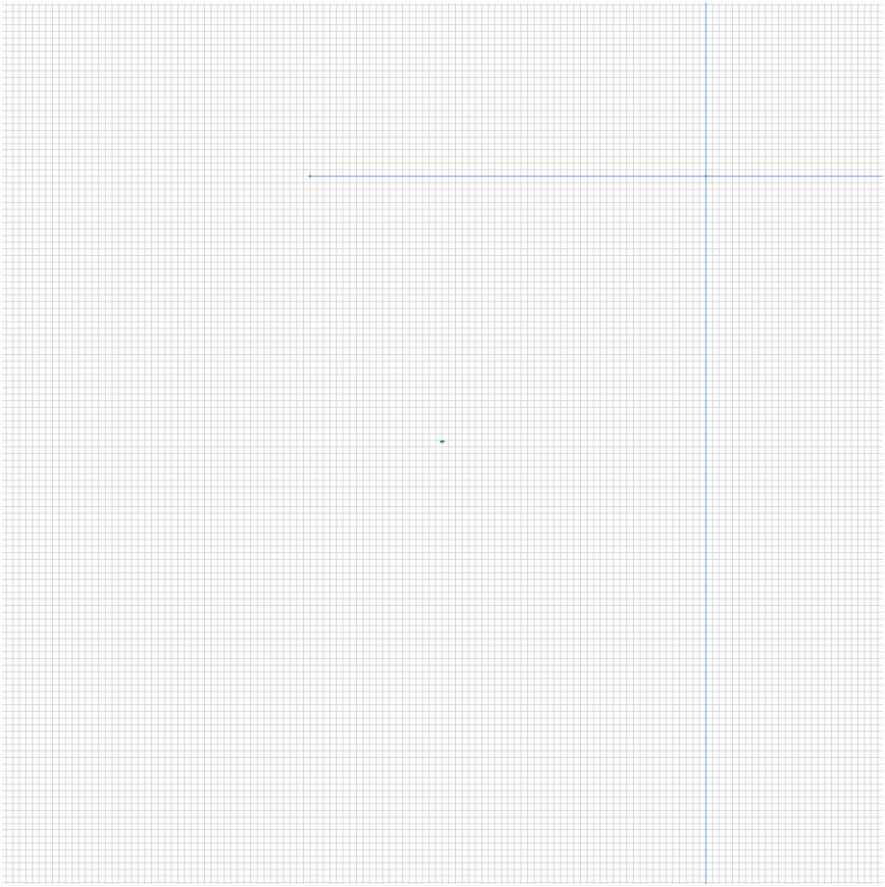
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=7700000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph C (Fe) part 1"

There are (1) objects with this label

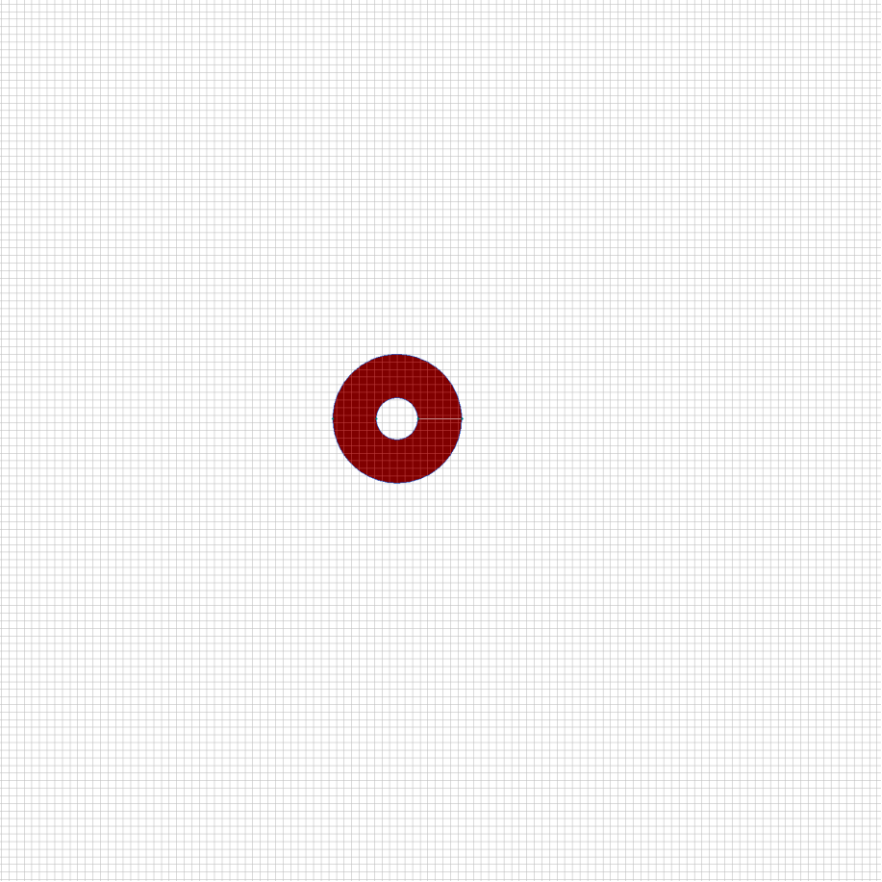
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=7700000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph B (Al) part 3"

There are (1) objects with this label

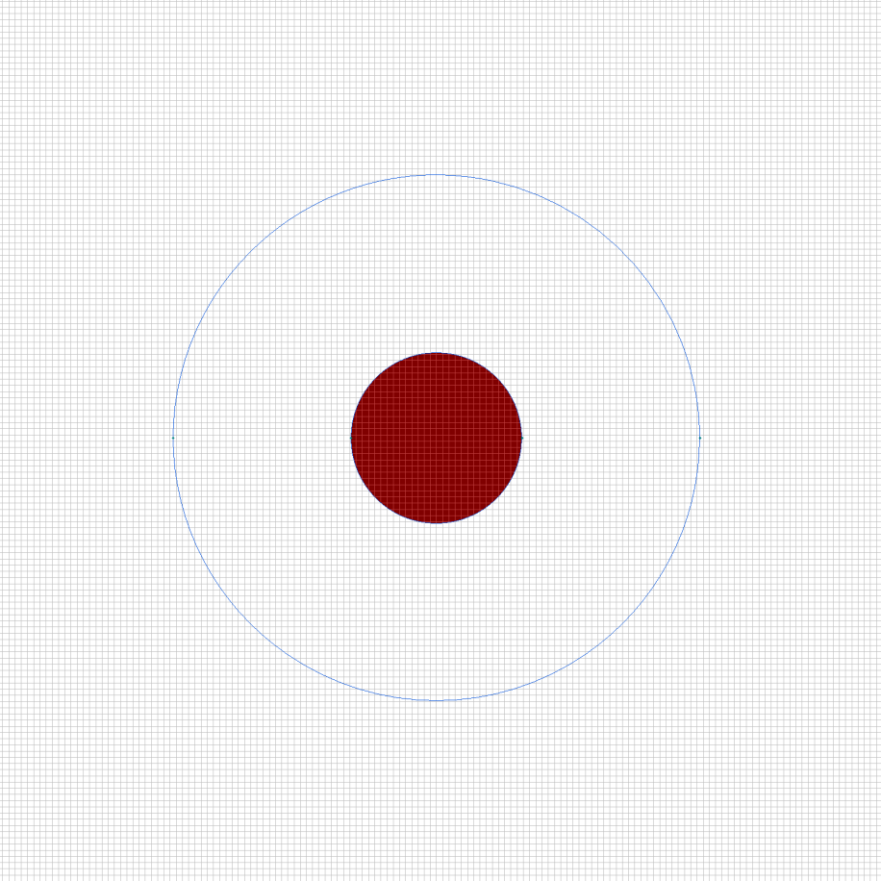
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=33500000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph B (Fe) part 1"

There are (1) objects with this label

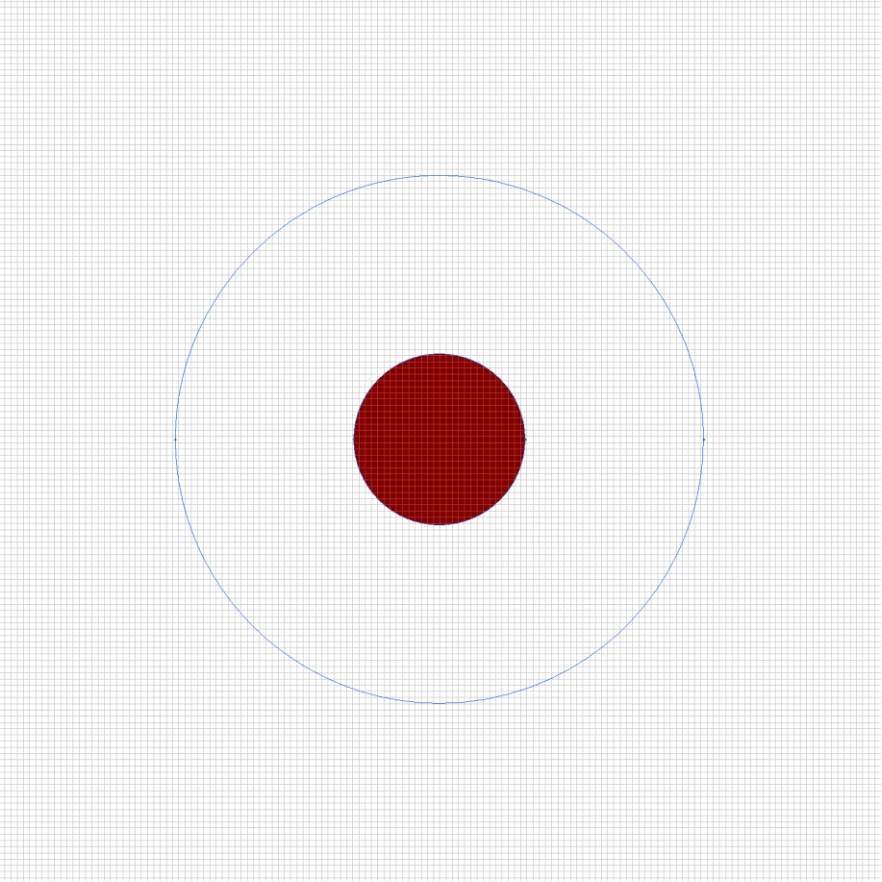
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=7700000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph B (Fe) part 3"

There are (1) objects with this label

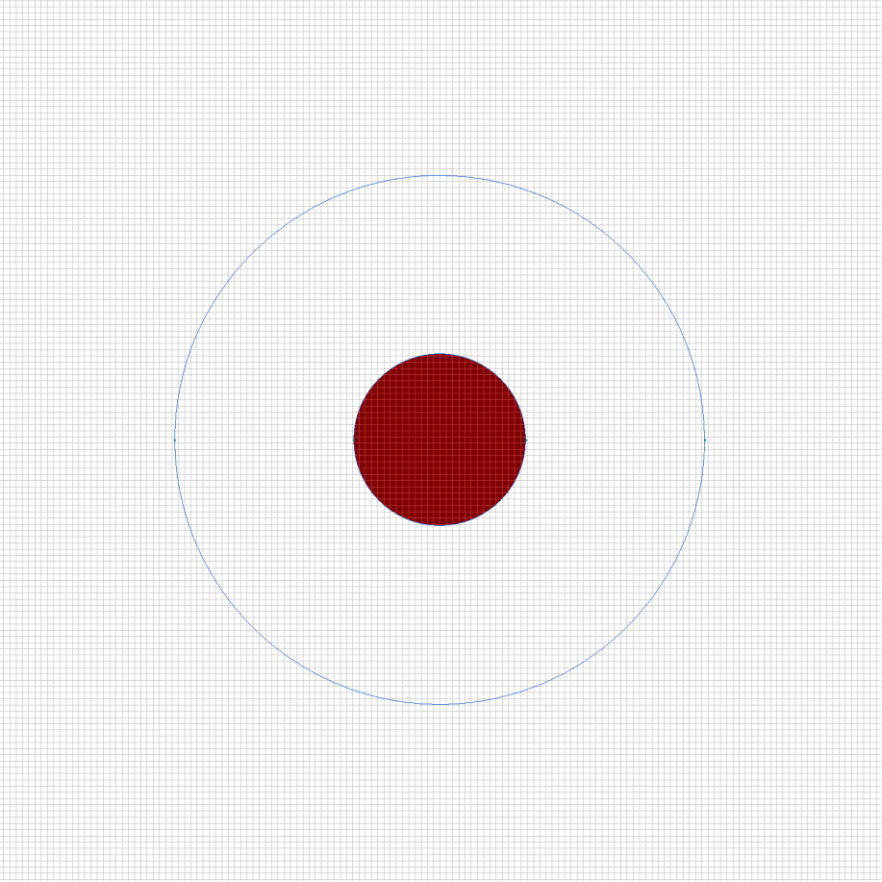
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=7700000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph A (Fe) part 1"

There are (1) objects with this label

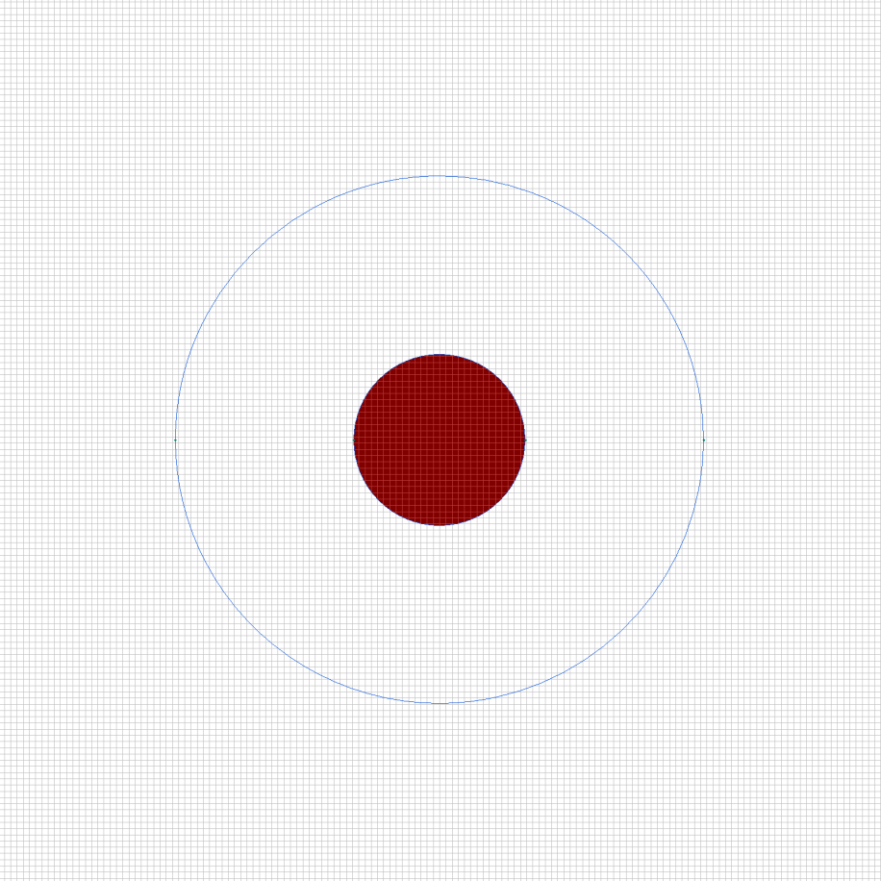
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=7700000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph B (Fe) part 2"

There are (1) objects with this label

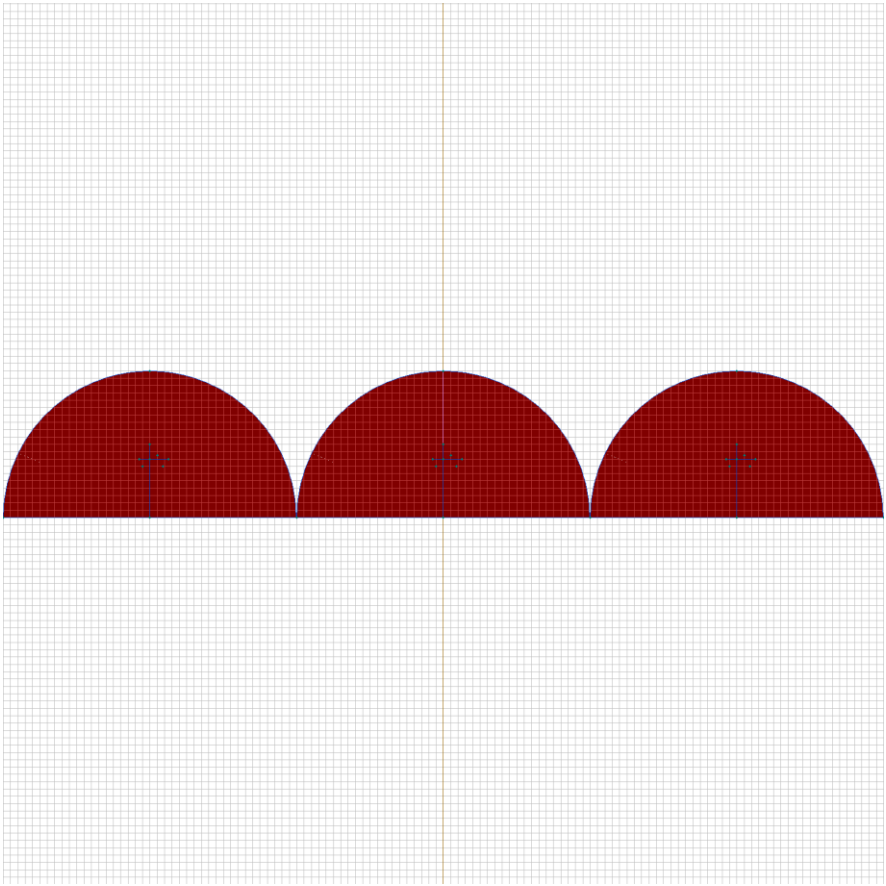
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=7700000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "air"

There are (3) objects with this label

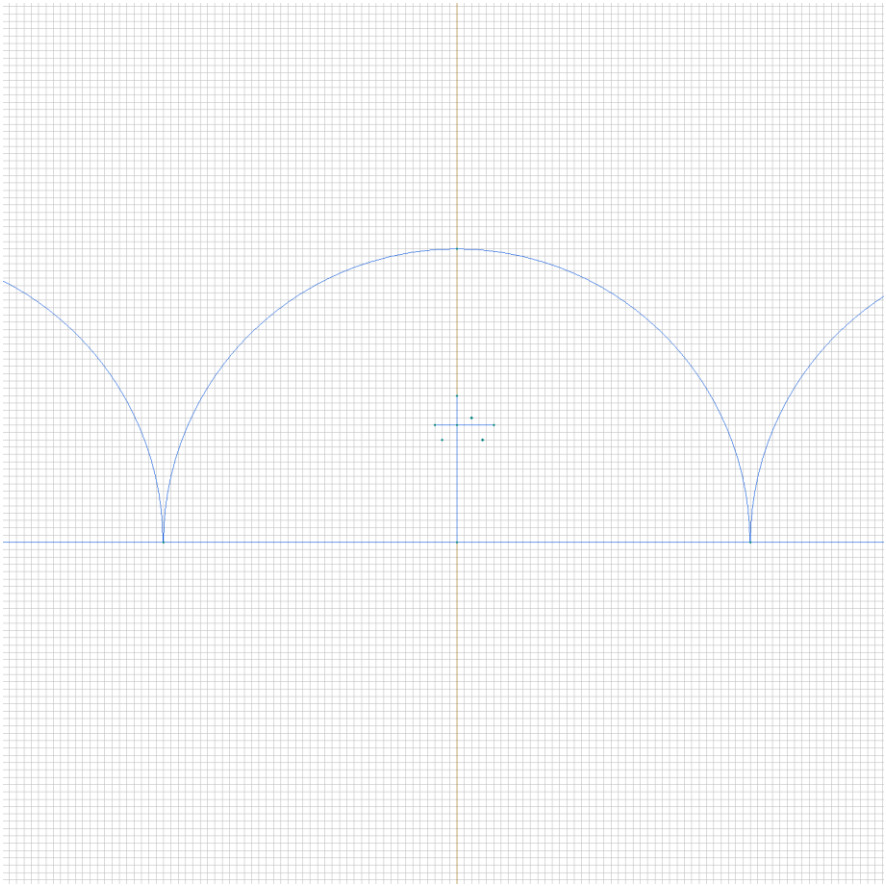
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=0 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph A (Fe) part 2"

There are (1) objects with this label

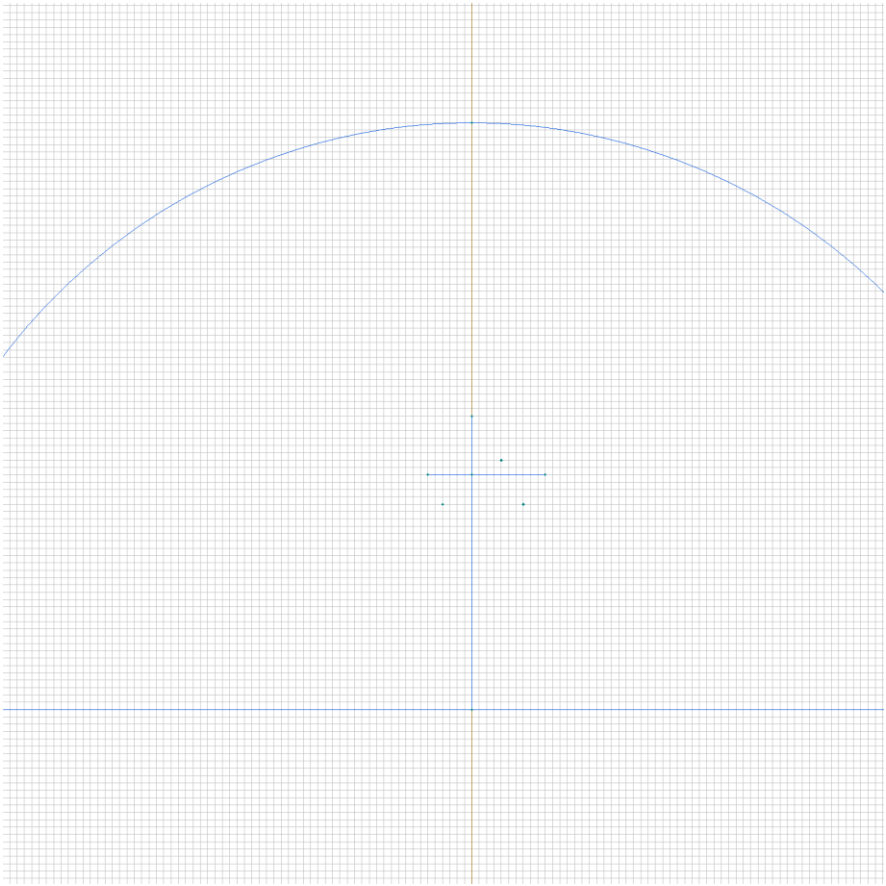
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=7700000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph A (Al) part 2"

There are (1) objects with this label

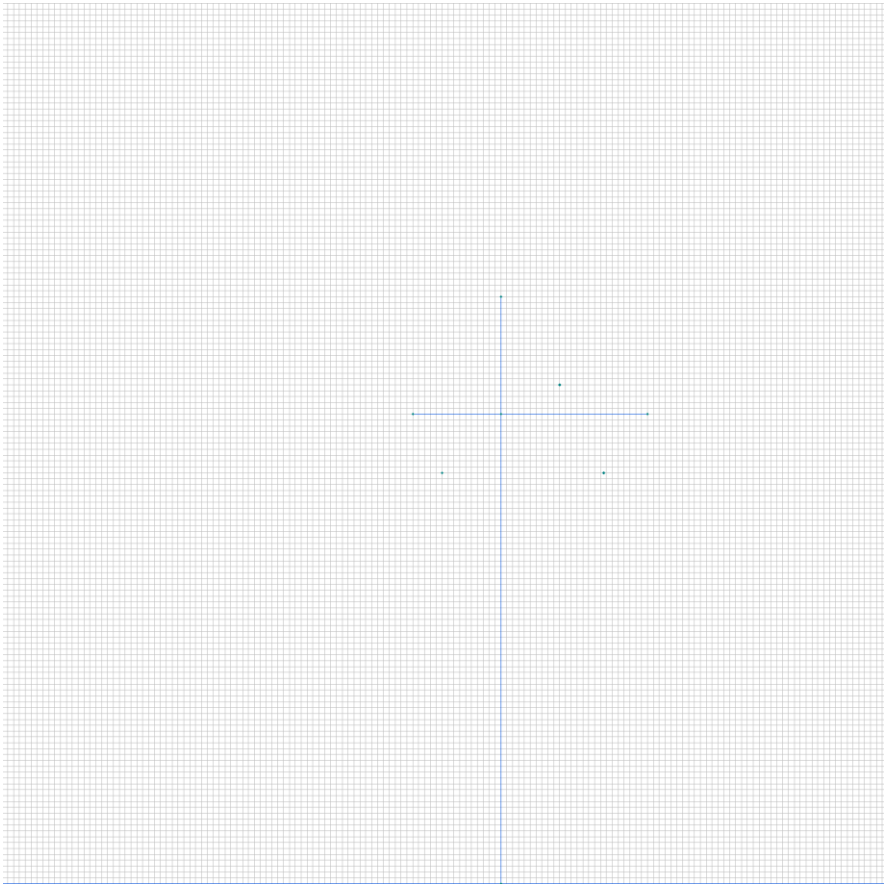
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=33500000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph C (Al) part 1"

There are (1) objects with this label

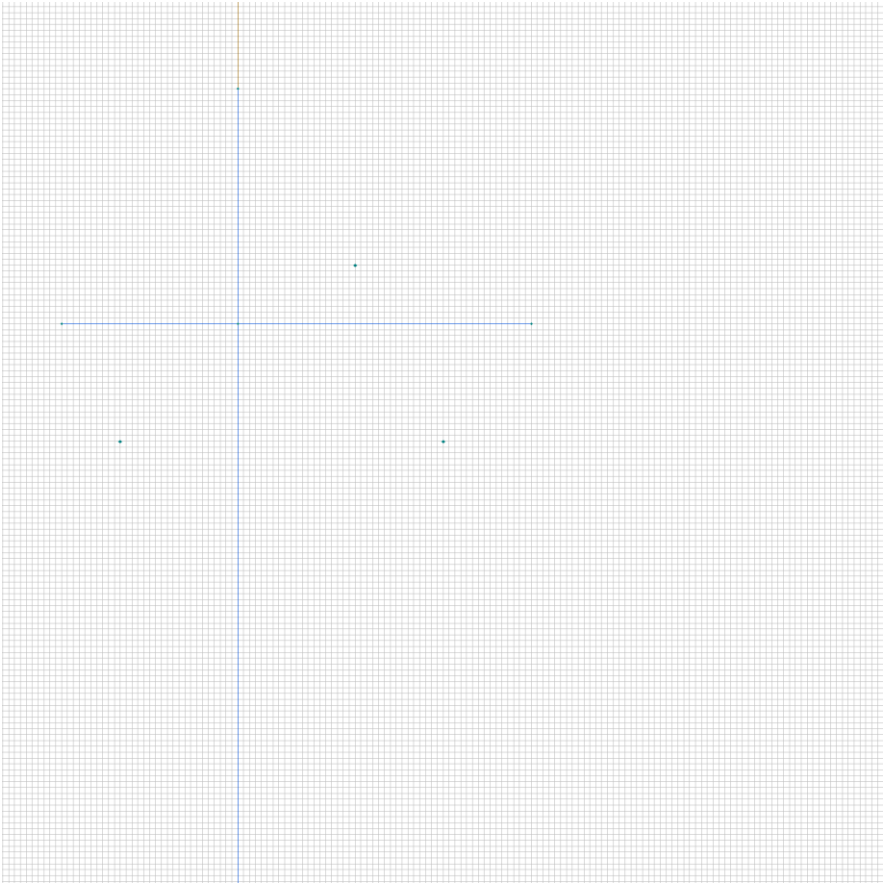
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=33500000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph C (Fe) part 2"

There are (1) objects with this label

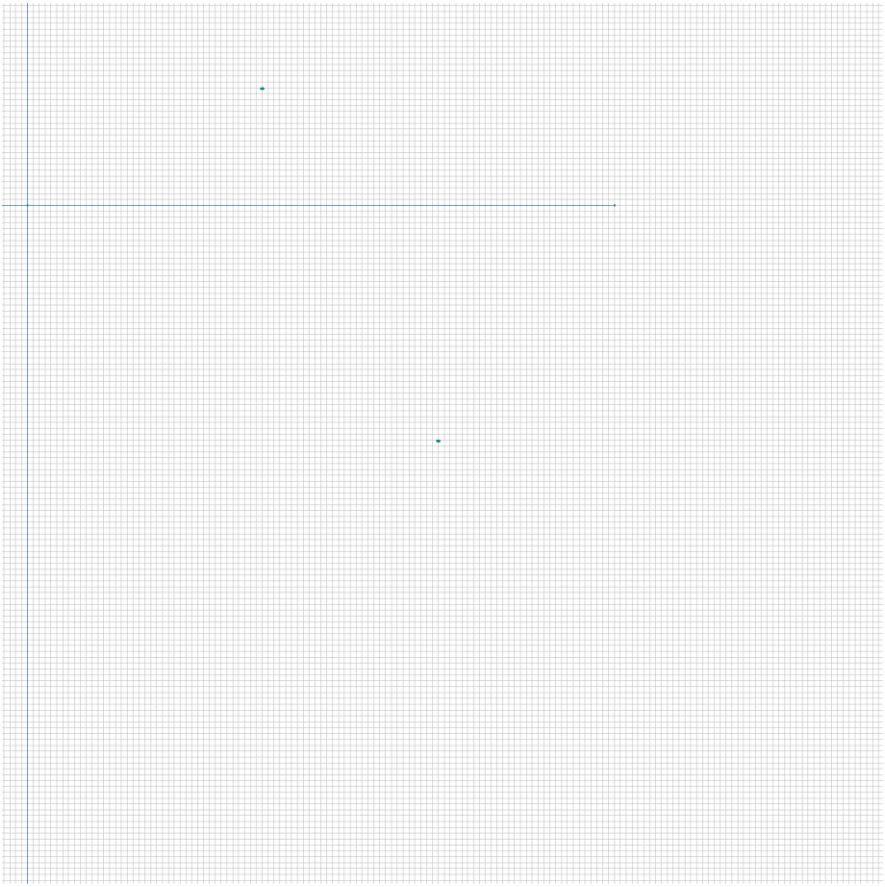
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=7700000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph B (Al) part 1"

There are (1) objects with this label

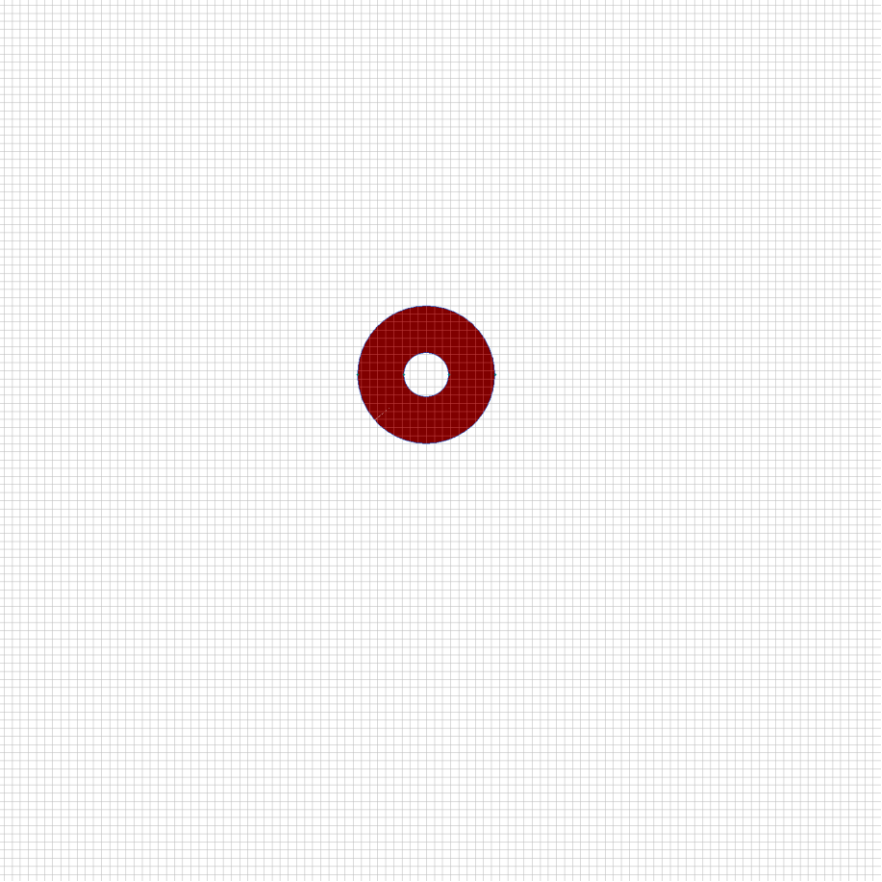
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=33500000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph C (Al) part 2"

There are (1) objects with this label

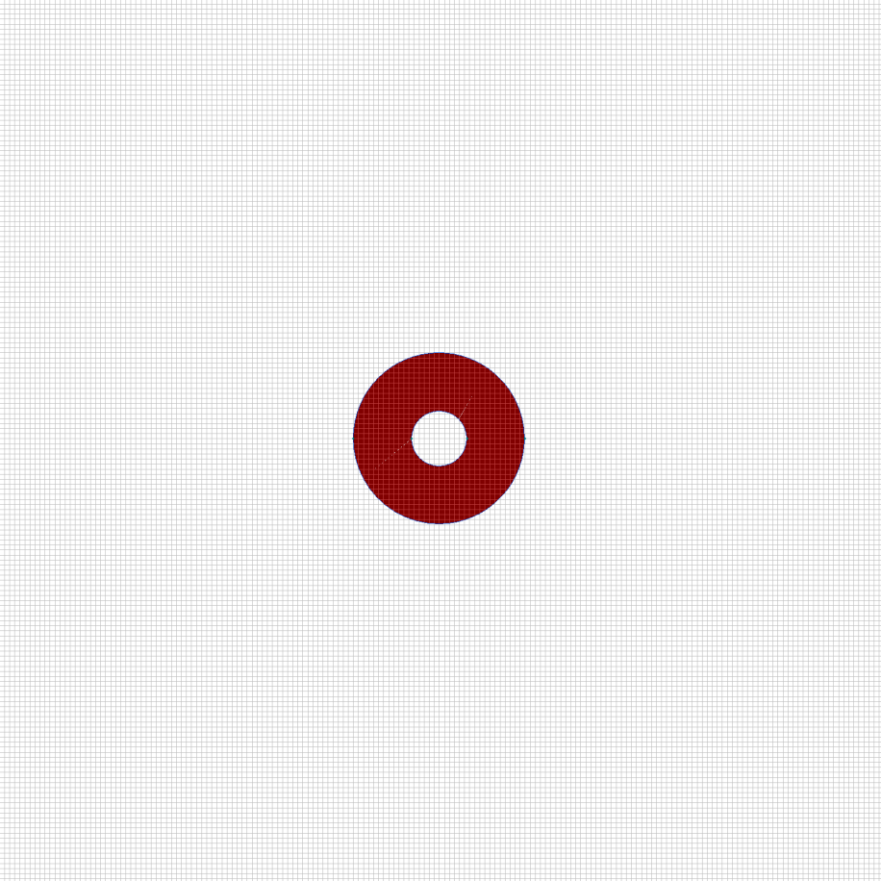
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=33500000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph B (Al) part 2"

There are (1) objects with this label

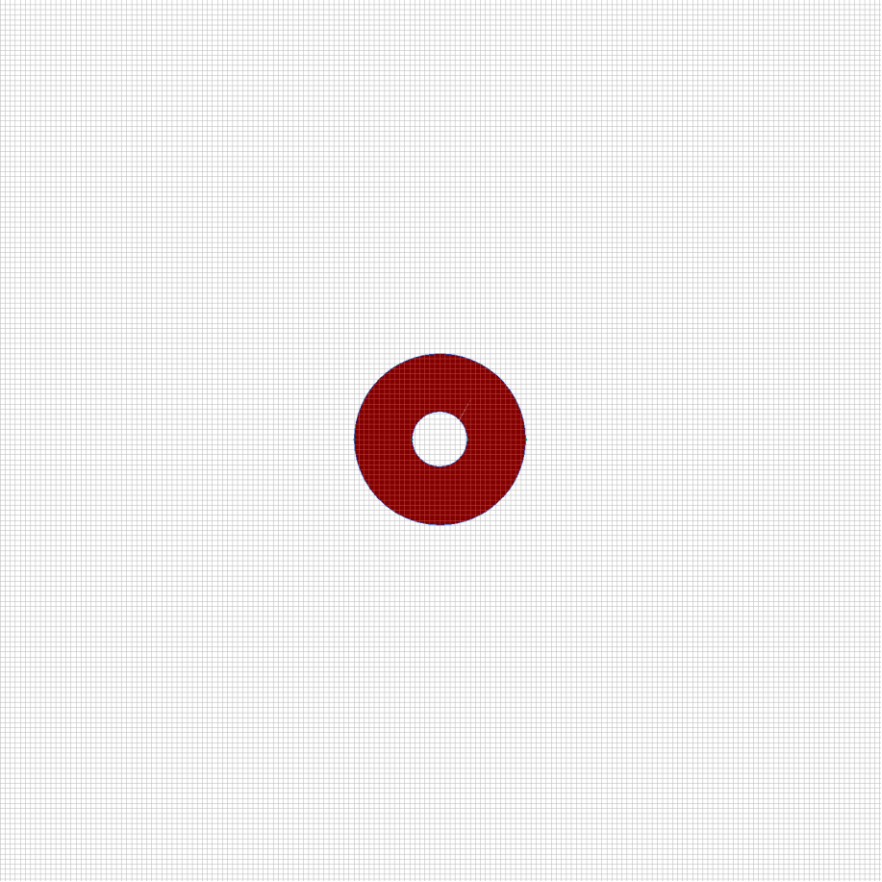
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=33500000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "ph A (Al) part 1"

There are (1) objects with this label

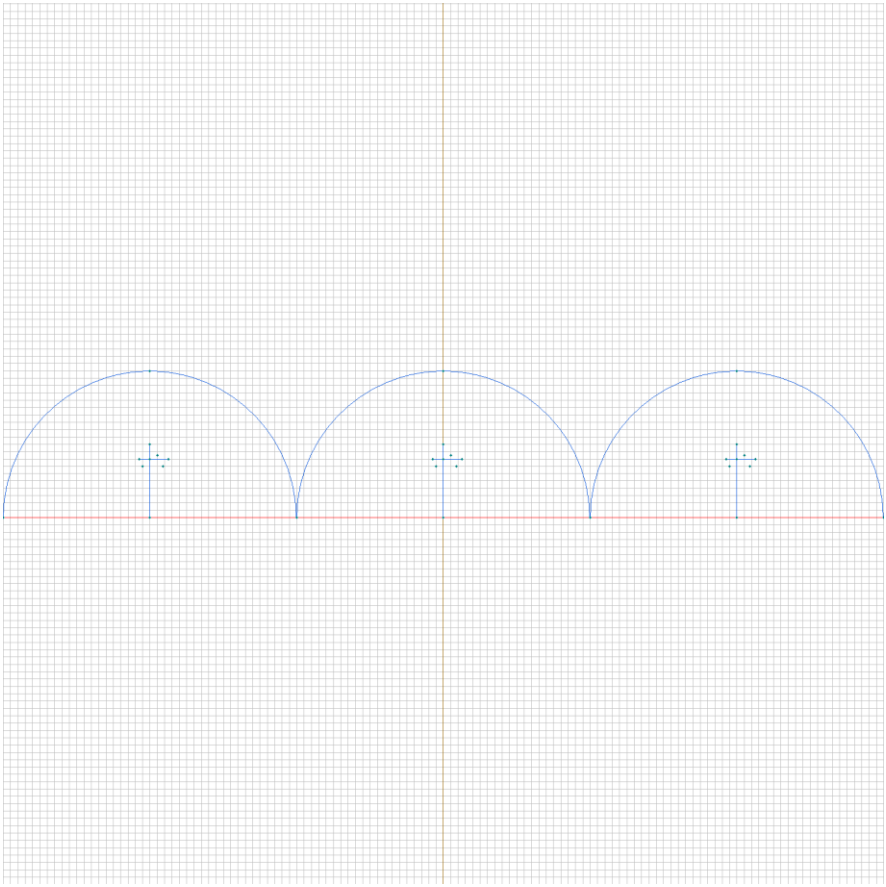
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=33500000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: edge "ground"

There are (6) objects with this label

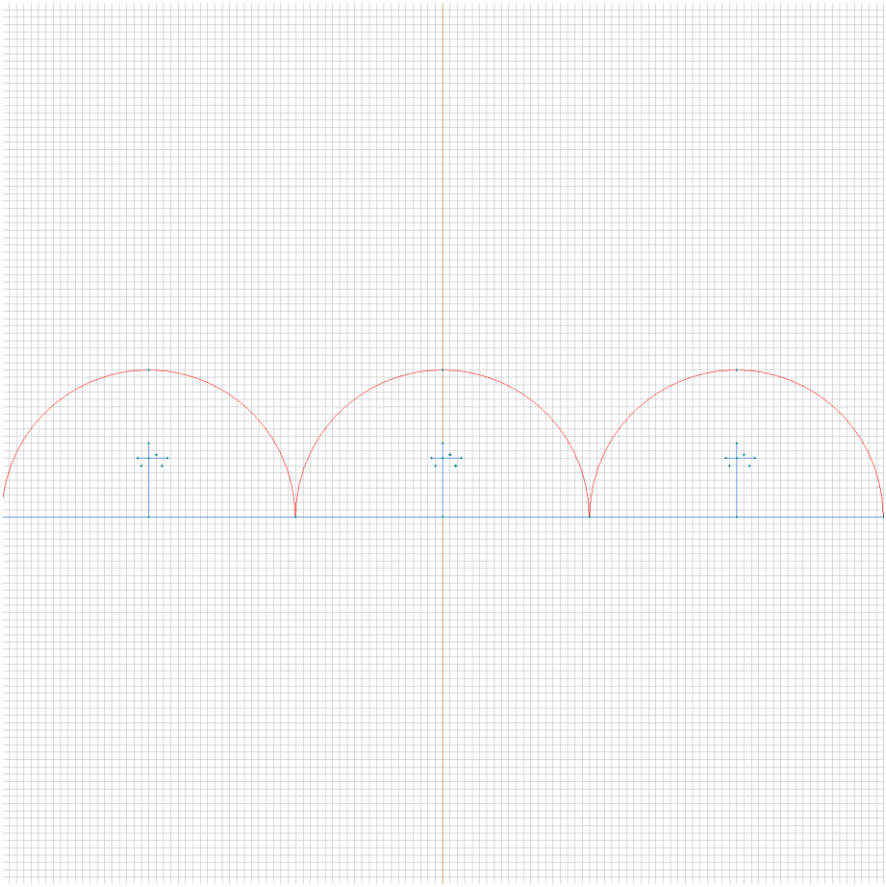
Magnetic potential: A=0 [Wb/m], phase 0 [deg]



Labelled objects: edge "zero potencial"

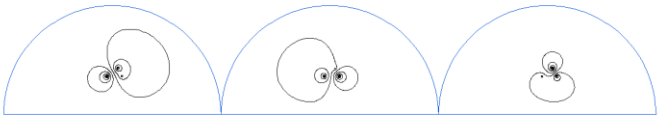
There are (6) objects with this label

Magnetic potential: A=0 [Wb/m], phase 0 [deg]



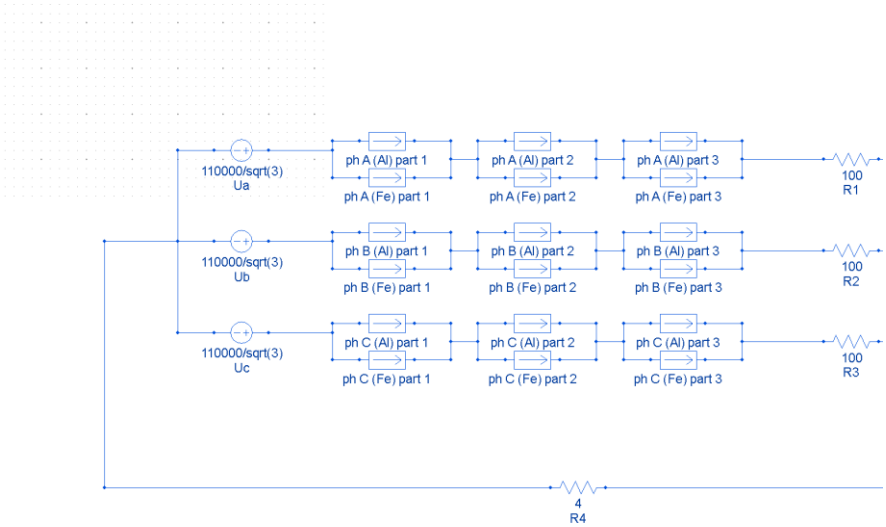
Results

Field lines



Results

Electric circuit currents



Circuit elements:

Ua. I=377.4 [A], phase=-45.83 [deg]

Ub. I=377.2 [A], phase=74.15 [deg]

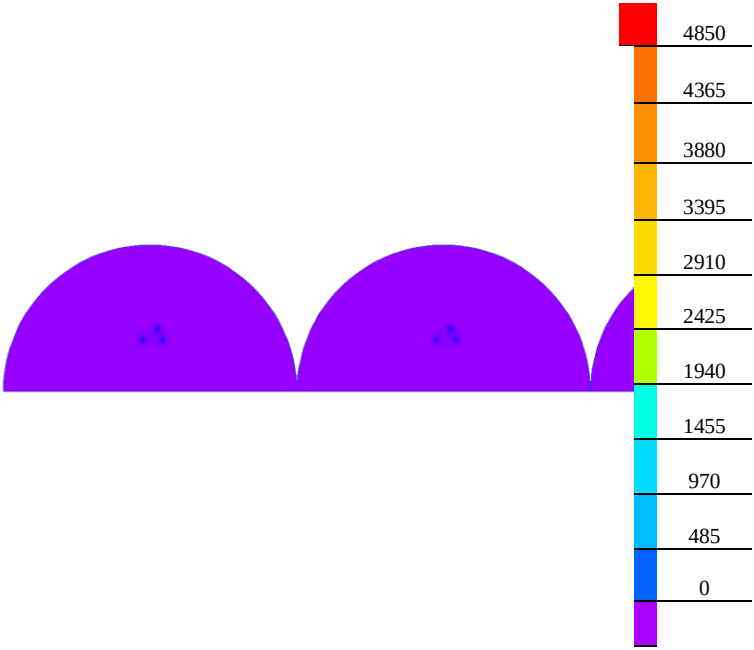
Uc. I=377.3 [A], phase=-165.85 [deg]

ph A (Al) part 1. I=368.4 [A], phase=-45.72 [deg]

ph A (Fe) part 1. I=8.985 [A], phase=-50.59 [deg]
ph B (Al) part 1. I=368.3 [A], phase=74.26 [deg]
ph B (Fe) part 1. I=8.981 [A], phase=69.4 [deg]
ph C (Al) part 1. I=368.3 [A], phase=-165.73 [deg]
ph C (Fe) part 1. I=8.983 [A], phase=-170.61 [deg]
R1. I=377.4 [A], phase=-45.83 [deg]
R2. I=377.2 [A], phase=74.15 [deg]
R3. I=377.3 [A], phase=-165.85 [deg]
L1. I=377.4 [A], phase=-45.83 [deg]
L2. I=377.2 [A], phase=74.15 [deg]
L3. I=377.3 [A], phase=-165.85 [deg]
ph A (Al) part 2. I=368.4 [A], phase=-45.72 [deg]
ph A (Fe) part 2. I=8.985 [A], phase=-50.62 [deg]
ph B (Al) part 2. I=368.3 [A], phase=74.26 [deg]
ph B (Fe) part 2. I=8.982 [A], phase=69.39 [deg]
ph C (Al) part 2. I=368.3 [A], phase=-165.73 [deg]
ph C (Fe) part 2. I=8.983 [A], phase=-170.64 [deg]
ph A (Al) part 3. I=368.4 [A], phase=-45.72 [deg]
ph A (Fe) part 3. I=8.985 [A], phase=-50.56 [deg]
ph B (Al) part 3. I=368.3 [A], phase=74.26 [deg]
ph B (Fe) part 3. I=8.981 [A], phase=69.42 [deg]
ph C (Al) part 3. I=368.3 [A], phase=-165.73 [deg]
ph C (Fe) part 3. I=8.983 [A], phase=-170.58 [deg]
R4. I=0.15698 [A], phase=159.56 [deg]

Results

Color map of Strength |H| [A/m]



Nonlinear dependencies

No non-linear dependencies are used in this problem data