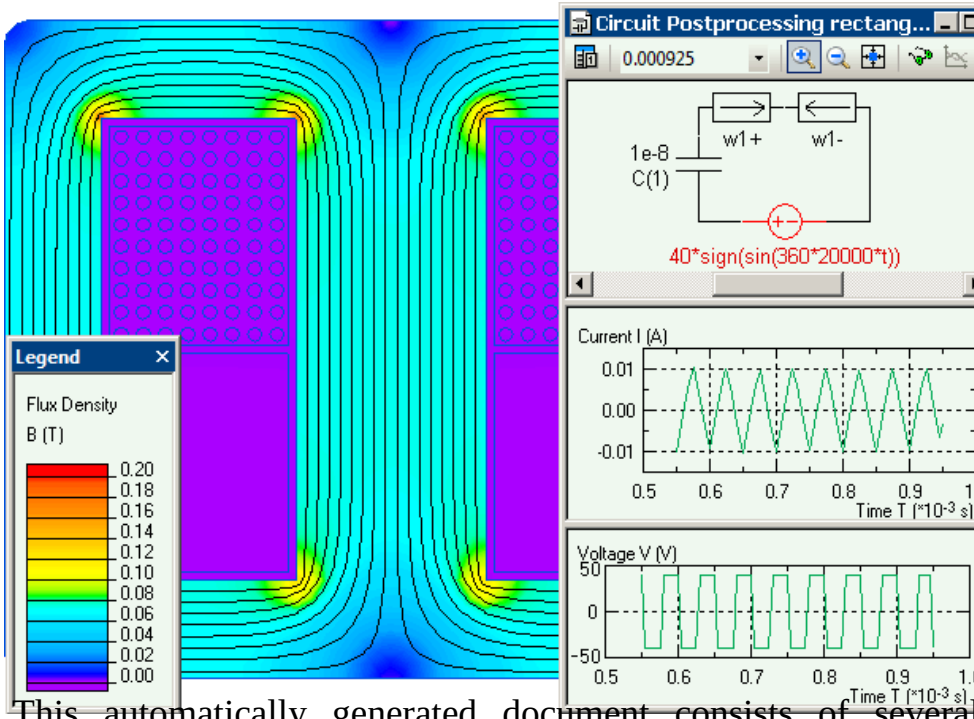
QuickField simulation report

Iron core loss in transient excitation mode

This is an example of the iron losses calculation in transient magnetic simulation performed with QuickField software.



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/core_loss_square_wave.htm

Problem info

Problem type: Transient Magnetics (integration time: 9.50000016018748E-04 s.)
Geometry model class: Plane-Parallel
Problem database file names:

- Problem: *rectangular_wave_problem.pbm*
- Geometry: *Transformer_model.mod*
- Material Data: *Material_data.dms*
- Material Data 2 (library): *none*
- Electric circuit: *circuit1.qcr*

Results taken from other problems:

- *none*

Geometry model

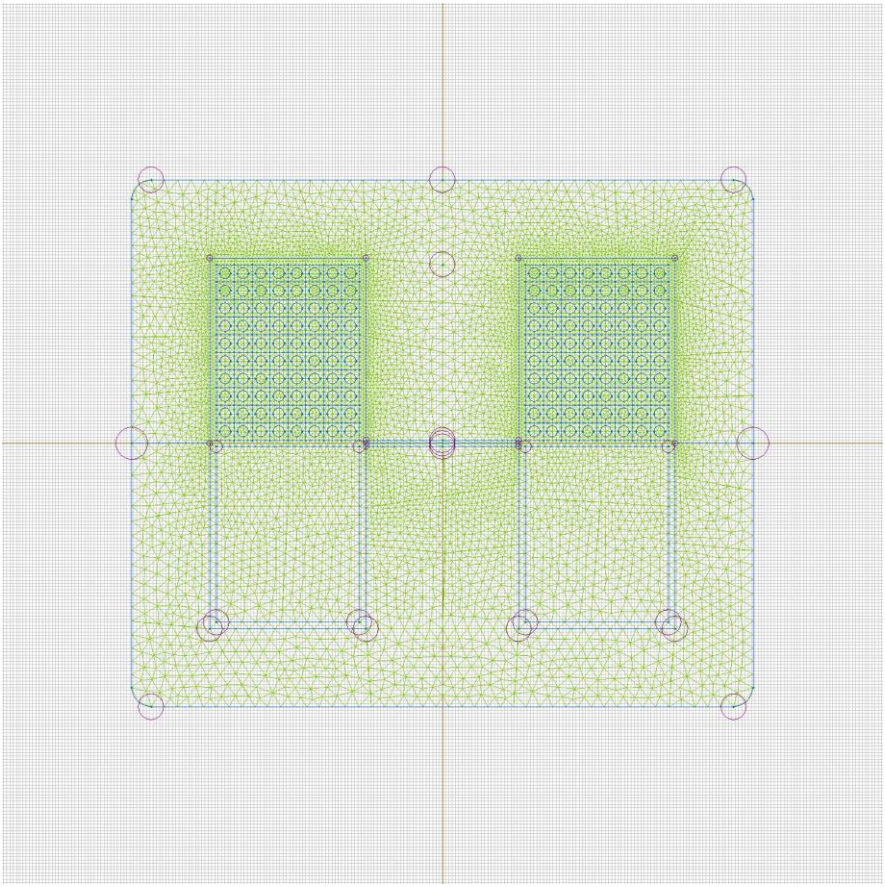


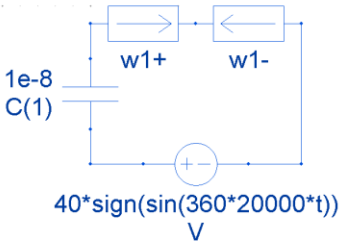
Table 1. Geometry model statistics

	With Label	Total
Blocks	7	328
Edges	1	719
Vertices	0	557

Number of nodes: 8857.

Electric circuit

Coupled electric circuit



Circuit elements:

QuickField block 'w1-'
QuickField block 'w1+'
Voltage source V=40*sign(sin(360*20000*t)) [V]
Capacitor C(1)=0.00000001 [F]

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)

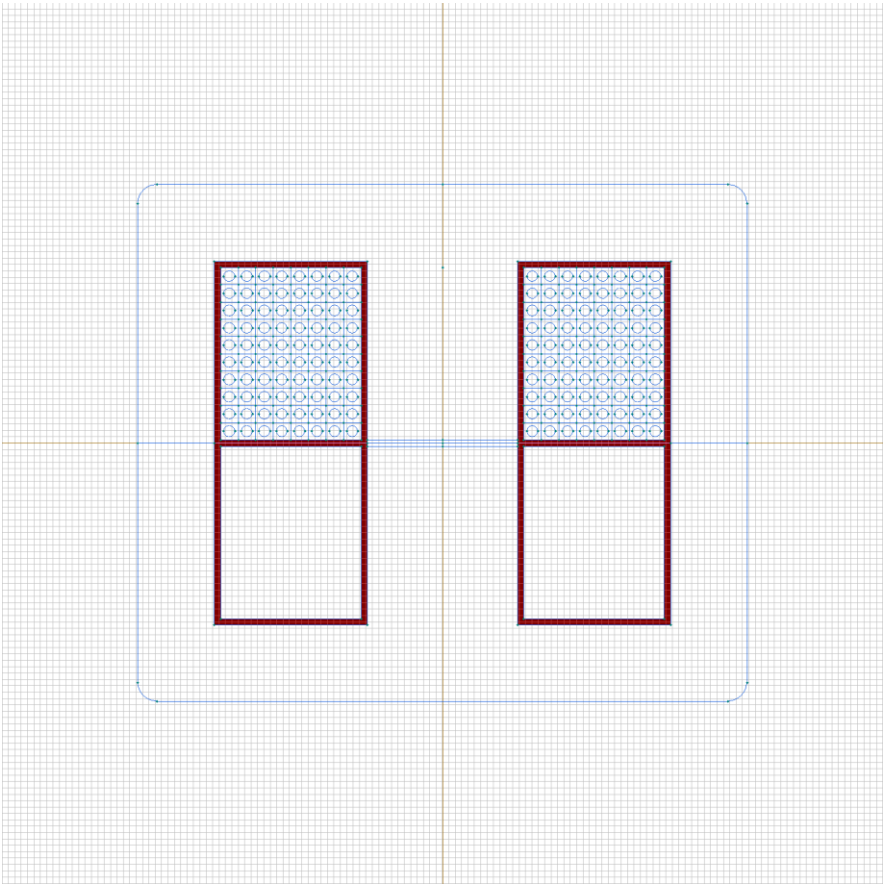
Blocks:	Edges:	Vertices:
• insulation • wire insulation • w2+ • w1- • core • w1+ • w2- •	• boundary •	

Detailed information about each label is listed below.

Labelled objects: block "insulation"

There are (2) objects with this label

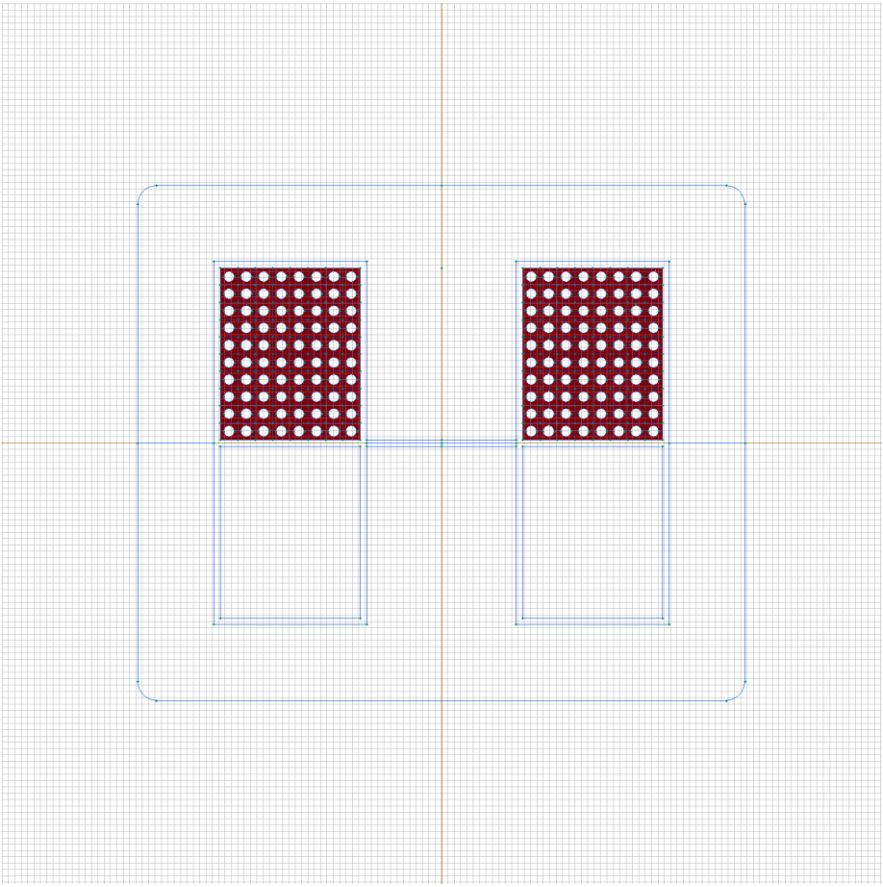
Relative magnetic permeability: mu_x=1, mu_y=1
Current density: j=0 [A/m2]
Conductor's connection: in parallel



Labelled objects: block "wire insulation"

There are (160) objects with this label

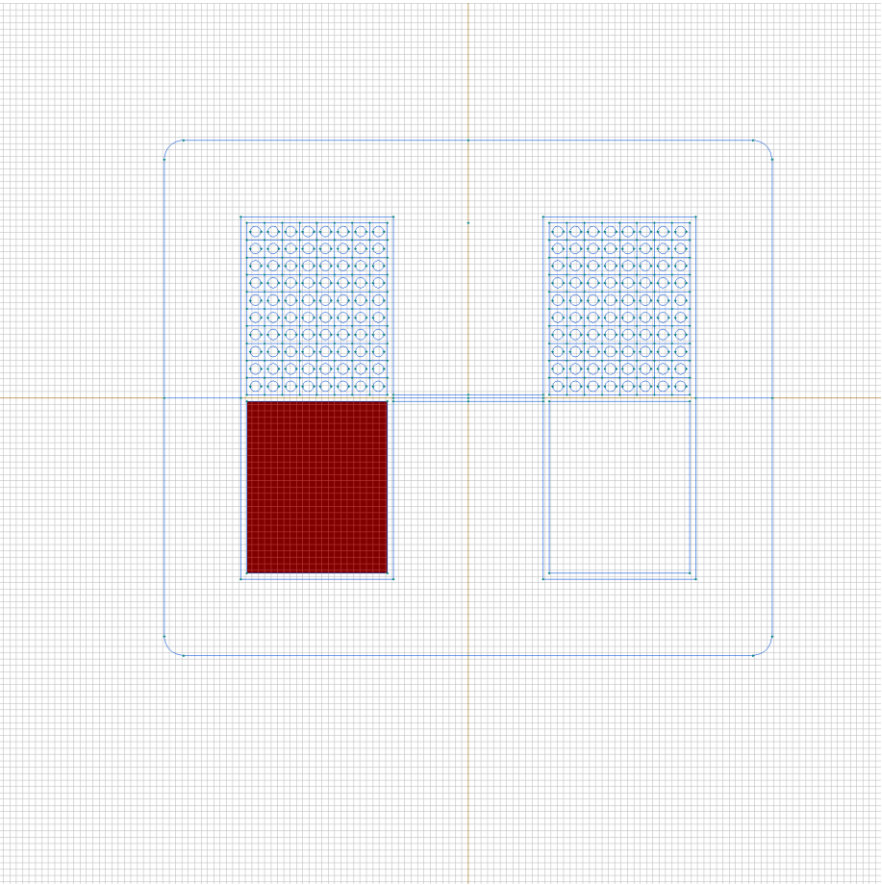
Relative magnetic permeability: mu_x=1, mu_y=1
Current density: j=0 [A/m2]
Conductor's connection: in parallel



Labelled objects: block "w2+"

There are (1) objects with this label

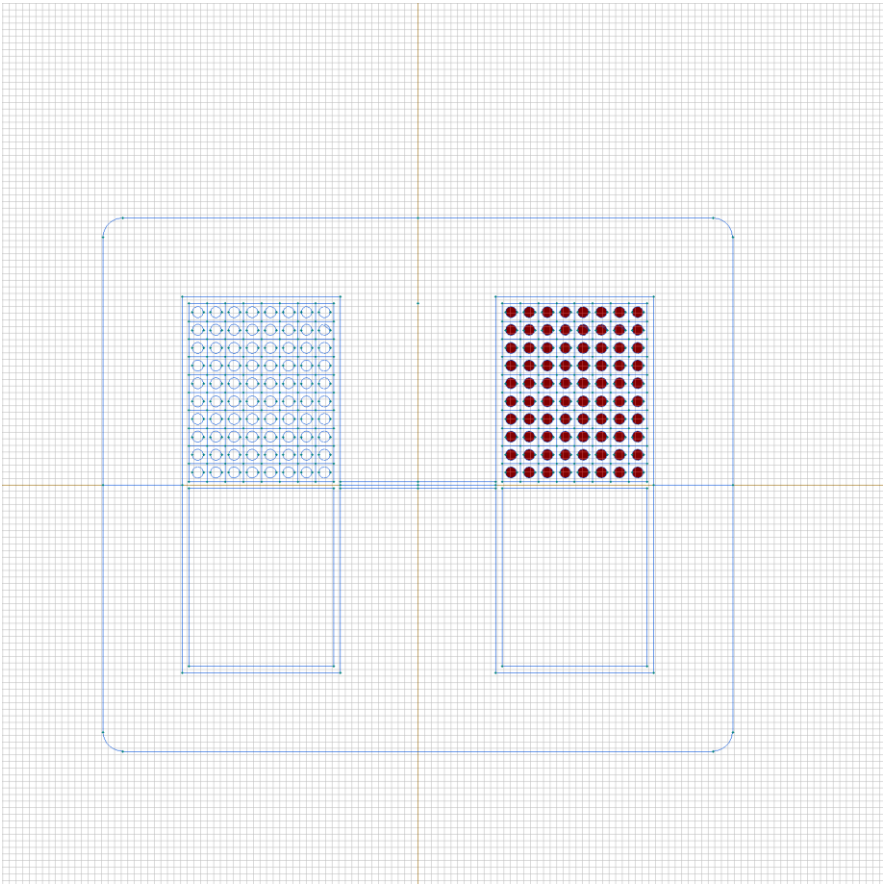
Relative magnetic permeability: mu_x=1, mu_y=1
Current density: j=0 [A/m2]
Conductor's connection: in parallel



Labelled objects: block "w1-"

There are (80) objects with this label

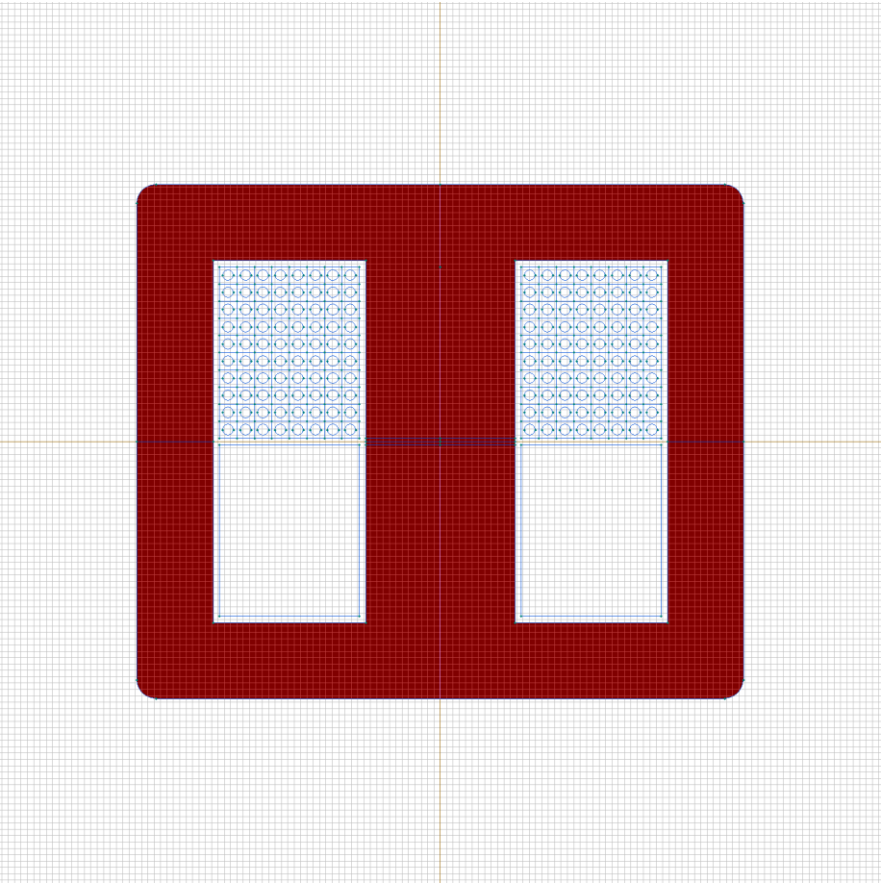
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma(T)=56000000 [S/m]
Voltage: U=-80*sign(sin(360*20000*t+45)) [V]
Conductor's connection: in series



Labelled objects: block "core"

There are (4) objects with this label

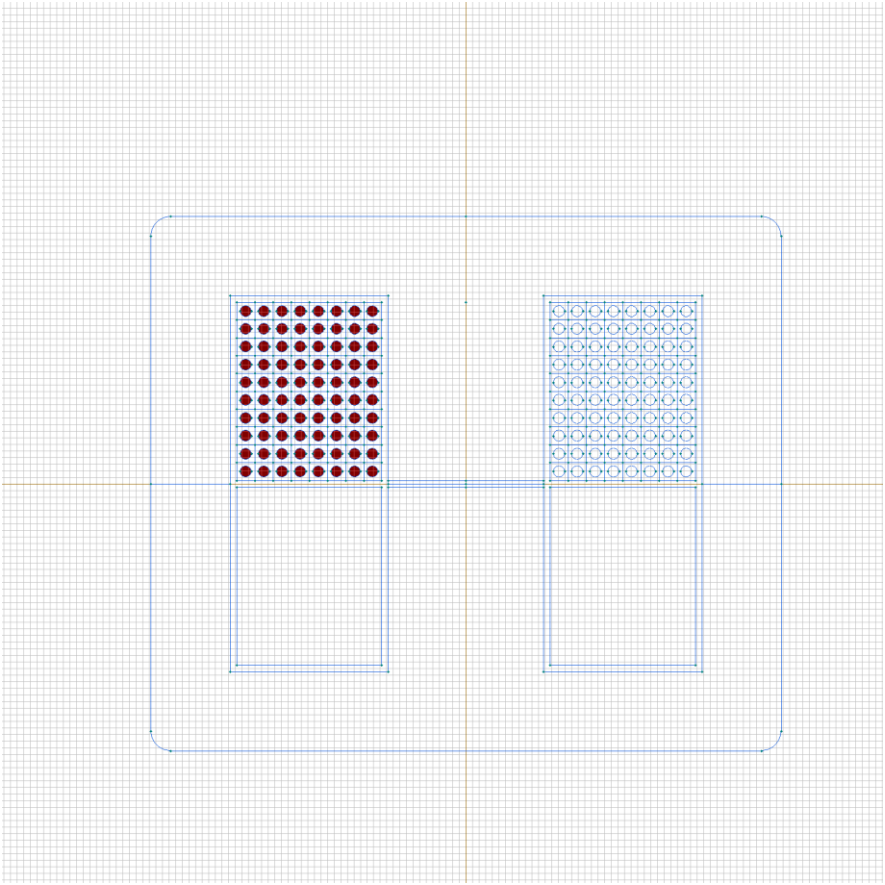
Relative magnetic permeability: mu_x=2700, mu_y=2700
Current density: j=0 [A/m2]
Conductor's connection: in parallel



Labelled objects: block "w1+"

There are (80) objects with this label

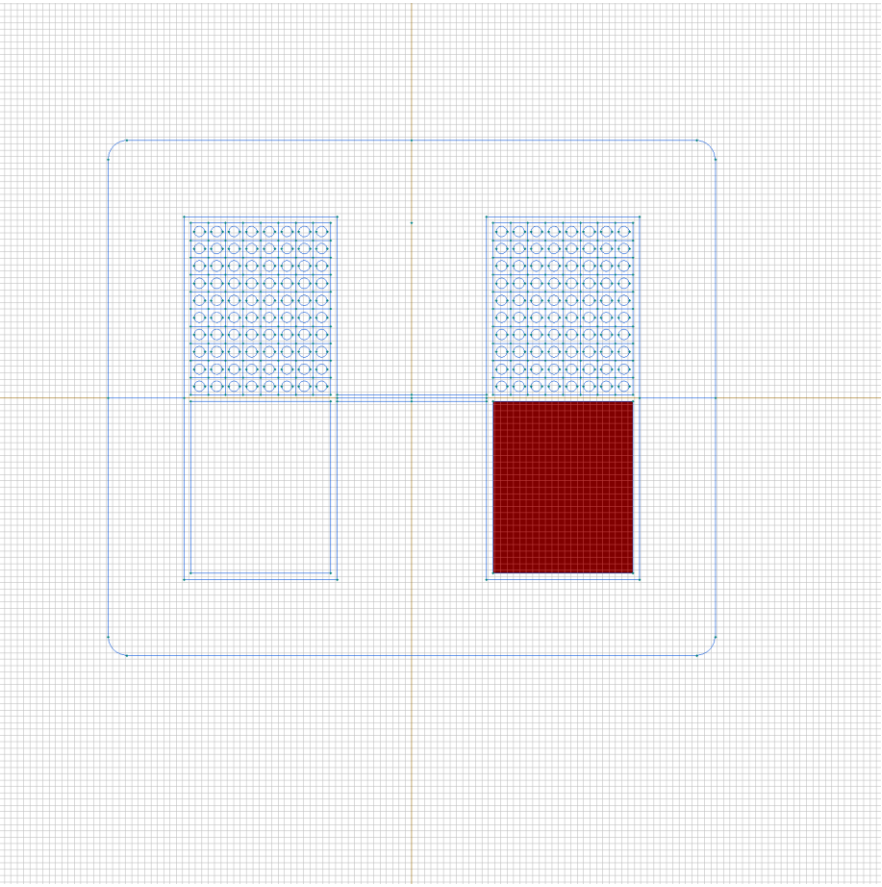
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma(T)=56000000 [S/m]
Voltage: U=80*sign(sin(360*20000*t+45)) [V]
Conductor's connection: in series



Labelled objects: block "w2-"

There are (1) objects with this label

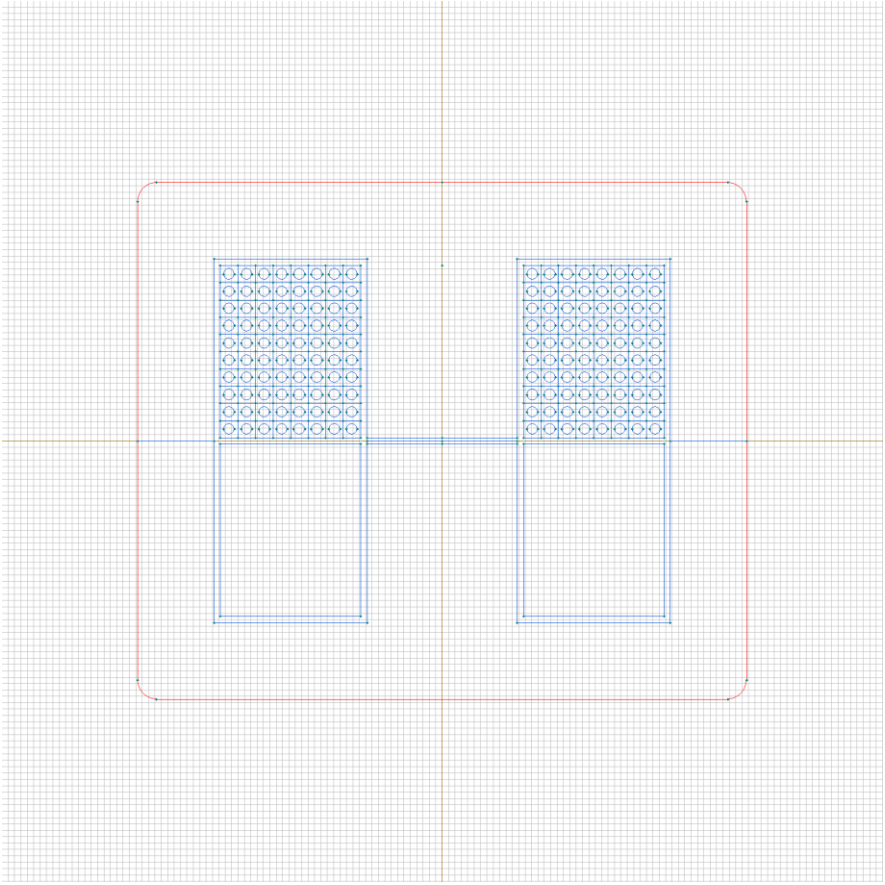
Relative magnetic permeability: mu_x=1, mu_y=1
Current density: j=0 [A/m2]
Conductor's connection: in parallel



Labelled objects: edge "boundary"

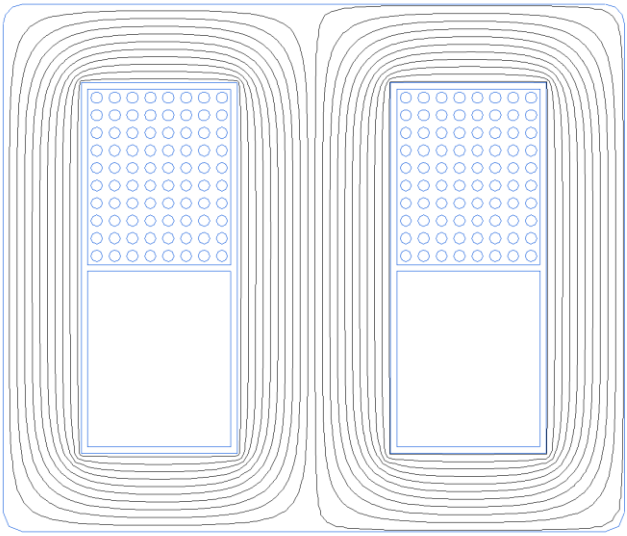
There are (11) objects with this label

Magnetic potential: A=0 [Wb/m]



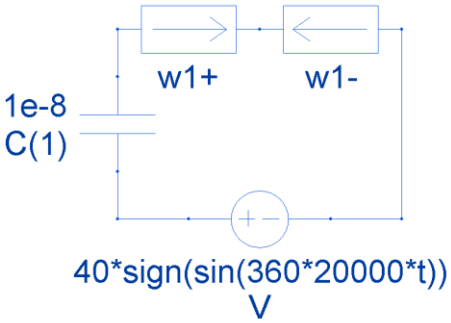
Results

Field lines



Results

Electric circuit currents



Circuit elements:

w1-. I=0.003014 [A]

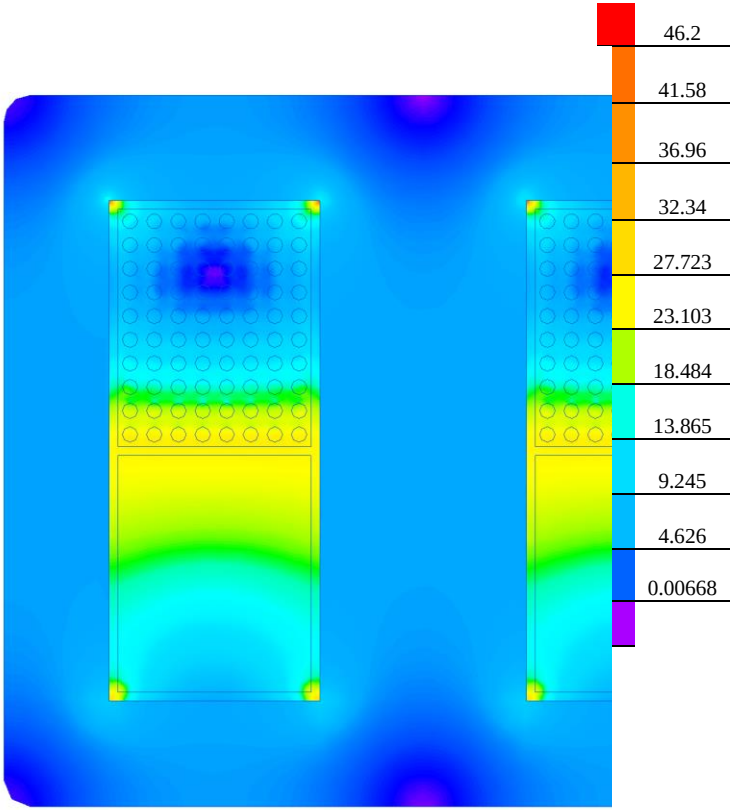
w1+. I=0.003015 [A]

V. I=0.003014 [A]

C(1). I=0.003014 [A]

Results

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



Nonlinear dependencies

No non-linear dependencies are used in this problem data