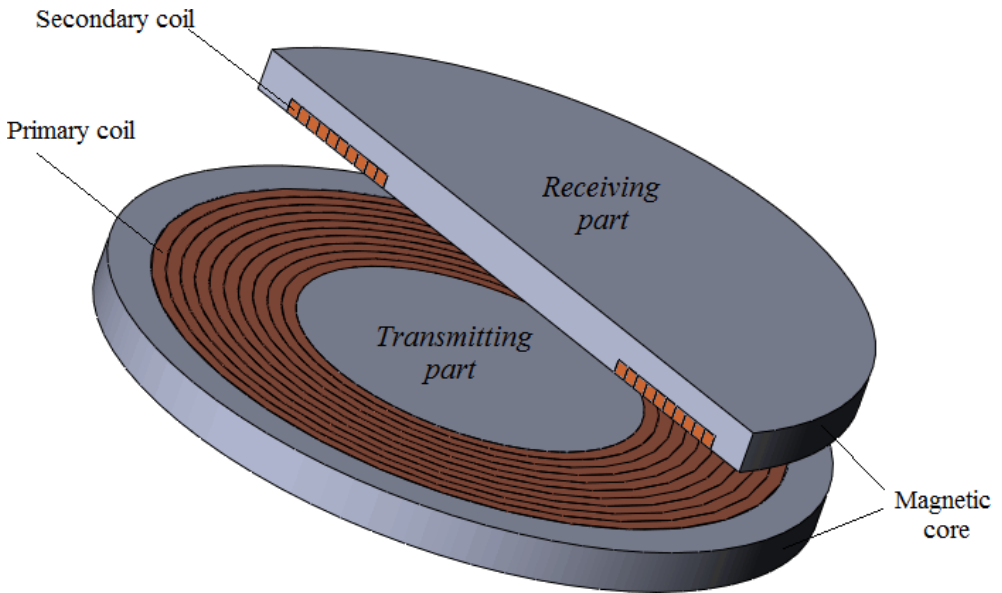


# QuickField simulation report

## Wireless charging

Wireless charger is an air transformer. Adding capacitances in series with primary and secondary coils improve its characteristics.



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/wireless\\_charger.htm](https://quickfield.com/advanced/wireless_charger.htm)

# Problem info

Problem type: AC Magnetics , frequency: 10000 Hz,

Geometry model class: Axisymmetric

Problem database file names:

- Problem: *Wireless\_charger\_core.pbm*
- Geometry: *Wireless\_charger\_core.mod*
- Material Data: *Wireless\_charger\_core.dhe*
- Material Data 2 (library): *none*
- Electric circuit: *Circuit.qcr*

Results taken from other problems:

- *none*

# Geometry model

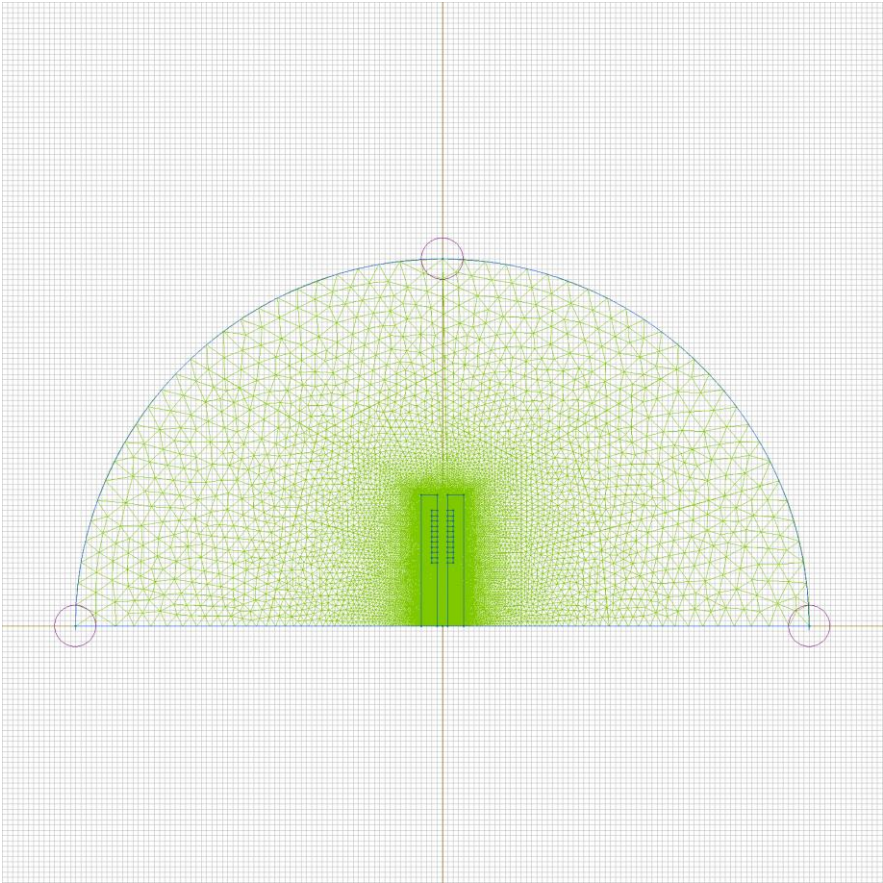


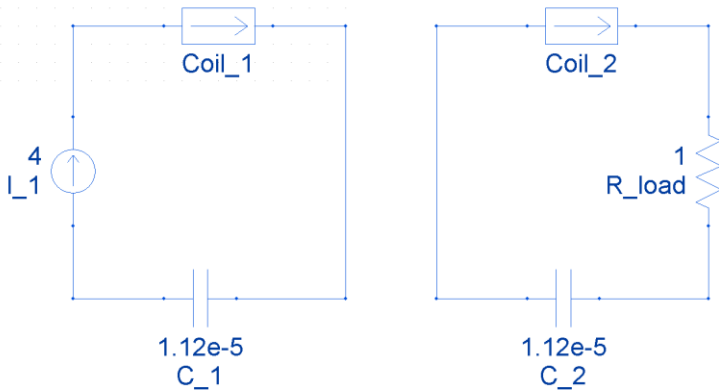
Table 1. Geometry model statistics

	With Label	Total
Blocks	4	23
Edges	1	78
Vertices	0	56

Number of nodes: 35638.

# Electric circuit

Coupled electric circuit



## Circuit elements:

QuickField block 'Coil\_1'

QuickField block 'Coil\_2'

Current source  $I_1=4$  [A] 0 [deg]

Resistor  $R_{load}=1$  [Ohm]

Capacitor  $C_2=0.0000112$  [F]

Capacitor  $C_1=0.0000112$  [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:

- [Coil 1](#)
- [Coil 2](#)
- [Air](#)
- [Core](#)
- 

Edges:

- [Boundary](#)
- 

Vertices:

Detailed information about each label is listed below.

Labelled objects: block "Coil\_1"

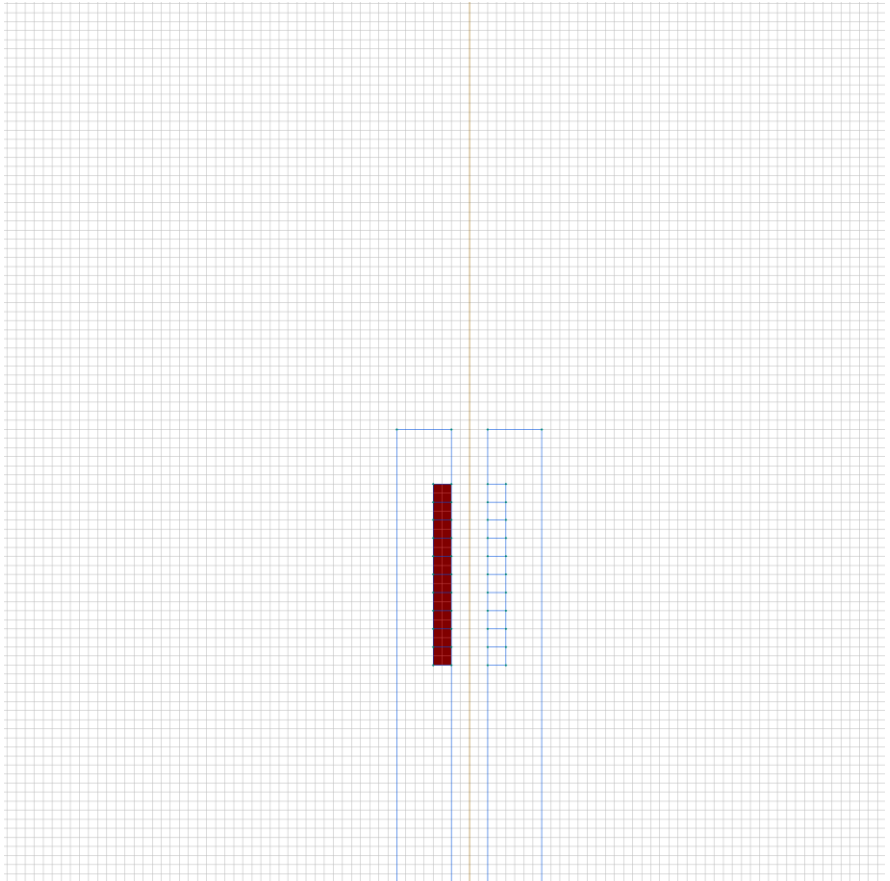
There are (10) objects with this label

Relative magnetic permeability:  $\mu_x=1$ ,  $\mu_y=1$

Electric conductivity:  $\sigma=57000000$  [S/m]

Current density:  $j=1$  [A/m<sup>2</sup>], phase 0 [deg]

Conductor's connection: in series





Labelled objects: block "Coil\_2"

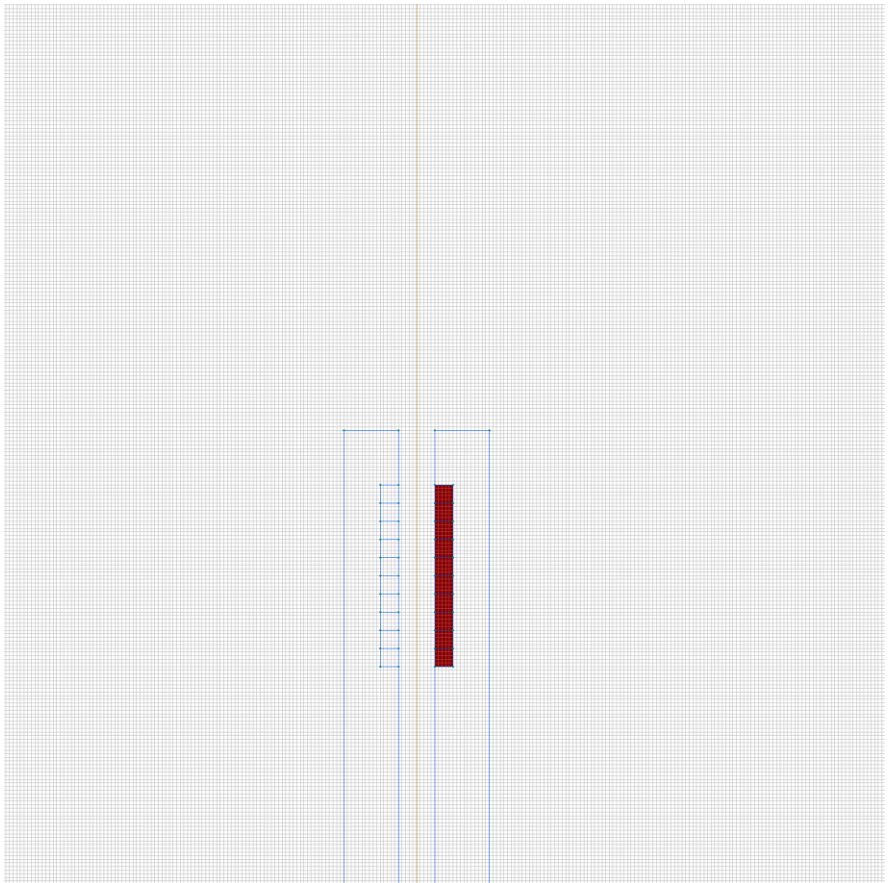
There are (10) objects with this label

Relative magnetic permeability:  $\mu_x=1$ ,  $\mu_y=1$

Electric conductivity:  $\sigma=57000000$  [S/m]

Total current:  $I=0$  [A], phase 0 [deg]

Conductor's connection: in series



Labelled objects: block "Air"

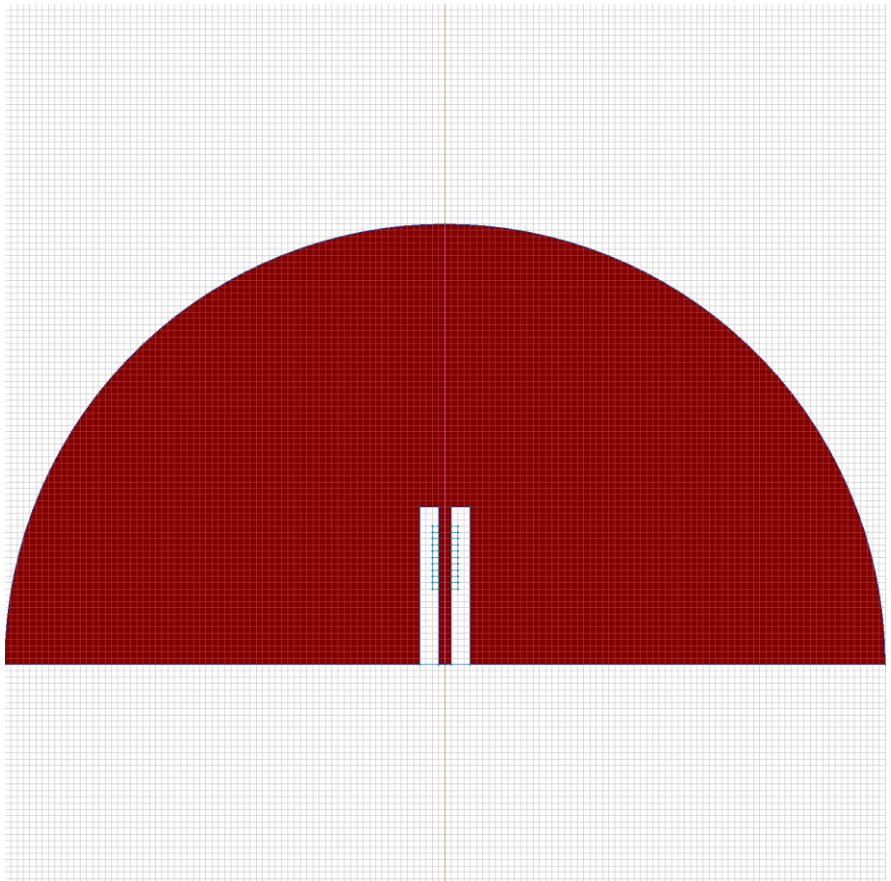
There are (1) objects with this label

Relative magnetic permeability:  $\mu_x=1$ ,  $\mu_y=1$

Electric conductivity:  $\sigma=0$  [S/m]

Current density:  $j=0$  [A/m<sup>2</sup>], phase 0 [deg]

Conductor's connection: in parallel



Labelled objects: block "Core"

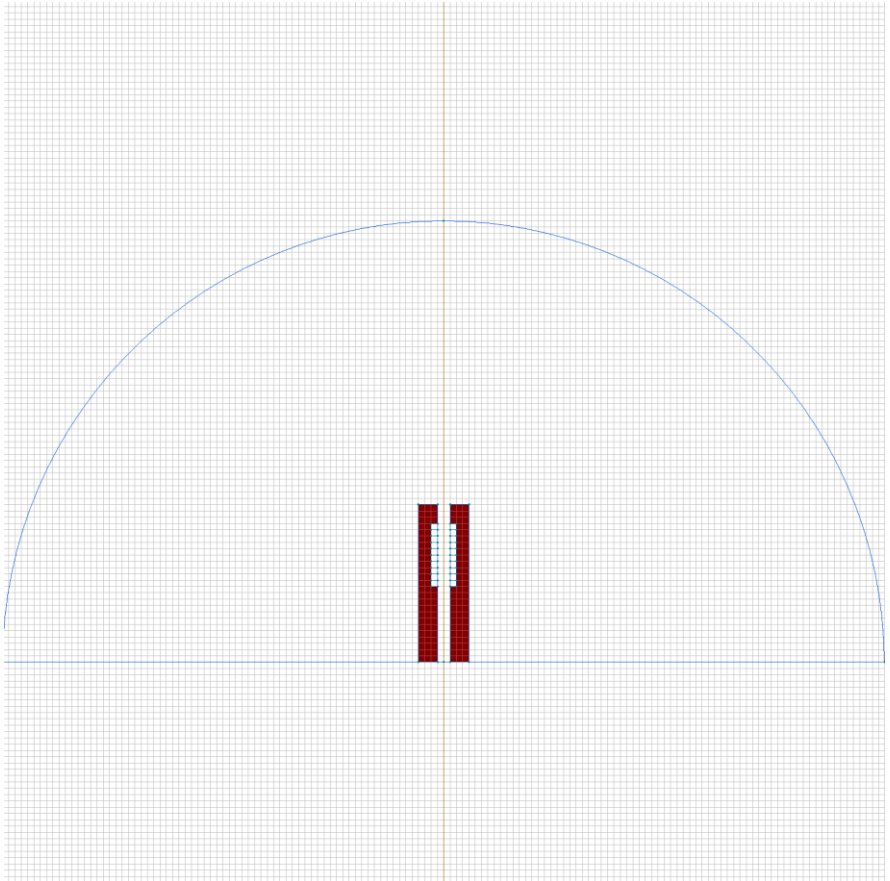
There are (2) objects with this label

Relative magnetic permeability:  $\mu_x=1000$ ,  $\mu_y=1000$

Electric conductivity:  $\sigma=0$  [S/m]

Current density:  $j=0$  [A/m<sup>2</sup>], phase 0 [deg]

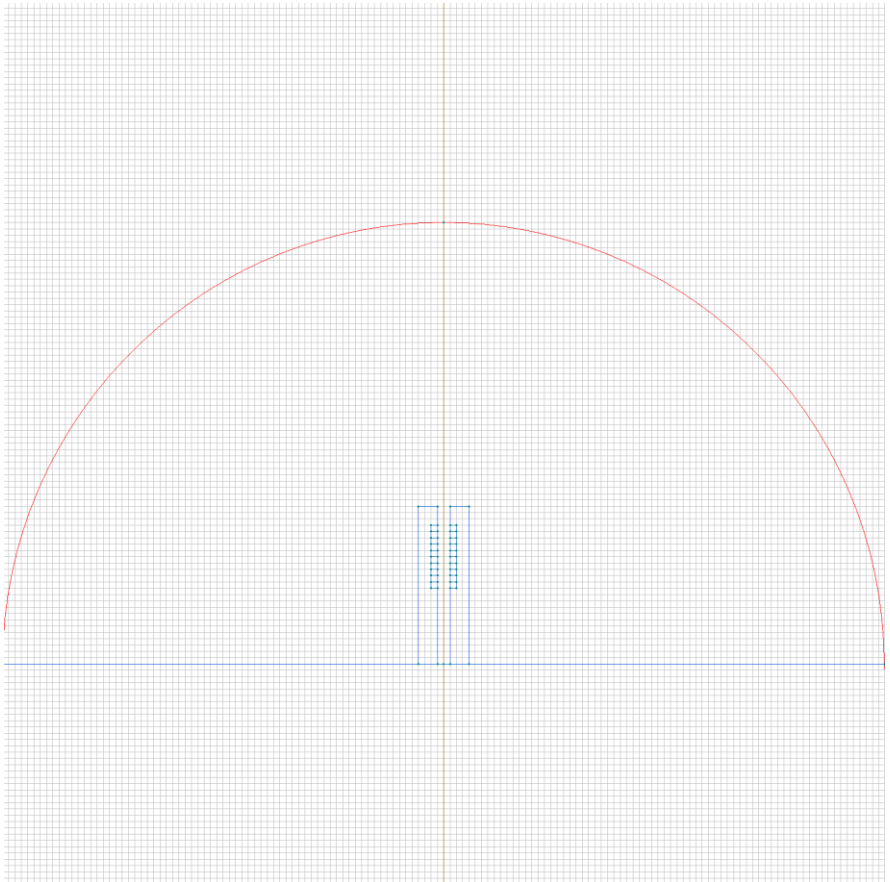
Conductor's connection: in parallel



Labelled objects: edge "Boundary"

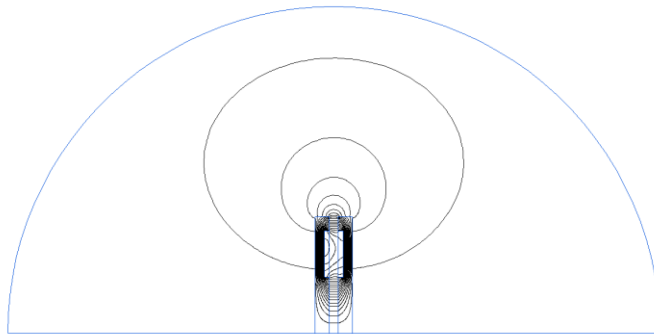
There are (2) objects with this label

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



# Results

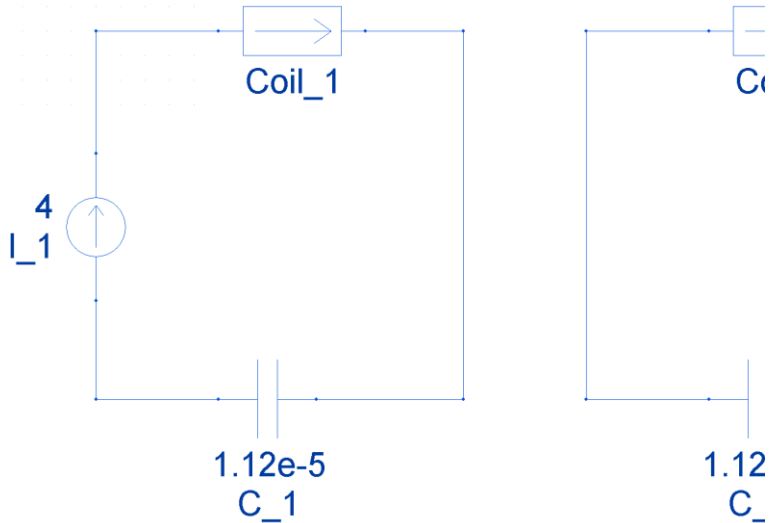
Field lines



# Results

## Electric circuit currents

Currents in the circuit elements are shown in the diagram below. The current in the source is 4 A. The current in the coil is 5.037 A. The current in the capacitor is 1.12e-5 A.



### Circuit elements:

Coil\_1. I=4 [A], phase=-0.000009874 [deg]

Coil\_2. I=5.037 [A], phase=-91.06 [deg]

I\_1. I=4 [A], phase=0 [deg]

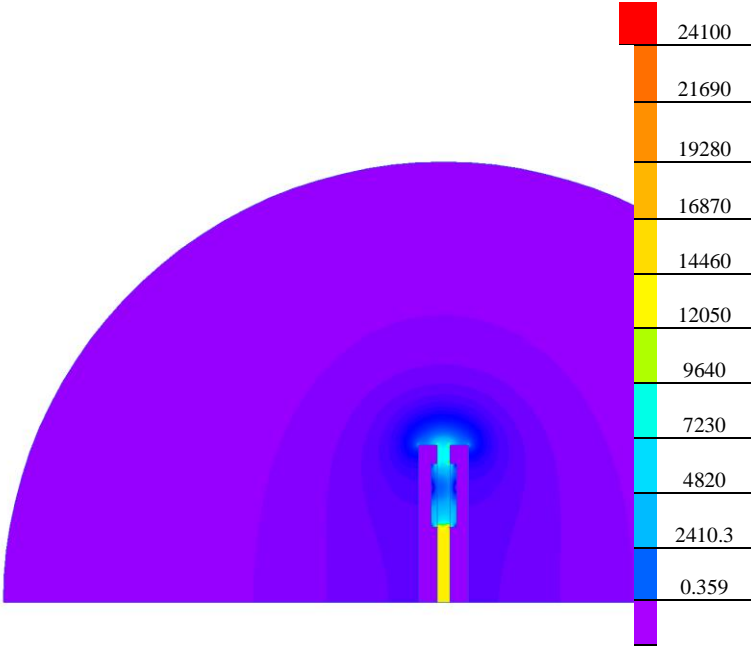
R\_load. I=5.037 [A], phase=-91.06 [deg]

C\_2. I=5.037 [A], phase=88.94 [deg]

C\_1. I=4 [A], phase=180 [deg]

# Results

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





# Nonlinear dependencies

No non-linear dependencies are used in this problem data