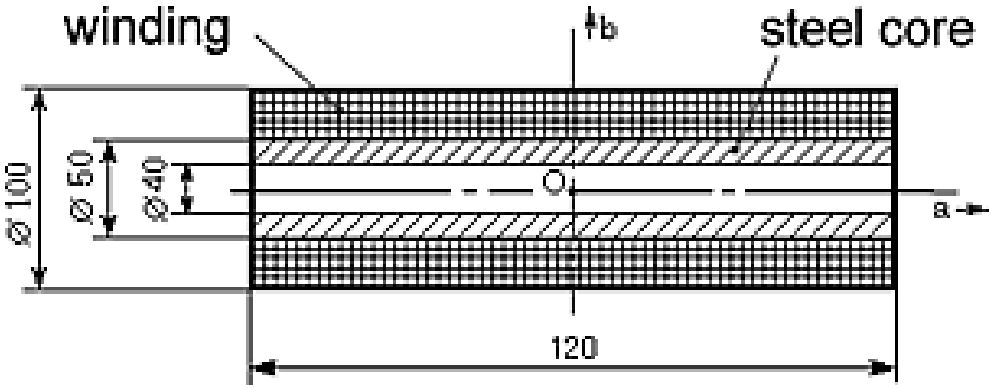
QuickField simulation report

Coil with ferromagnetic core

Determination of the electric current within the coil winding



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/hmagn4.htm

Problem info

Problem type: AC Magnetics , frequency: 50 Hz,
Geometry model class: Axisymmetric
Problem database file names:

- Problem: *hmagn4.pbm*
- Geometry: *Hmagn4.mod*
- Material Data: *Hmagn4.dhe*
- Material Data 2 (library): *none*
- Electric circuit: *hmagn4.qcr*

Results taken from other problems:

- *none*

Geometry model

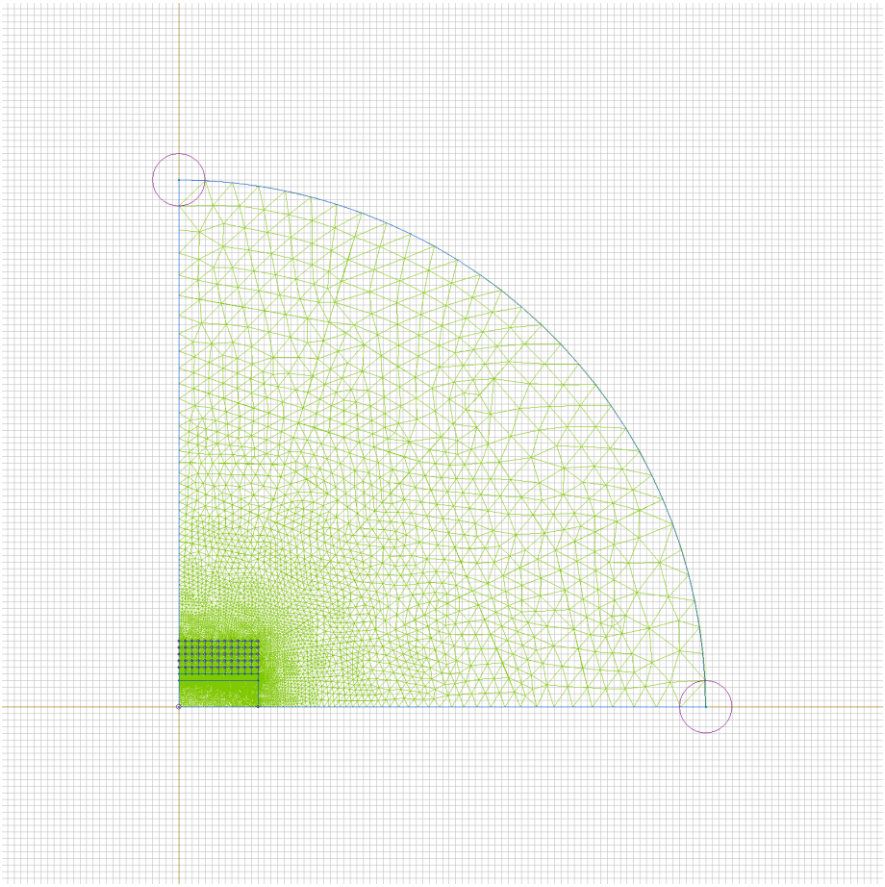


Table 1. Geometry model statistics

	With Label	Total
Blocks	3	63
Edges	3	146
Vertices	0	84

Number of nodes: 9156.

Electric circuit

Coupled electric circuit

Circuit elements:

Voltage source U=13.33 [V] 0 [deg]
QuickField block 'winding'
Resistor R1=0.05 [Ohm]
Capacitor C1=0.000005 [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)

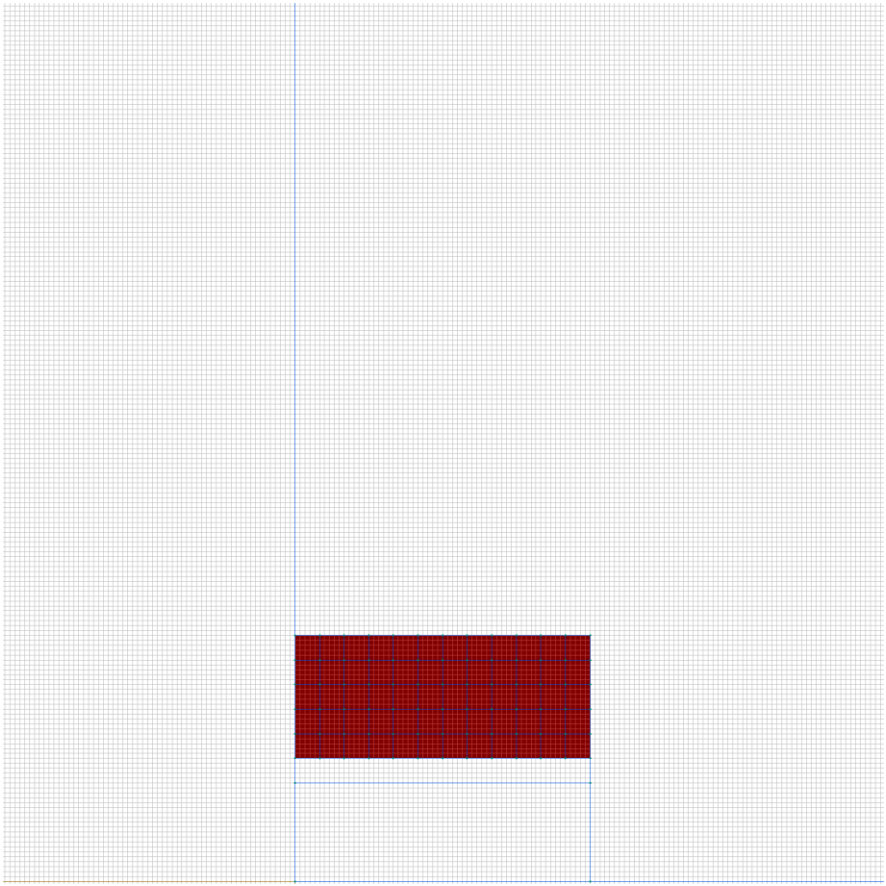
Blocks:	Edges:	Vertices:
• winding • air • steel core •	• symmetry • far away • axis of rotation •	

Detailed information about each label is listed below.

Labelled objects: block "winding"

There are (60) objects with this label

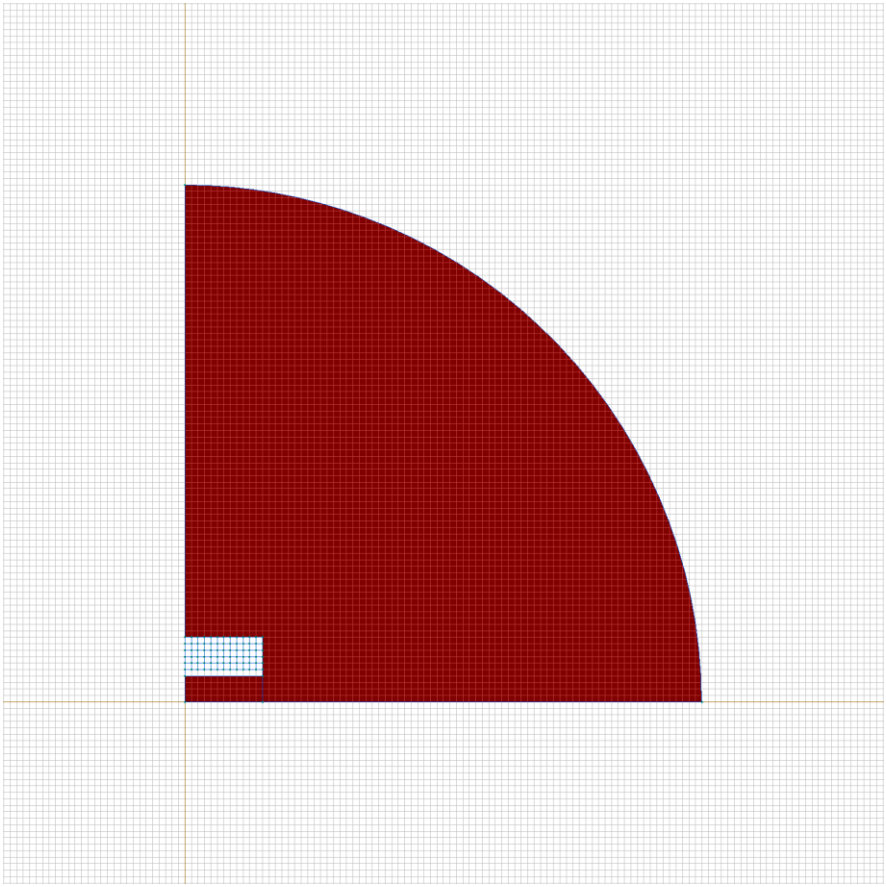
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=56000000 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in series



Labelled objects: block "air"

There are (2) objects with this label

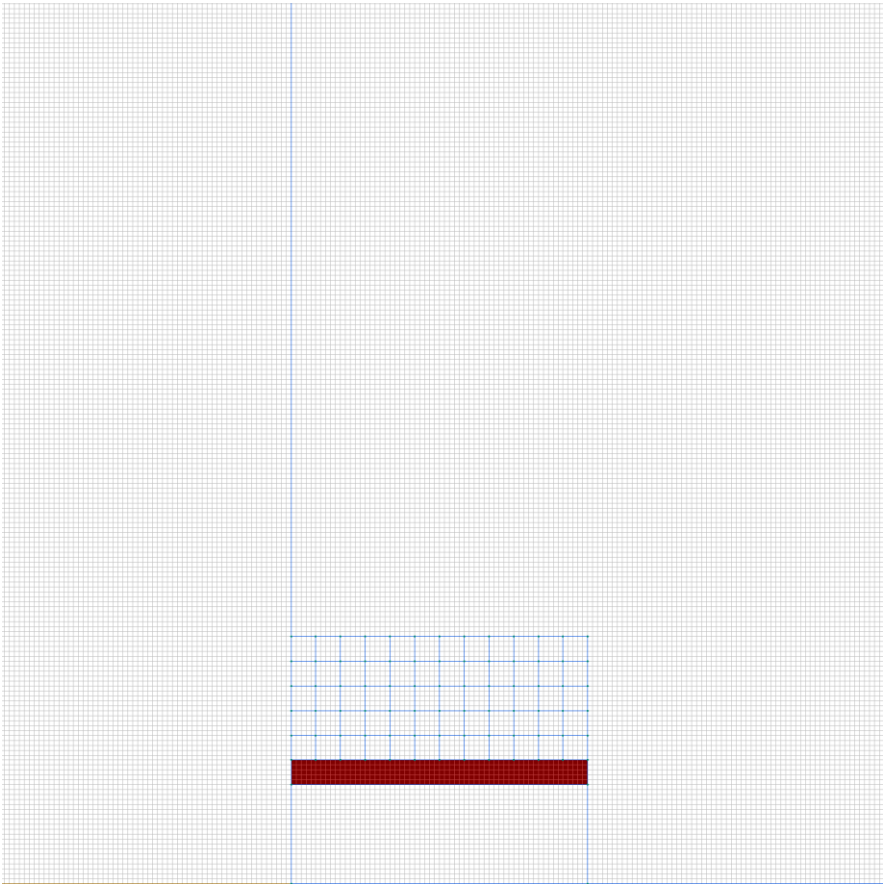
Relative magnetic permeability: mu_x=1, mu_y=1
Electric conductivity: sigma=0 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: block "steel core"

There are (1) objects with this label

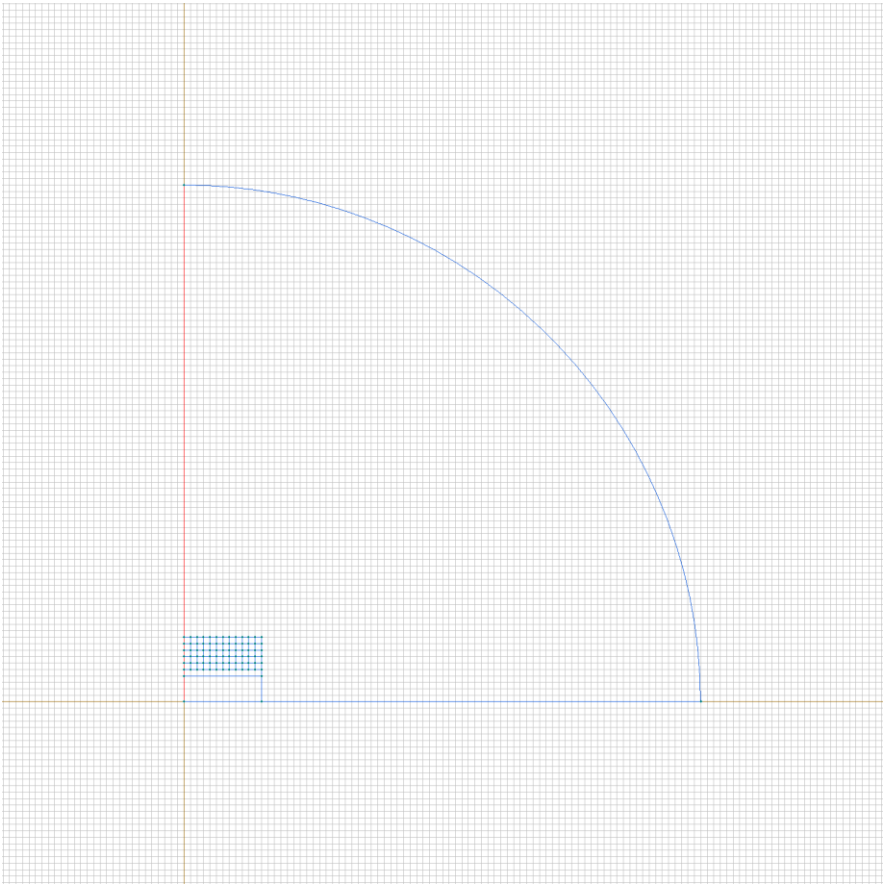
Relative magnetic permeability: mu=nonlinear (see Table 2 in the "Nonlinear dependencies" section)
Electric conductivity: sigma=0 [S/m]
Current density: j=0 [A/m2], phase 0 [deg]
Conductor's connection: in parallel



Labelled objects: edge "symmetry"

There are (8) objects with this label

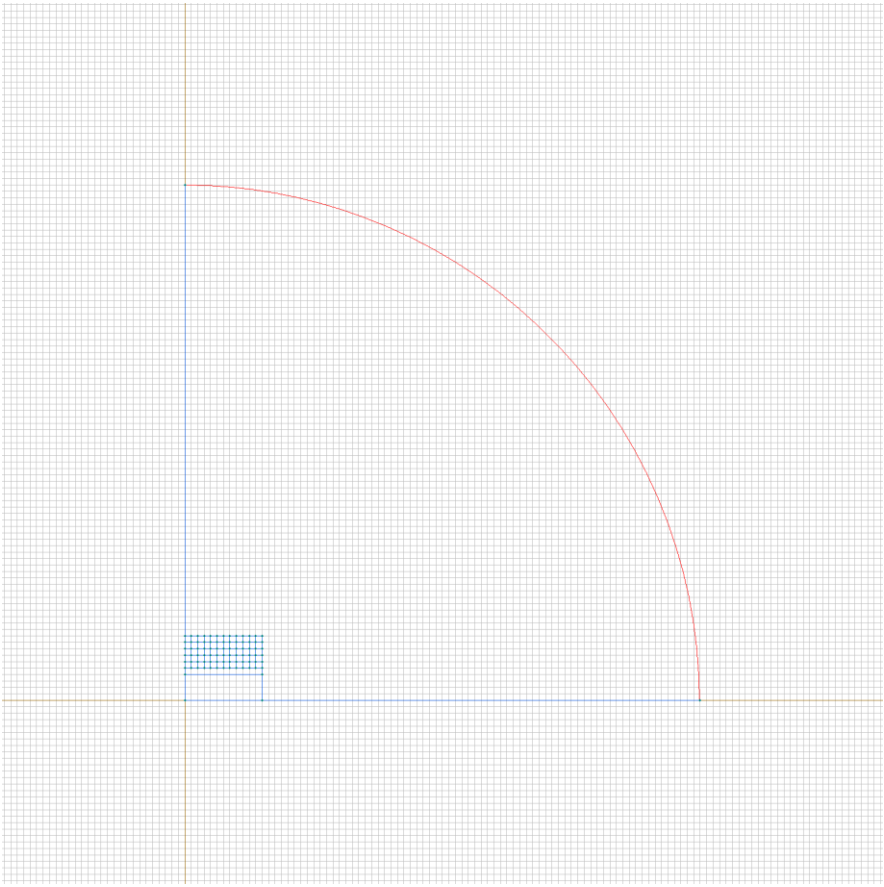
Tangential field: Ht=0 [A/m], phase 0 [deg]



Labelled objects: edge "far away"

There are (1) objects with this label

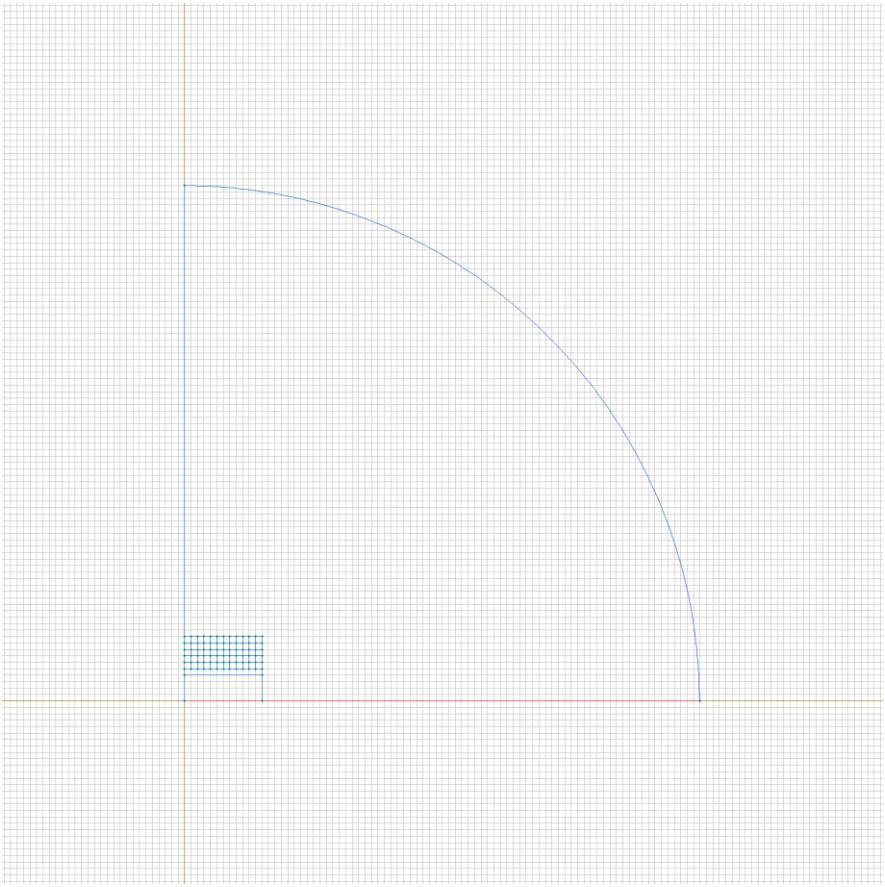
Magnetic potential: A=0 [Wb/m], phase 0 [deg]



Labelled objects: edge "axis of rotation"

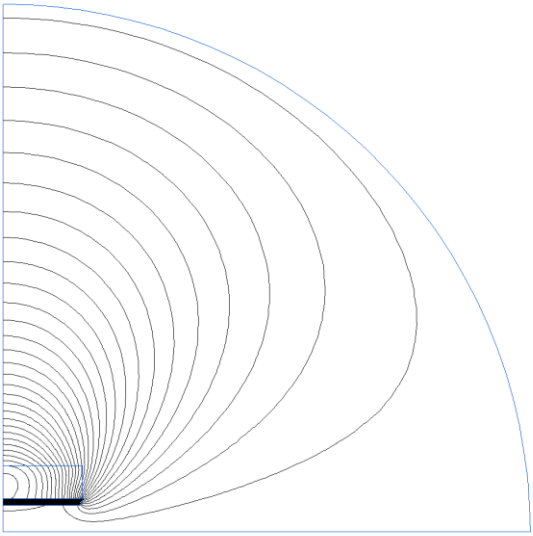
There are (2) objects with this label

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



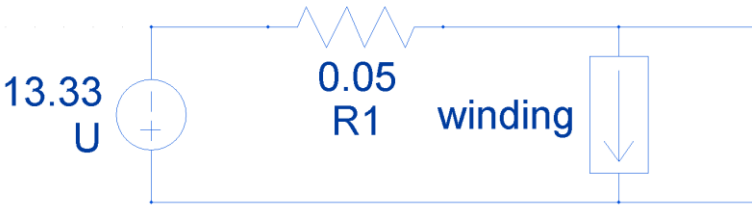
Results

Field lines



Results

Electric circuit currents



Circuit elements:

U. I=49.93 [A], phase=-76.41 [deg]

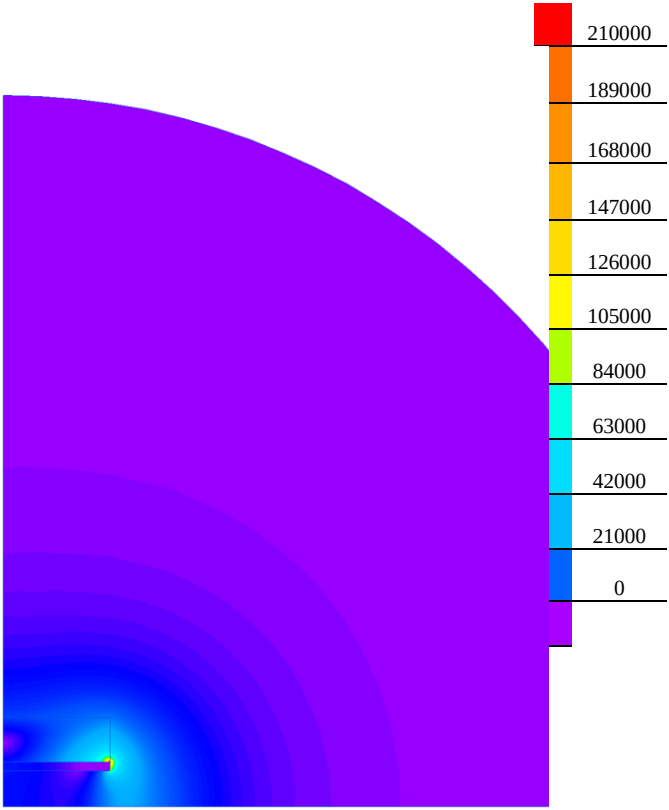
winding. I=49.95 [A], phase=103.59 [deg]

R1. I=49.93 [A], phase=103.59 [deg]

C1. I=0.020377 [A], phase=100.78 [deg]

Results

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



Nonlinear dependencies

Table 2. BH-curve

B [T]	H [A/m]
0	0
0.5	400
0.8	800
1	10000