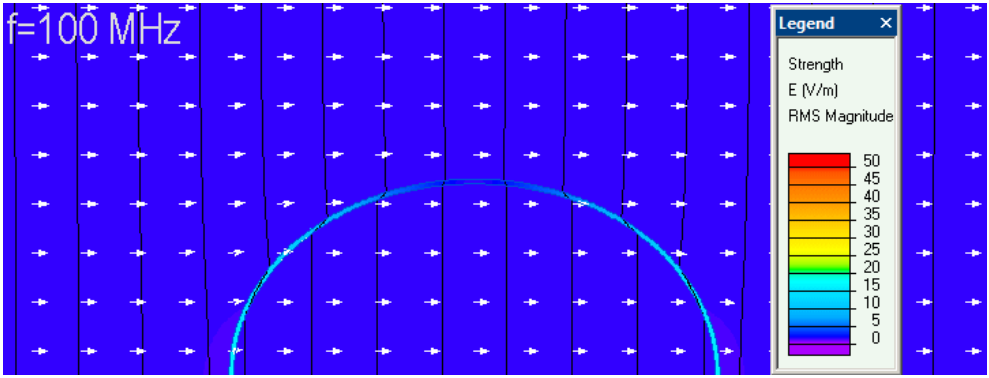
QuickField simulation report

Biological cell in the external AC electric field

Alternating electric field penetration inside the biological cell at different frequencies.



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/bio_cell_in_external_electric_field.h

Problem info

Problem type: AC Conduction , frequency: 100000000 Hz,
Geometry model class: Axisymmetric
Problem database file names:

- Problem: *bio_cell_ext_field.pbm*
- Geometry: *Bio_cell_model.mod*
- Material Data: *Bio_cell_data.dec*
- Material Data 2 (library): *none*
- Electric circuit: *none*

Results taken from other problems:

- *none*

Geometry model

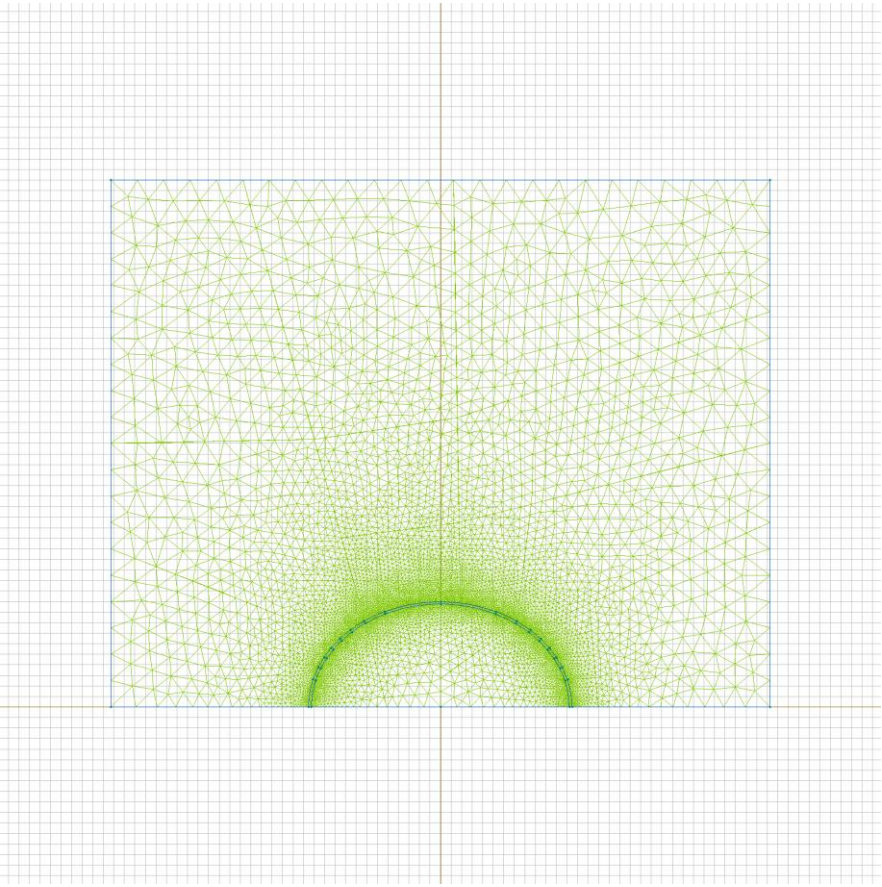


Table 1. Geometry model statistics

	With Label	Total
Blocks	3	3
Edges	3	45
Vertices	0	43

Number of nodes: 7687.

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)

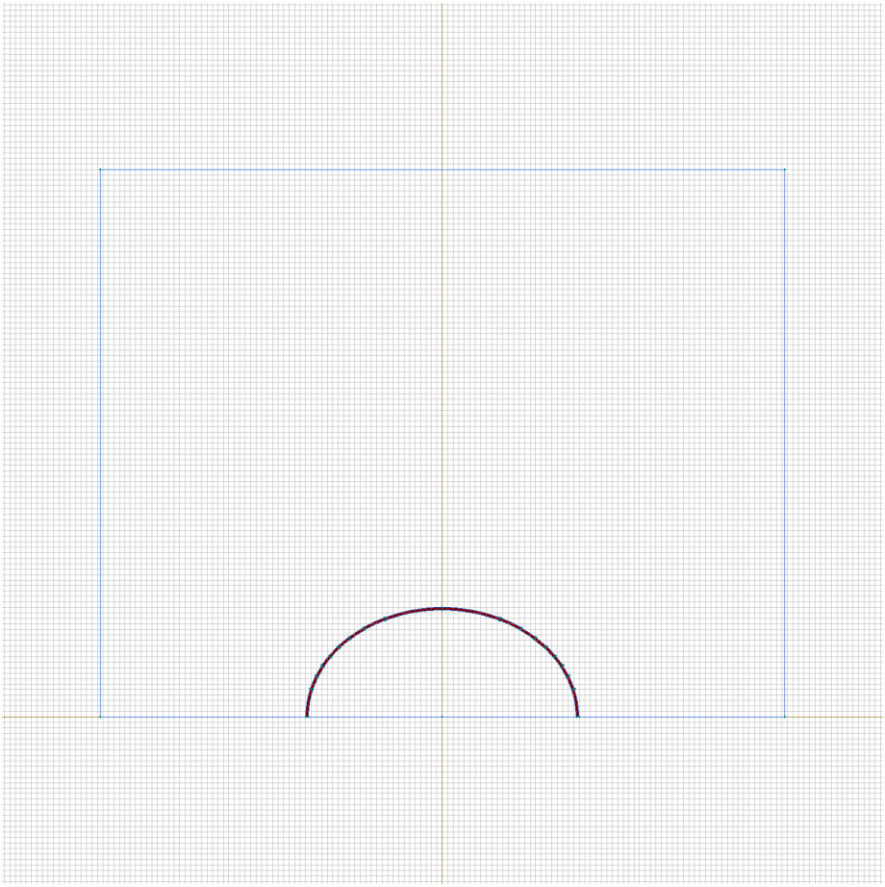
Blocks:	Edges:	Vertices:
• membrane • extracell medium • cytoplasm •	• V_plus • side • V_minus •	

Detailed information about each label is listed below.

Labelled objects: block "membrane"

There are (1) objects with this label

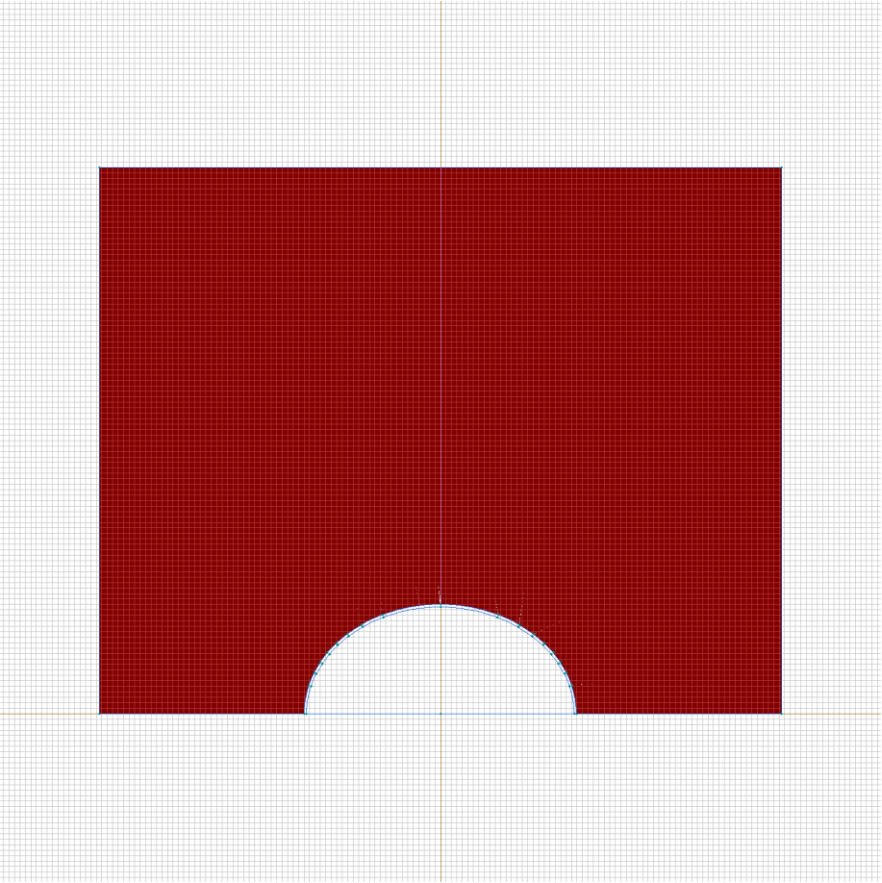
Relative electric permittivity eps_x=12.1, eps_y=12.1
Electrical conductivity sigma_x=0.000001 [S/m], sigma_y=0.000001 [S/m]



Labelled objects: block "extracell medium"

There are (1) objects with this label

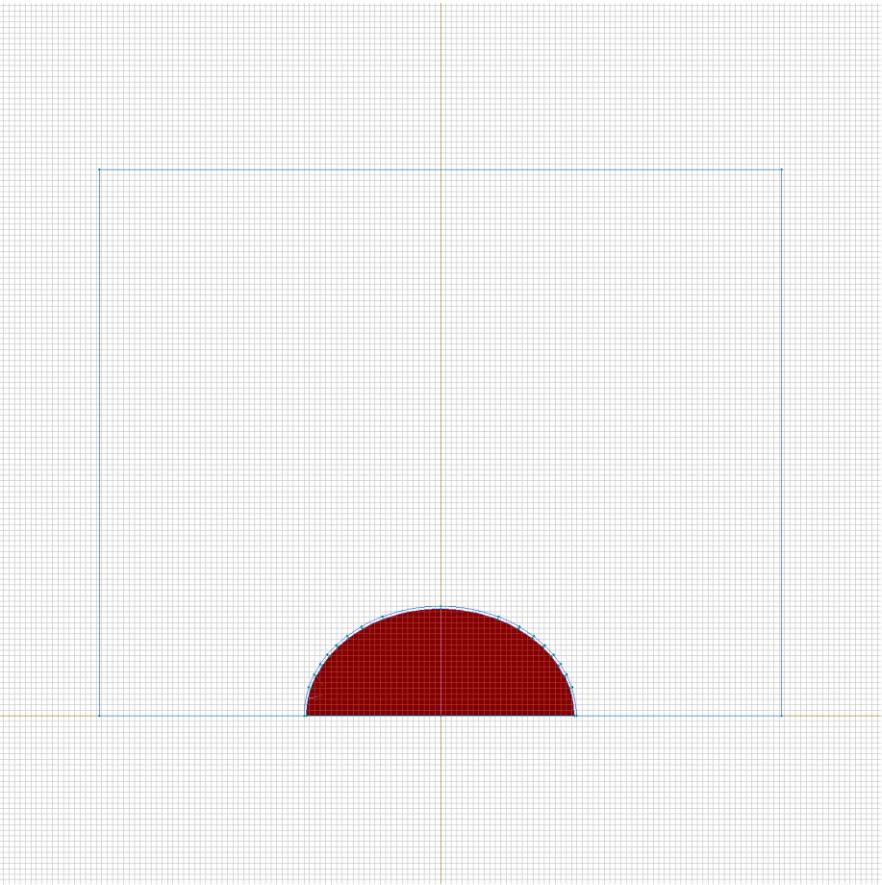
Relative electric permittivity eps_x=80, eps_y=80
Electrical conductivity sigma_x=1 [S/m], sigma_y=1 [S/m]



Labelled objects: block "cytoplasm"

There are (1) objects with this label

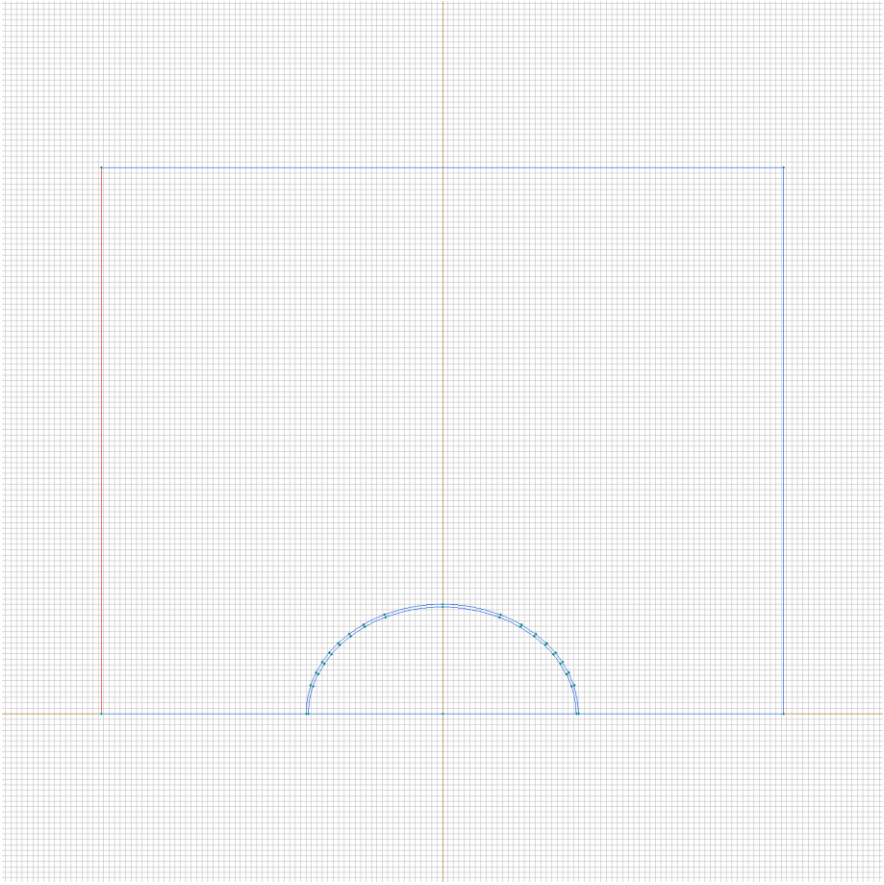
Relative electric permittivity eps_x=50, eps_y=50
Electrical conductivity sigma_x=1 [S/m], sigma_y=1 [S/m]



Labelled objects: edge "V_plus"

There are (1) objects with this label

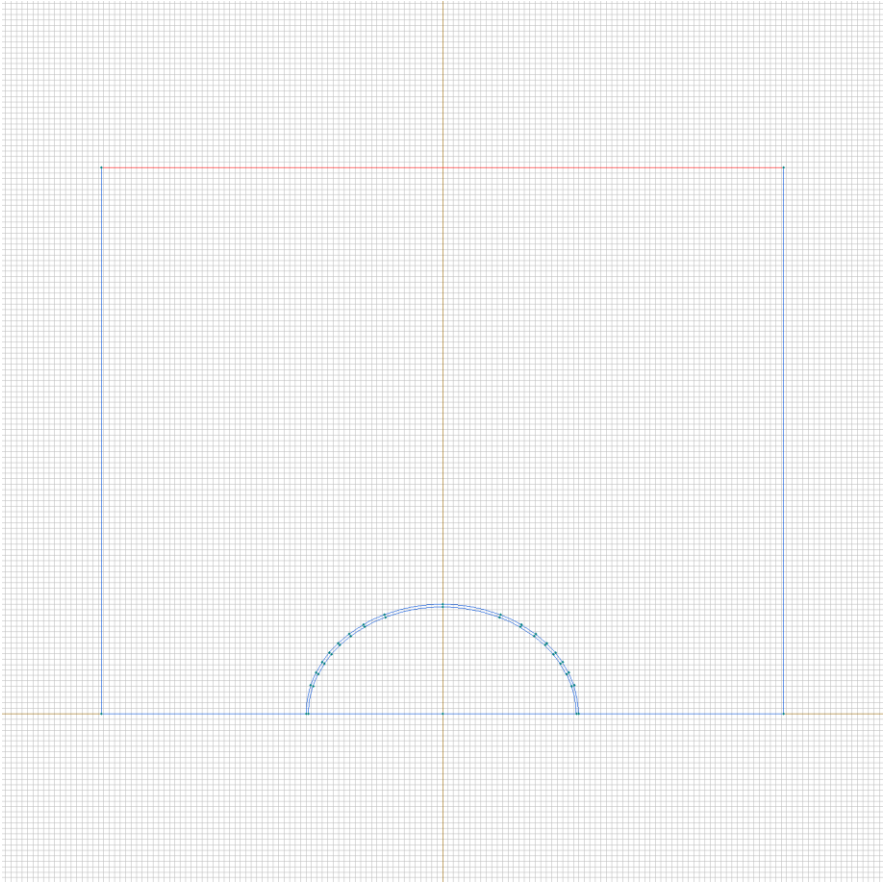
Voltage: U=0.0001 [V], phase 0 [deg]



Labelled objects: edge "side"

There are (1) objects with this label

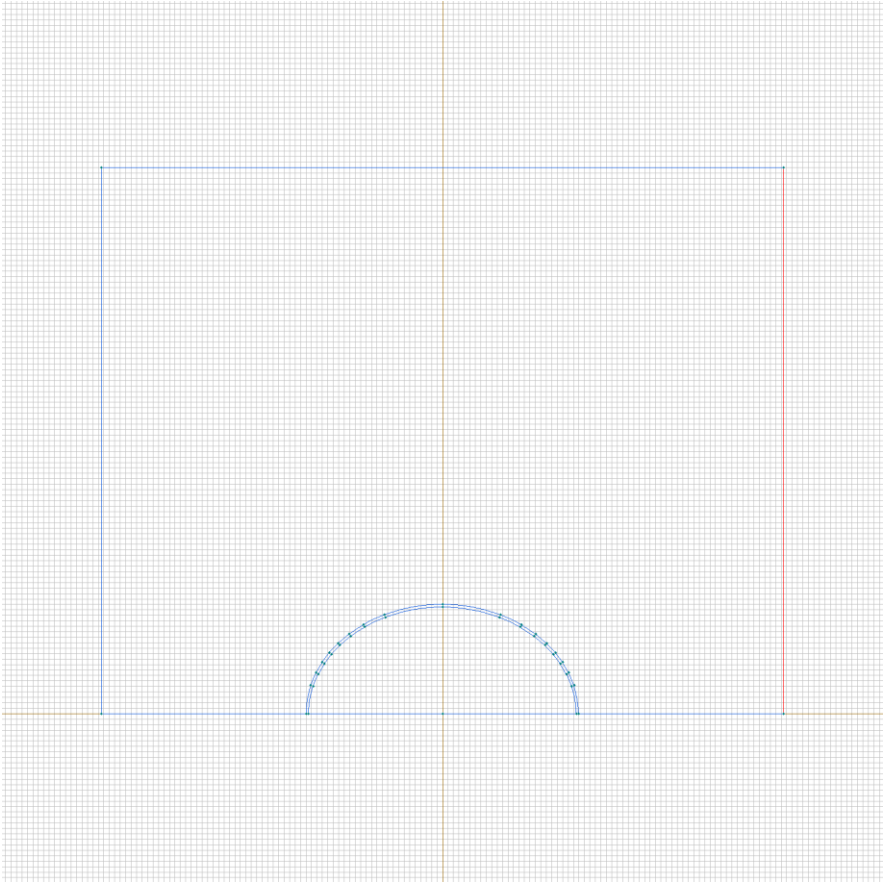
Normal current density: jn=0 [A/m2], phase 0 [deg]



Labelled objects: edge "V_minus"

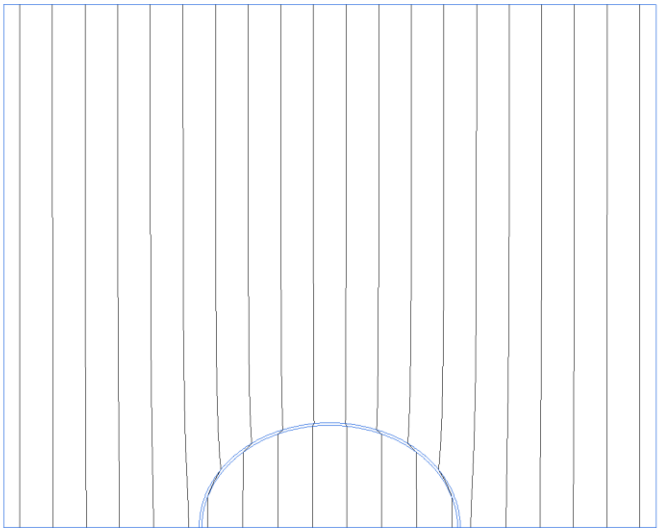
There are (1) objects with this label

Voltage: U=-0.0001 [V], phase 0 [deg]



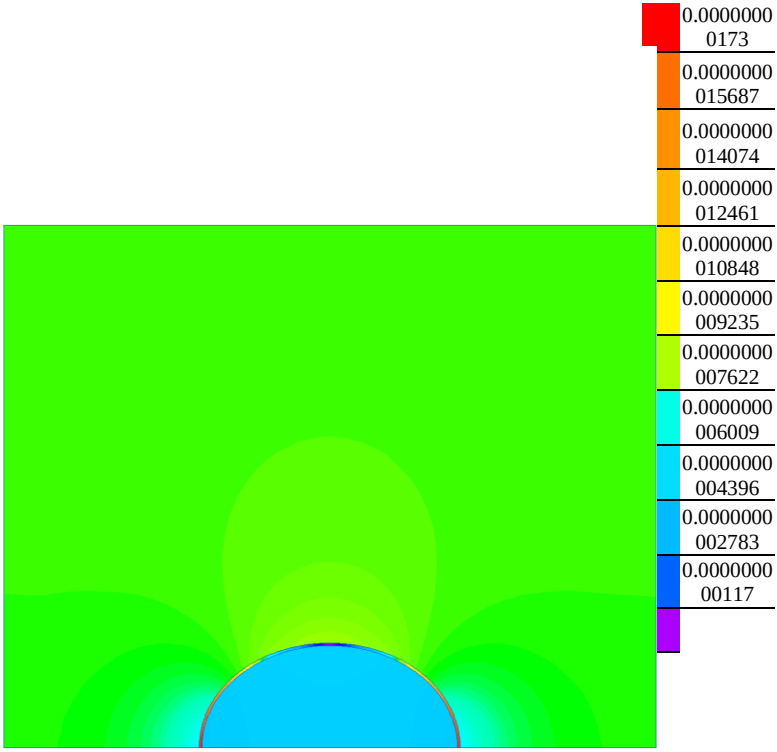
Results

Field lines



Results

Color map of Electric induction |D| [C/m2]



Nonlinear dependencies

No non-linear dependencies are used in this problem data