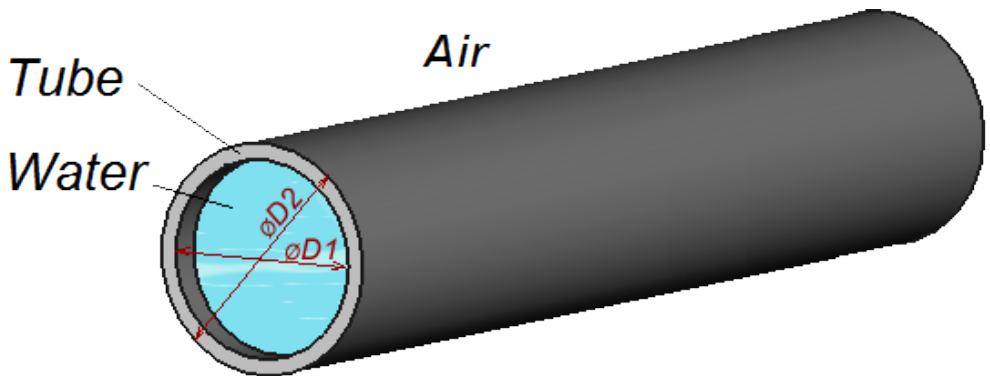


# QuickField simulation report

## Natural convection from the horizontal tube surface

Calculation of the temperature of the tube outer surface  
and the heat flux per meter of the tube length



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/tube\\_convection.htm](https://quickfield.com/advanced/tube_convection.htm)

# Problem info

Problem type: Steady-State Heat Transfer

Geometry model class: Plane-Parallel

Problem database file names:

- Problem: *tube\_convection.pbm*
- Geometry: *Tube\_convection.mod*
- Material Data: *Tube\_convection.dht*
- Material Data 2 (library): *none*
- Electric circuit: *none*

Results taken from other problems:

- *none*

# Geometry model

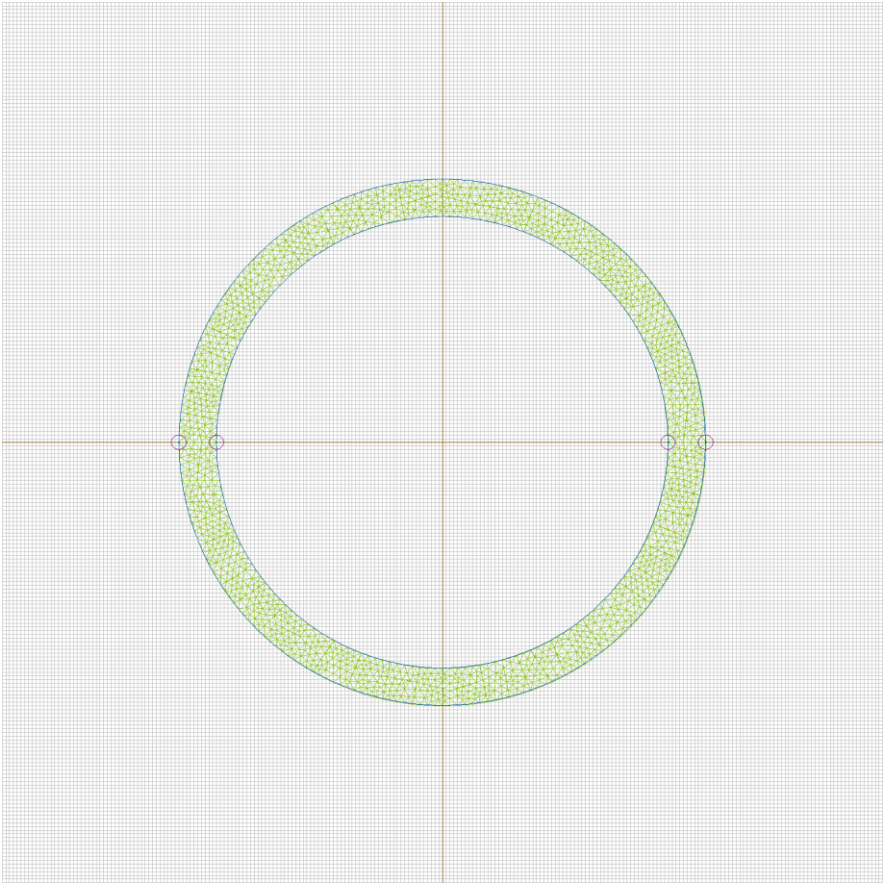


Table 1. Geometry model statistics

	With Label	Total
Blocks	1	2
Edges	2	4
Vertices	0	4

Number of nodes: 1580.

# 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:

- [tube](#)
- 

Edges:

- [T internal](#)
- [convection](#)
- 

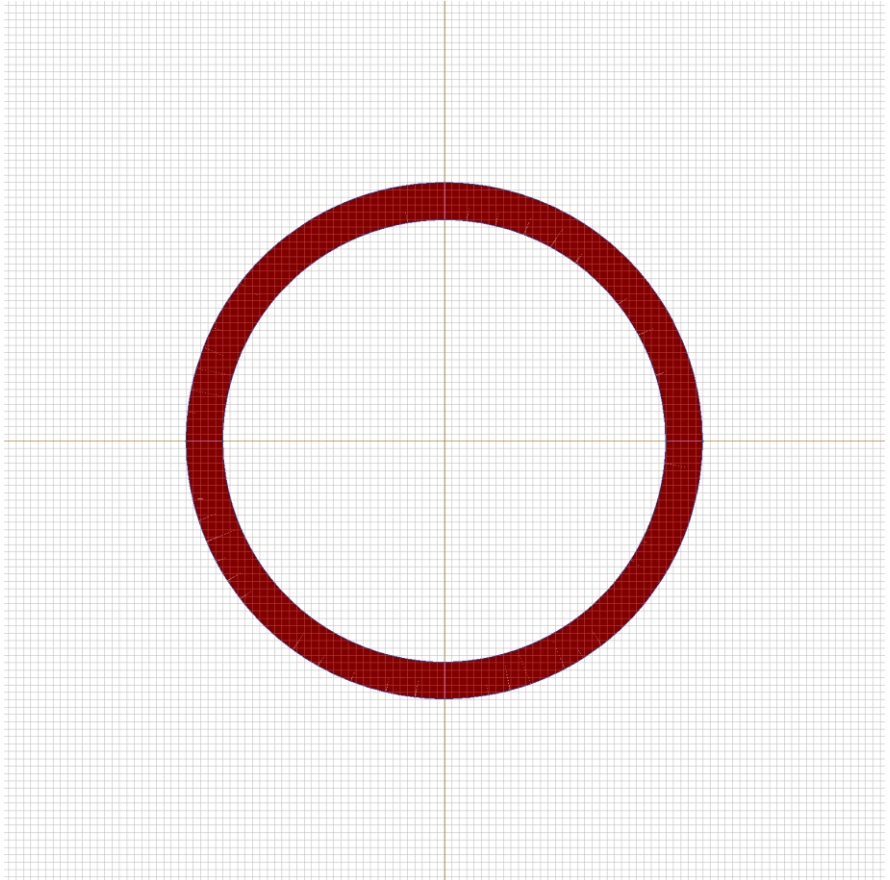
Vertices:

Detailed information about each label is listed below.

Labelled objects: block "tube"

There are (1) objects with this label

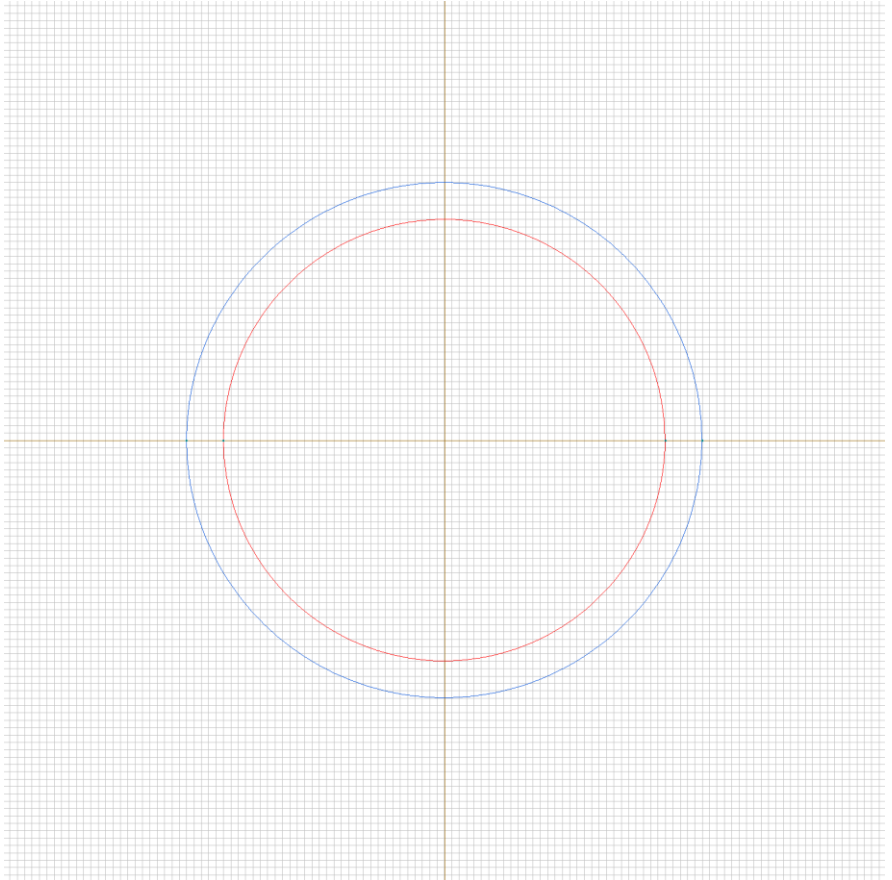
Thermal conductivity:  $\lambda_x=42$  [W/(K\*m)],  
 $\lambda_y=42$  [W/(K\*m)]



Labelled objects: edge "T internal"

There are (2) objects with this label

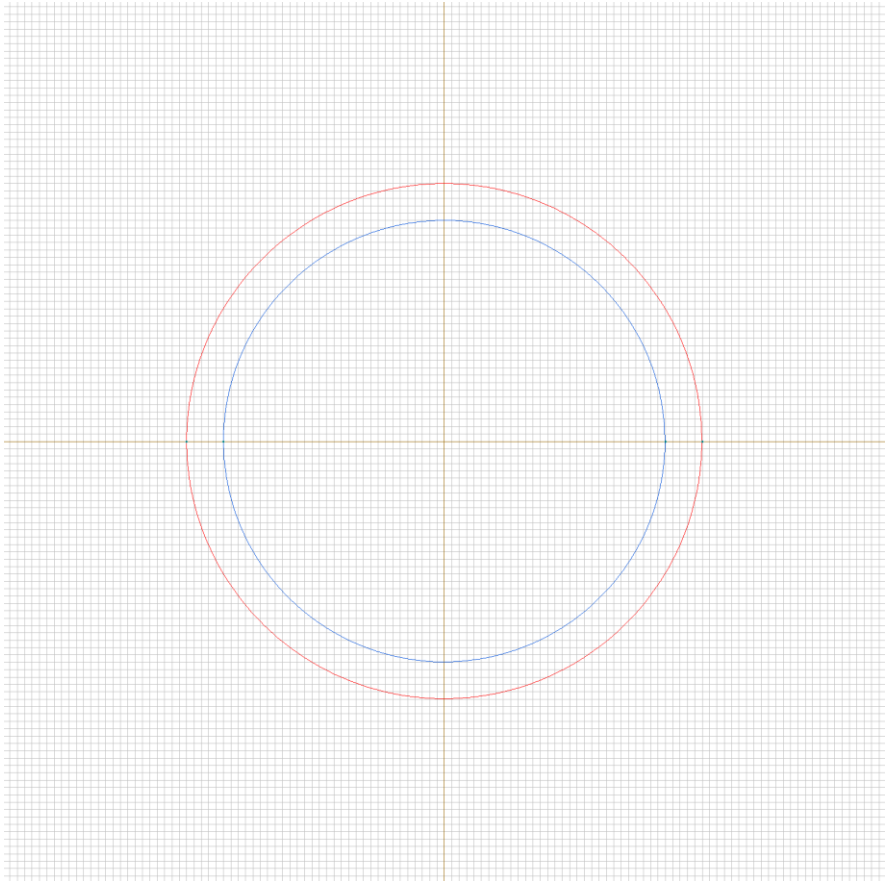
Temperature:  $T=273.15+90, K$  [K]



## Labelled objects: edge "convection"

There are (2) objects with this label

Convection:  $\alpha=5.97$  [W/(K\*m<sup>2</sup>)], temperature  
 $T_0=273.15+20$ ,K [K]

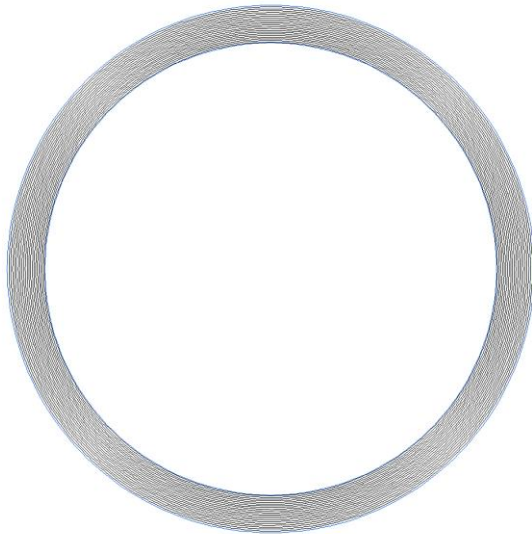






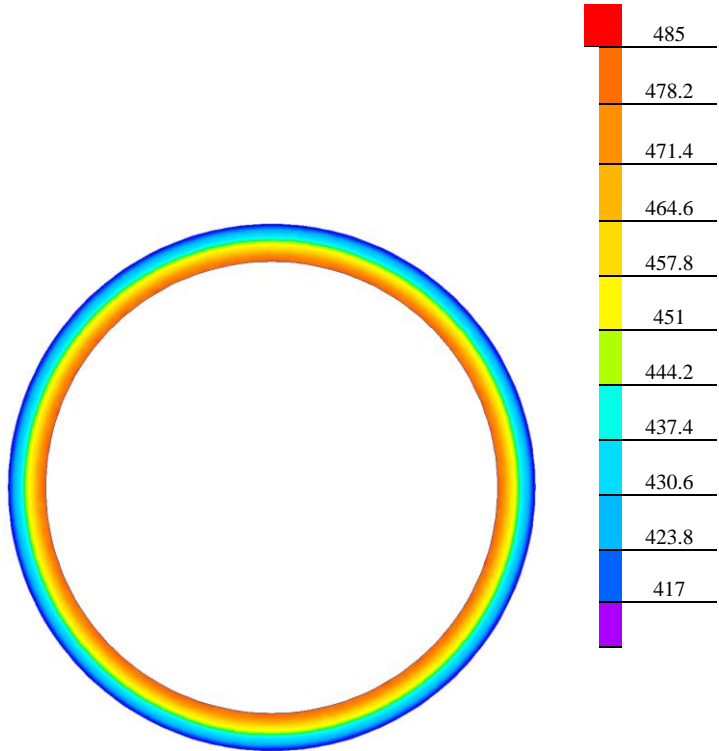
# Results

Field lines



# Results

Color map of Heat flux  $|F|$  [W/m<sup>2</sup>]



# Nonlinear dependencies

No non-linear dependencies are used in this problem data